SOIL SURVEY OF

Clayton, Fayette, and Henry Counties, Georgia

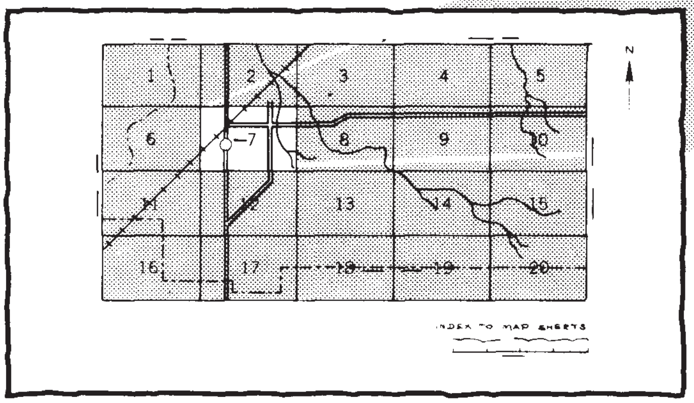
United States Department of Agriculture
Soil Conservation Service

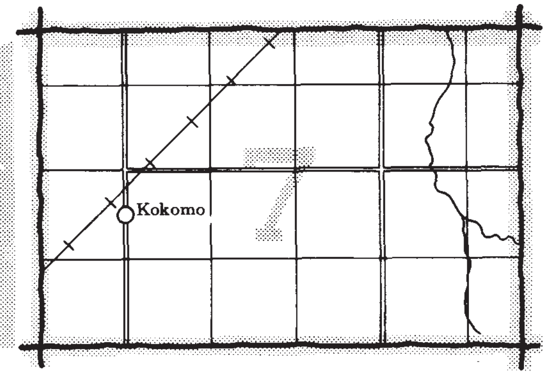
in cooperation with

University of Georgia, College of Agriculture
Agricultural Experiment Stations

HOW TO USE

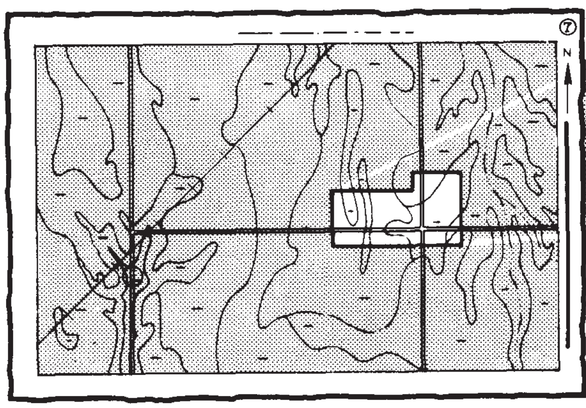
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

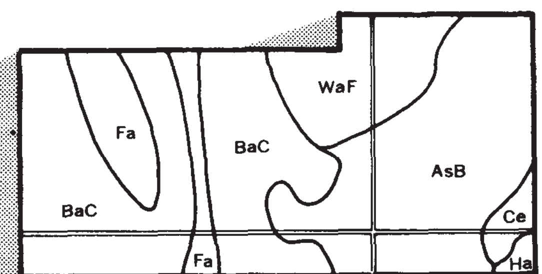




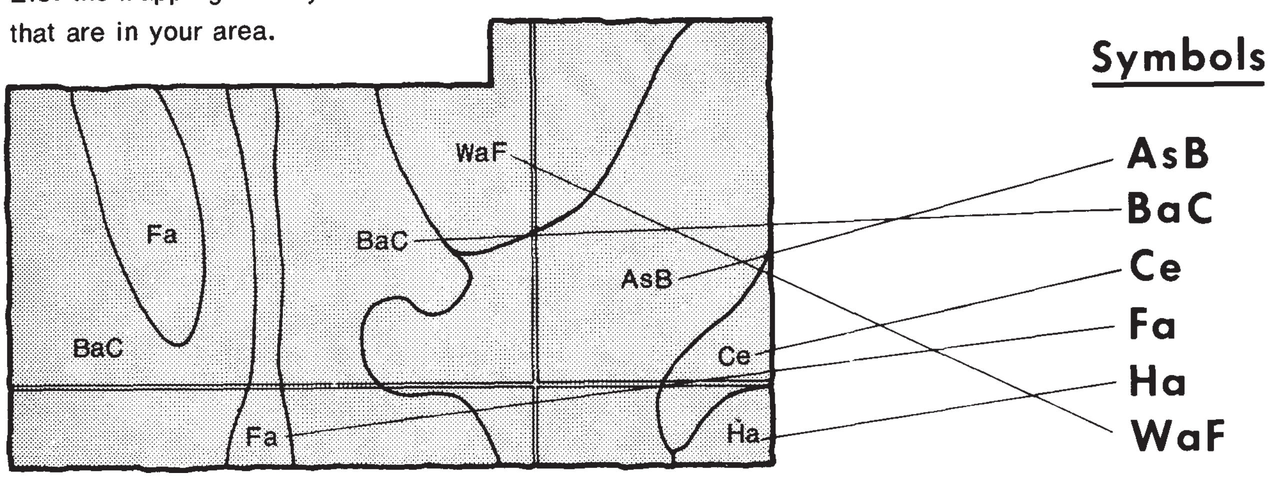
2. Note the number of the map sheet and turn to that sheet.

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



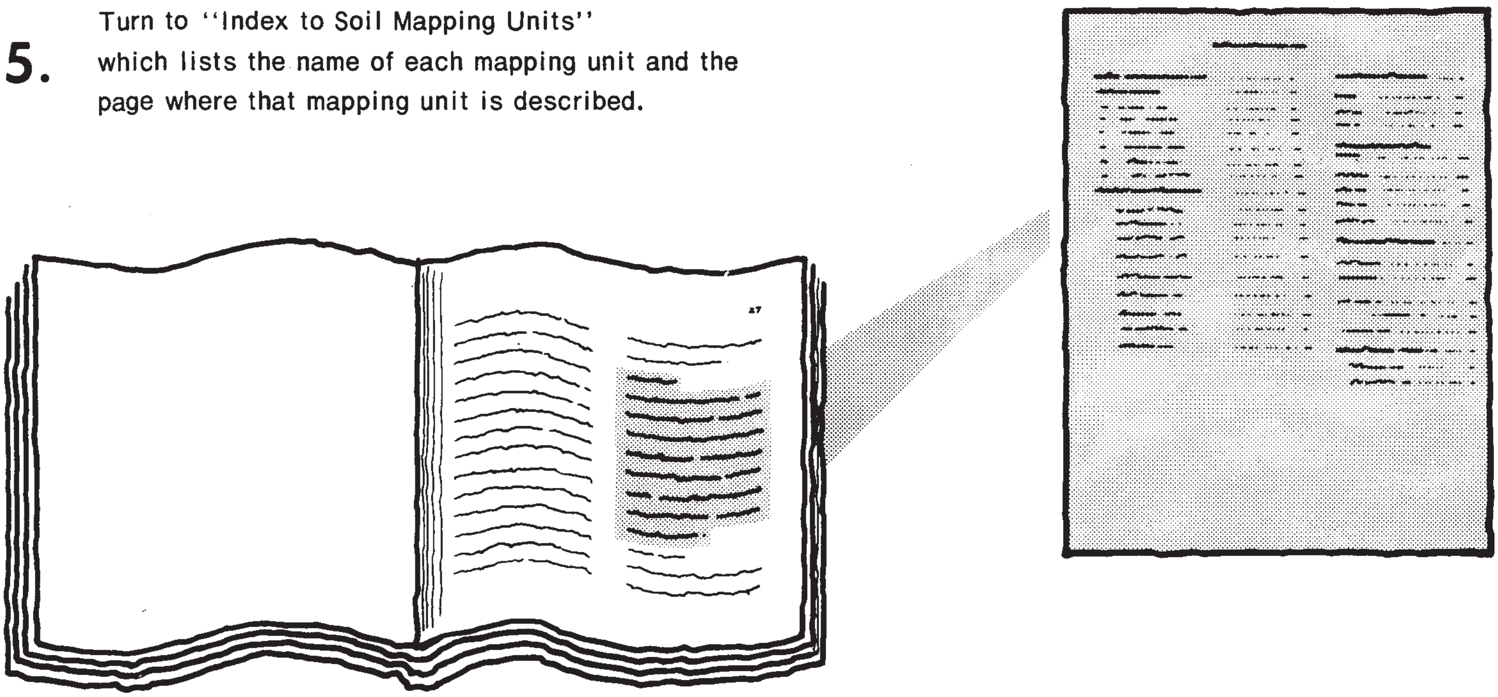


4. List the mapping unit symbols that are in your area.

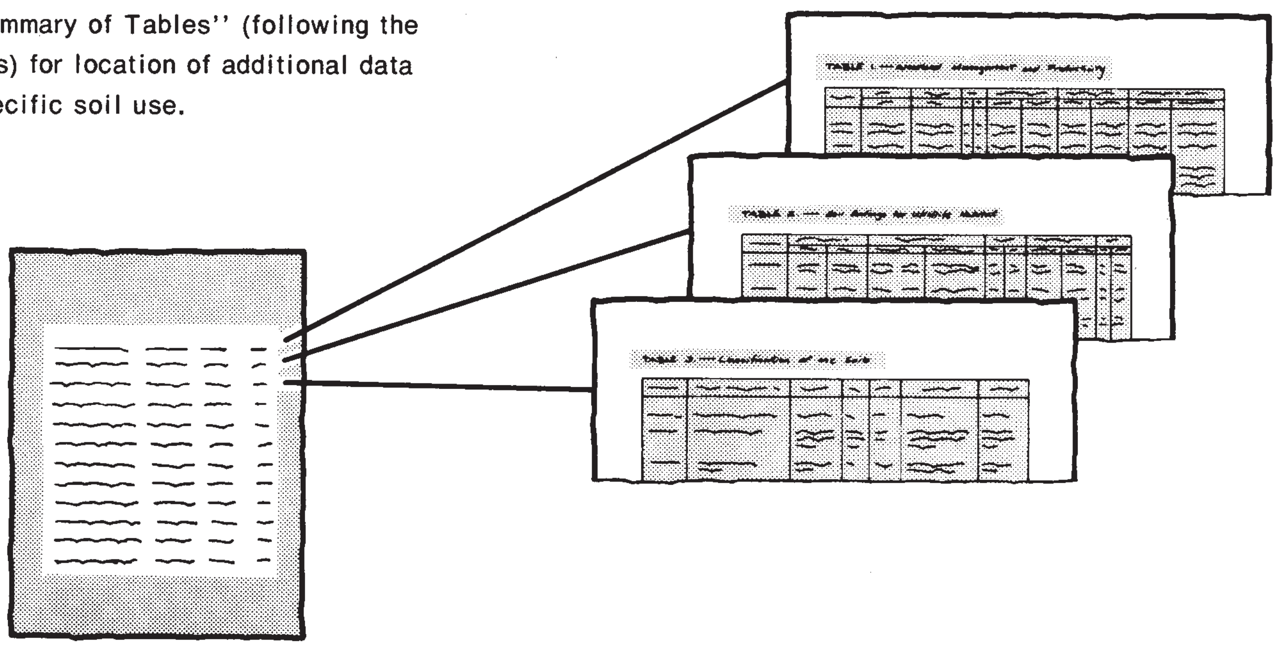


THIS SOIL SURVEY

5. Turn to ''Index to Soil Mapping Units'' which lists the name of each mapping unit and the page where that mapping unit is described.



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



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

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

Major fieldwork for this soil survey was completed in the period 1972-75. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service and the University of Georgia, College of Agriculture, Agricultural Experiment Stations. It is part of the technical assistance furnished to the Upper Ocmulgee River Soil and Water Conservation District.

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

Cover: Livestock pond on Gwinnett sandy clay loam, 6 to 10 percent slopes, eroded. A properly constructed pond is an effective means of controlling erosion and beautifying the landscape.

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Issued September 1979

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Foreword

The Soil Survey of Clayton, Fayette, and Henry Counties, Georgia, contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

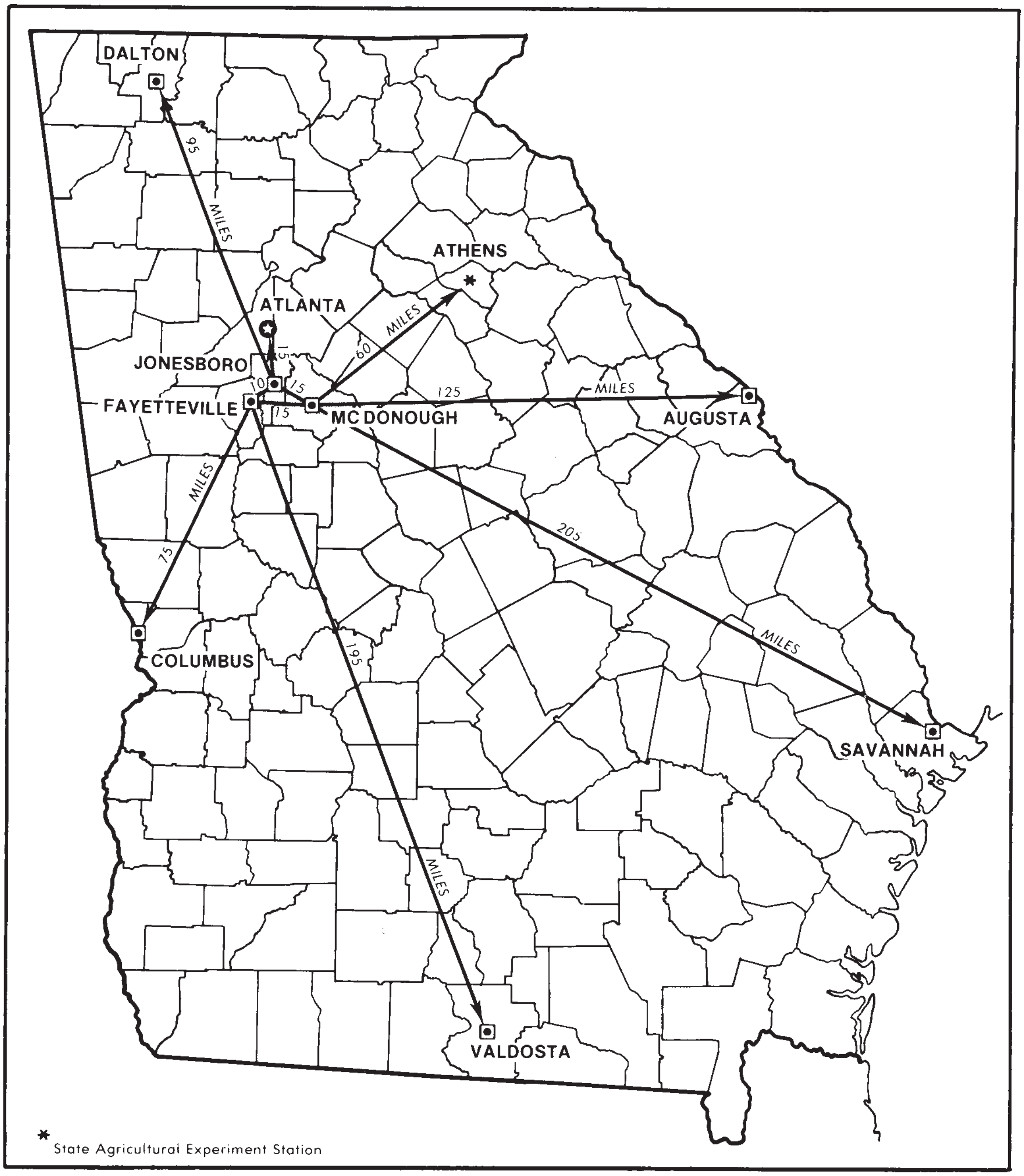
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers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

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

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

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

Dwight M. Treadway
State Conservationist
Soil Conservation Service



Location of Clayton, Fayette, and Henry Counties in Georgia.

SOIL SURVEY OF CLAYTON, FAYETTE, AND HENRY COUNTIES, GEORGIA

By James O. Murphy, Soil Conservation Service

Soils surveyed by Hugh T. Davis, Sidney M. Jones, James O. Murphy, and Grover J. Thomas, Soil Conservation Service

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

CLAYTON, FAYETTE, AND HENRY COUNTIES, in the western north central part of Georgia, have a land area of 434,176 acres or 678.4 square miles. Clayton County has 95,360 acres or 149 square miles and a population of 98,043. Fayette County has 127,040 acres or 198.5 square miles and a population of 11,364. Henry County has 211,776 acres or 330.9 square miles and a population of 23,724.

Clayton, Fayette, and Henry Counties are in the Southern Piedmont Land Resource Area. Drainage for the survey area is provided principally by the Flint River, the South River, and tributaries of these rivers. The Flint River is the boundary separating Clayton and Fayette Counties; the South River is the eastern boundary of Henry County.

The landscape consists of ridgetops and hillsides that are dissected by numerous drainageways. The survey area is generally characterized by broad gently sloping and strongly sloping ridgetops in the western part and by steep hillsides below narrow ridgetops in the eastern part. Narrow to wide, nearly level flood plains are throughout the survey area but are commonly adjacent to steep hillsides. Elevation of the land ranges from 740 feet near the Flint River in the southeastern tip of Fayette County to 1,000 feet in the northeastern part of Henry County.

General nature of the counties

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

Climate

This section was prepared by the National Climatic Center, Asheville, North Carolina.

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

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Atlanta, Georgia, for the period 1951 to 1974. 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 44 degrees F, and the average daily minimum is 35 degrees. The lowest temperature on record, -3 degrees, occurred at Atlanta on January 24, 1963. In summer the average temperature is 77 degrees, and the average daily maximum is 87 degrees. The highest temperature, 102 degrees, was recorded on August 16, 1954.

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

Of the total annual precipitation, 23 inches, or 48 percent, usually falls during the period April through September, which includes the growing season for most crops. Two years in ten, the April-September rainfall is less than 20 inches. The heaviest 1-day rainfall during the period of record was 5.30 inches at Atlanta on September 25, 1956. Thunderstorms number about 50 each year, 28 of which occur in summer.

Average seasonal snowfall is 2 inches. The greatest snow depth at any one time during the period of record was 3 inches. On the average, 1 day has at least 1 inch of snow on the ground, but the number of days varies greatly from year to year.

The average relative humidity in midafternoon in spring is less than 55 percent; during the rest of the year it is about 60 percent. Humidity is higher at night in all seasons, and the average at dawn is about 85 percent. The percentage of possible sunshine is 65 percent in summer and 50 percent in winter. The prevailing direction of the wind is from the northwest. Average windspeed is highest, 11 miles per hour, in February.

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

Physiography, relief, and drainage

Clayton, Fayette, and Henry Counties are in the Southern Piedmont Land Resource Area of Georgia. The survey area consists mostly of broad to narrow, gently sloping or strongly sloping ridgetops and long to short, strongly sloping or steep hillsides adjacent to numerous small drainageways that dissect the area. The ridgetops are commonly smooth and convex, and the hillsides are commonly irregular and convex. Nearly level flood plains are along the Flint River, the South River, and their tributaries. In most places the flood plains are narrow, and during winter and early spring they are frequently flooded.

The elevation on South River is 740 feet above sea level. The highest elevation in the survey area is 1,000 feet above sea level near the Atlanta Airport.

The drainage system for the three counties includes the Flint River, the South River, Line Creek, and their associated tributaries.

The beginning of the Flint River is about 3 miles south of the Atlanta Airport. This river and its tributaries drain the western part of Clayton County and the eastern part of Fayette County. Important tributaries of the Flint River are Jester Creek in Clayton County and Houston, Morning, and Nash Creeks in Fayette County.

The South River and its tributaries drain most of Henry County and the eastern part of Clayton County. Important tributaries of the South River are Big Cotton-Indian, Little Cotton-Indian, Pate, and Rum Creeks. Most of these creeks begin in Clayton County and flow in a southeasterly direction into South River; this river forms most of the eastern boundary of Henry County.

Line Creek drains the western part of Fayette County. Important tributaries of Line Creek are Flat and Whitewater Creeks.

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

The upland soils are well drained. The bottomlands along the major streams and their tributaries are subject to frequent overflow during winter and early spring. They drain off slowly and remain wet for long periods.

History and development

The survey area lies within the territory acquired by treaty from the Creek (Muscogee) Indians, at Indian Springs, Georgia, in 1821. This treaty included land from the Ocmulgee River on the east to the Flint River on the west, south to what is now the City of Albany, and north to the Chattahoochee River south of Marietta. The land was distributed by lottery to the new settlers.

Clayton County was formed in 1859 from parts of Fayette and Henry Counties. It was named in honor of Augustin Smith Clayton, a judge and member of the United States House of Representatives. Clayton County was the site of heavy fighting during the Civil War.

Fayette County was formed in 1821. Fayette County and the county seat of Fayetteville were named for the Marquis de Lafayette. The Fayette County courthouse was built in 1825. It is the oldest courthouse still in use in Georgia.

Henry County was formed from land acquired by treaty with the Creek Indians on January 8, 1821. The county was named for Patrick Henry. Three other counties were formed from parts of this county. McDonough, the county seat, was established in 1823.

Most of the early settlers in the survey area came from the northeastern states. Cotton was the chief crop until the boll weevil infestation in 1920. From that time, the survey area has undergone several changes in land use, including pastureland, woodland, and some land in row crops. The three counties are rapidly becoming urbanized. In 1970 the population of Clayton County was 98,126. It had increased to 127,900 by 1974. During this period, the population in Fayette County increased from 16,928 to 21,300. In Henry County it advanced from 23,404 to 38,000.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

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

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

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

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

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

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

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

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

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

Each map unit is rated for cultivated farm crops, pasture, woodland, urban uses, and recreation areas. Cultivated farm crops and pasture are those grown extensively by farmers in the survey area. Woodland refers to land that is producing either trees native to the area or introduced species. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas include campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic.

Clayton County

1. Cartecay-Wehadkee

Nearly level, poorly drained and somewhat poorly drained soils that are predominantly loamy throughout; formed in alluvial sediment

This unit consists of soils on narrow to wide flood plains. The landscape is nearly level. The low relief is commonly expressed by low lying, poorly drained areas and areas that are somewhat higher lying and better drained. The areas have a high probability of flooding during winter and spring. Slopes are less than 2 percent.

This unit occupies about 12 percent of the county. About 55 percent of the unit is Cartecay soils, 27 percent Wehadkee soils, and the remaining 18 percent soils of minor extent.

Cartecay soils are somewhat poorly drained. Typically, the surface layer is dark brown loam about 7 inches thick. This is underlain by brown and red stratified sandy loam and loamy sand to a depth of about 36 inches. Gray loam mottled with dark brown extends to a depth of about 50 inches. Below is dark gray silty clay loam mottled with strong brown to a depth greater than 60 inches.

Wehadkee soils are poorly drained. Typically, the surface layer is predominantly dark grayish brown silt loam about 7 inches thick. The subsoil extends to a depth of 50 inches. It is dominantly gray silty clay loam mottled with yellowish brown. Beneath this to a depth of 60 inches or more is gray sandy loam mottled with brown.

The minor soils in this unit are Altavista and Toccoa. Altavista soils are moderately well drained and commonly occupy higher lying stream terraces. Toccoa soils are well drained and share the same flood plains with the major soils.

This unit is mainly wooded. A few areas are used for cultivated crops and pasture. The potential is high for woodland production, but equipment limitation is a management problem on most of the unit.

This unit has a low potential for farming and urban use. Flooding and wetness are primary concerns for use and management of this unit.

2. Cecil-Appling-Pacolet

Gently sloping and strongly sloping, well drained soils that have a red or predominantly yellowish brown clayey subsoil; formed in material weathered from gneiss and schist

This unit consists of upland soils on smooth and convex ridgetops and on hillsides that are mostly smooth and choppy. Slopes range from 2 to 10 percent.

This unit occupies about 33 percent of the county. About 52 percent of the unit is Cecil soils, 25 percent is Appling soils, 11 percent is Pacolet soils, and the remaining 12 percent is soils of minor extent.

Cecil soils commonly occupy the slightly higher ridgetops. They have a red subsoil. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 58 inches; it is sandy clay loam in the upper few inches, clay in the middle, and sandy clay loam below. The underlying material to a depth of 65 inches or more is red sandy loam mottled with strong brown and pale brown and is mixed with weathered gneiss and schist.

Appling soils commonly occupy the slightly lower ridgetops. They have a predominantly yellowish brown subsoil. Typically, the surface layer is grayish brown sandy loam about 6 inches thick. The subsurface layer is brownish yellow sandy loam and extends to a depth of 10 inches. The subsoil extends to a depth of 45 inches; it is yellowish brown sandy clay loam in the upper few inches and yellowish brown clay mottled with yellowish red, red, and strong brown below. The underlying material to a depth of 60 inches or more is mottled yellowish red, strong brown, and red sandy loam.

Pacolet soils occupy strongly sloping ridgetops and hillsides. They have a red subsoil. Typically, the surface layer is strong brown sandy loam about 4 inches thick. The subsoil extends to a depth of 33 inches; the upper part is clay, and the lower part is clay loam. Below this is soft weathered gneiss and schist to a depth of 60 inches or more.

The minor soils in this unit are Cecil-Urban land complex and Molena. The Cecil-Urban land complex is well drained and shares the same upland landscape with Cecil soils. Molena soils are somewhat excessively drained and occupy stream terraces.

This unit is used mainly for cultivated crops, pasture, and subdivisions (fig. 1). Some areas have reverted to woodland. The potential for intensive cropping is limited unless slopes are protected from erosion.

The soils in this unit have a medium potential for woodland production. The potential for those that are eroded is commonly limited because of the erosion hazard, equipment limitations, and seedling mortality.

The gently sloping soils in this unit have a high potential for most urban uses. The strongly sloping soils have a medium potential. The major soils in the unit have a clayey subsoil, which needs to be considered before installing most sanitary facilities and making shallow excavations. Those areas that are eroded have a surface layer that is too clayey. If recreational development is planned, this fact also needs to be taken into account.

3. Cecil-Pacolet-Madison

Gently sloping and strongly sloping, well drained soils that have a red clayey subsoil; formed in material weathered from gneiss and schist

This unit consists of upland soils on smooth and convex ridgetops and on hillsides that are mostly smooth or irregular and choppy. Slopes range from 2 to 10 percent.

This soil unit occupies about 20 percent of the county. About 62 percent of the unit is Cecil soils, 16 percent is Pacolet soils, 13 percent Madison soils, and the remaining 9 percent is soils of minor extent.

Cecil soils commonly occupy ridgetops. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is red and extends to a depth of 58 inches; it is sandy clay loam in the upper few inches, clay in the middle, and sandy clay loam below. The underlying material to a depth of 65 inches or more is red sandy loam mottled with strong brown and pale brown and is mixed with weathered gneiss and schist.

Pacolet soils commonly occupy strongly sloping ridgetops and hillsides. Typically, the surface layer is strong brown sandy loam about 4 inches thick. The subsoil is red and extends to a depth of 33 inches; the upper part is clay, and the lower part is clay loam. Below this is soft weathered gneiss and schist to a depth of 60 inches or more.

Madison soils commonly occupy gently sloping ridgetops and strongly sloping hillsides. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is red and extends to a depth of 28 inches; the upper few inches is sandy clay loam and the lower part is clay. Below this is soft weathered gneiss and schist. Rippable bedrock is at a depth of about 40 inches.

Minor in this unit is the Cecil-Urban land complex. This complex is well drained and shares the same upland landscape with Cecil soils.

This soil unit is used mainly for cultivated crops, pasture, and woodland. A few areas are used for urban purposes. The potential for intensive cropping is limited unless slopes are protected from erosion.

The soils in this unit have a medium potential for woodland production. The potential for those that are eroded is commonly limited because of the erosion hazard, equipment limitations, and seedling mortality.

The gently sloping soils in this unit have a high potential for most urban uses. The strongly sloping soils have a medium potential. The soils in the unit have a clayey subsoil, which needs to be considered before installing most sanitary facilities and making shallow excavations. Areas that are eroded have a surface layer that is too clayey. If recreational development is planned, this fact also needs to be taken into account.

4. Gwinnett-Cecil

Gently sloping and strongly sloping, well drained soils that have a dark red or red clayey subsoil; formed in material weathered from gneiss

This unit consists of upland soils on smooth and convex ridgetops and on hillsides that are mostly smooth or irregular and choppy. Slopes range from 2 to 10 percent.

This unit occupies about 15 percent of the county. About 41 percent of the unit is Gwinnett soils, 36 percent is Cecil soils, and the remaining 23 percent is soils of minor extent.

Gwinnett soils have a dark red subsoil. Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is clay that extends to a depth of about 36 inches. It is underlain by soft weathered gneiss and schist to depths of 60 inches or more.

Cecil soils have a red subsoil. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 58 inches; it is sandy clay loam in the upper few inches, clay in the middle, and sandy clay loam below. The underlying material to a depth of 65 inches or more is red sandy loam mottled with strong brown and pale brown and is mixed with weathered gneiss and schist.

Minor in this unit are Ashlar soils, the Cecil-Urban land complex, and Davidson soils. The Ashlar, Cecil-Urban land complex, and Davidson soils share the same landscape as the Cecil soils.

This unit is used mainly for cultivated crops, pasture, and subdivisions. Some areas have reverted to woodland. The potential for intensive cropping is limited unless slopes are protected from erosion.

The soils in this unit have a medium potential for woodland production. The potential for those that are eroded is commonly limited because of the erosion hazard, equipment limitation, and seedling mortality.

The majority of the soils in this unit have a medium potential for most urban uses. The soils in this unit have a clayey subsoil, which needs to be considered before installing most sanitary facilities and making shallow excavations. Those areas that are eroded have a surface layer that is too clayey. If recreational development is planned, this fact also needs to be taken into account. Shrinking and swelling of the soil, a concern in much of the unit, needs to be considered in those areas used for the construction of roads and buildings.

5. Pacolet-Ashlar-Gwinnett

Moderately steep and steep, well drained or excessively drained soils that have a red or dark red clayey or a yellowish brown loamy subsoil; formed in material weathered from granite, gneiss, and schist

This unit consists of upland soils on moderately steep or steep, irregular and convex hillsides. Slopes range from 10 to 25 percent.

This unit occupies about 14 percent of the county. About 63 percent of the unit is Pacolet soils, 20 percent is Ashlar soils, 9 percent is Gwinnett soils, and the remaining 8 percent is soils of minor extent.

Pacolet soils are well drained and have a red clayey subsoil. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 36 inches; the upper few inches is clay loam, and the lower part is clay. Below this is soft weathered granite, gneiss, and schist to a depth of 60 inches or more.

Ashlar soils are excessively drained and have a yellowish brown loamy subsoil. Typically, the surface layer is dark grayish brown sandy loam about 5 inches thick. The subsoil is sandy loam that extends to a depth of 24 inches. Below this is highly weathered rock that is gravelly sandy loam if crushed. Hard rock is at a depth of about 38 inches.

Gwinnett soils are well drained and have a dark red clayey subsoil. Typically, the surface layer is dark reddish brown sandy clay loam about 5 inches thick. The upper part of the subsoil is dusky red clay, and the lower part is dark red sandy clay that extends to a depth of 34 inches. Below this is soft weathered granite, gneiss, or schist to a depth of 60 inches or more.

Minor in this unit are Madison soils and the Pacolet-Urban land complex. Madison soils and the Pacolet-Urban land complex share the same landscape as the major soils in the unit.

This unit has a low potential for farming and urban uses. Slope is the primary management concern. The potential is medium for pasture.

This unit has a medium potential for the production of woodland. The potential is limited mainly because of the erosion hazard and equipment limitation. These limiting features need careful attention if this unit is managed for woodland use.

6. Urban land

Gently sloping and strongly sloping urban land areas in which the landscape is commonly modified by cuts and fill material

This unit consists mainly of broad to narrow ridgetops and smooth and choppy hillsides associated with drainageways and flood plains.

This unit occupies about 6 percent of Clayton County. It is 85 to 100 percent Urban land and 15 percent or less Cecil and Pacolet soils.

Typically, the soil has been modified by cutting, filling, shaping, and smoothing. In places, the cuts are deep, and weathered mica schist, granite, or gneiss is exposed.

This unit includes business districts, shopping centers, schools, churches, parking lots, motels, industries, streets and sidewalks, housing developments, and airport areas. A few areas are wooded or in grass (fig. 2).

Erosion is a severe hazard in most areas under construction. Flooding and sediment from the uplands are hazards in areas on the flood plain.

Fayette County

1. Cartecay-Wehadkee

Nearly level, poorly drained, and somewhat poorly drained soils that are predominantly loamy throughout; formed in alluvial sediment

This unit consists of soils on narrow to wide flood plains. The landscape is nearly level. The low relief is commonly expressed by low lying, poorly drained areas and areas that are somewhat higher lying and better drained. The areas have a high probability of flooding during winter and spring. Slopes are less than 2 percent.

This unit occupies about 11 percent of the county. About 53 percent of the unit is Cartecay soils, 41 percent Wehadkee soils, and the remaining 6 percent soils of minor extent.

Cartecay soils are somewhat poorly drained. Typically, the surface layer is dark brown loam about 7 inches thick. It is underlain by brown and red stratified sandy loam and loamy sand to a depth of about 36 inches. Gray loam mottled with dark brown extends to a depth of about 50 inches. Below is dark gray silty clay loam mottled with strong brown to a depth greater than 60 inches.

Wehadkee soils are poorly drained. Typically, the surface layer is predominantly dark grayish brown silt loam about 7 inches thick. The subsoil extends to a depth of 50 inches. It is dominantly gray silty clay loam mottled with yellowish brown. Beneath this to a depth of 60 inches or more is gray sandy loam mottled with brown.

Minor in this unit are Altavista and Toccoa soils. Altavista soils are moderately well drained and commonly occupy higher lying stream terraces. Toccoa soils are well drained and share the same flood plains with the major soils.

This unit is mainly wooded, but a few areas are used for cultivated crops and pasture. The potential is high for woodland production, but equipment limitation is a management problem on most of the unit.

This unit has low potential for farming and urban use. Flooding and wetness are primary concerns in use and management.

2. Cecil-Appling

Gently sloping and strongly sloping, well drained soils that have a red or predominantly yellowish brown clayey subsoil; formed in material weathered from gneiss and schist

This unit consists of upland soils on smooth and convex ridgetops and on hillsides that are mostly smooth or choppy. Slopes range from 2 to 10 percent.

This unit occupies about 78 percent of the county. About 80 percent of the unit is Cecil soils, 11 percent is Appling soils, and the remaining 9 percent is soils of minor extent.

Cecil soils commonly occupy the slightly higher ridgetops. They have a red subsoil. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 58 inches; it is sandy clay loam in the upper few inches, clay in the middle, and sandy clay loam below. The underlying material to a depth of 65 inches or more is red sandy loam mottled with strong brown and pale brown and is mixed with weathered gneiss and schist.

Appling soils commonly occupy the slightly lower ridgetops. They have a predominantly yellowish brown subsoil. Typically, the surface layer is grayish brown sandy loam about 6 inches thick. The subsurface layer is brownish yellow sandy loam that extends to a depth of 10 inches. The subsoil extends to a depth of 45 inches; it is sandy clay loam in the upper few inches and clay mottled with yellowish red, red, and strong brown below. The underlying material to a depth of 60 inches or more is mottled yellowish red, strong brown, and red sandy loam.

The minor soils in this unit are Altavista, Davidson, Gwinnett, and Madison. Altavista soils are moderately well drained and occupy lower lying stream terraces. Davidson, Gwinnett, and Madison soils share the same upland landscape with Cecil soils.

This unit is used mainly for cultivated crops and pasture. Some areas have reverted to woodland. The potential for intensive cropping is limited unless slopes are protected from erosion.

The soils in this unit have a medium potential for woodland production. The potential for those that are eroded is commonly limited because of the erosion hazard, equipment limitations, and seedling mortality.

The gently sloping soils in this unit have a high potential for most urban uses. The strongly sloping soils have a medium potential. The soils in the unit have a clayey subsoil, which needs to be considered before installing most sanitary facilities and making shallow excavations. Those areas that are eroded have a surface layer that is too clayey. If recreational development is planned, this fact also needs to be taken into account.

3. Gwinnett-Davidson

Gently sloping and strongly sloping, well drained soils that have a dark red clayey subsoil; formed in material weathered from diorite, gneiss, and hornblende gneiss

This unit consists of upland soils on smooth and convex ridgetops and on hillsides that are mostly smooth or irregular and choppy. Slopes range from 2 to 10 percent.

This unit occupies about 5 percent of the county. About 60 percent of the unit is Gwinnett soils, 30 percent is Davidson soils, and the remaining 10 percent is soils of minor extent.

Gwinnett soils commonly occupy the strongly sloping hillsides. Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is a dark red clay that extends to a depth of about 36 inches. It is underlain by soft weathered gneiss and schist to depths of 60 inches or more.

Davidson soils commonly occupy the gently sloping ridgetops. Typically, the surface layer is dusky red loam about 6 inches thick. The subsoil is predominantly clay that extends to a depth of 78 inches or more; it is dusky red in the upper part, and dark red below.

The minor soils in this unit are Ashlar and Cecil. These soils share the same landscape as the Davidson and Gwinnett soils.

This unit is used mainly for cultivated crops and pasture. Some areas have reverted to woodland. The potential for intensive cropping is limited unless slopes are protected from erosion.

The soils in this unit have a medium potential for woodland production. The potential for those that are eroded is commonly limited because of the erosion hazard, equipment limitation, and seedling mortality.

The soils in this unit have a medium potential for most urban uses. However, the soils have a clayey subsoil, which needs to be considered before installing most sanitary facilities and making shallow excavations. Those areas that are eroded have a surface layer that is too clayey. If recreational development is planned, this fact also needs to be taken into account. Shrinking and swelling of the soil, a concern in much of the unit, needs attention in those areas used for the construction of roads and buildings.

4. Pacolet-Ashlar-Gwinnett

Moderately steep and steep, well drained or excessively drained soils that have a red or dark red clayey or a yellowish brown loamy subsoil; formed in material weathered from granite, gneiss, and schist

This unit consists of upland soils on moderately steep or steep, irregular and convex hillsides. Slopes range from 10 to 25 percent.

This unit occupies about 6 percent of the county. About 45 percent of the unit is Pacolet soils, 39 percent is Ashlar soils, 15 percent is Gwinnett soils, and the remaining 1 percent is soils of minor extent.

Pacolet soils are well drained and have a red clayey subsoil. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 36 inches; the upper few inches is clay loam, and the lower part is clay. Below this is soft weathered granite, gneiss, and schist to a depth of 60 inches or more.

Ashlar soils are excessively drained and have a yellowish brown loamy subsoil. Typically, the surface layer is dark grayish brown sandy loam about 5 inches thick. The subsoil is sandy loam that extends to a depth of 24 inches. Below this is highly weathered rock that is gravelly sandy loam if crushed. Hard rock is at a depth of about 38 inches.

Gwinnett soils are well drained and have a dark red clayey subsoil. Typically, the surface layer is dark reddish brown sandy clay loam about 5 inches thick. The upper part of the subsoil is dusky red clay, and the lower part is dark red sandy clay that extends to a depth of 34 inches. Below this is soft weathered granite, gneiss, or schist to a depth of 60 inches or more.

The minor soils in this unit are Altavista and Madison. Altavista soils are moderately well drained and occupy lower lying stream terraces. Madison soils share the hillside landscape with the major soils.

This unit has a low potential for farming, urban, and most recreational uses. Slope is the primary management concern. The potential for pasture is medium.

This unit has a medium potential for the production of woodland. The potential is limited mainly because of the erosion hazard and equipment limitation.

Henry County

1. Cartecay-Toccoa

Nearly level, somewhat poorly drained and well drained soils that are predominantly loamy throughout; formed in alluvial sediment

This unit consists of soils on narrow to wide flood plains. The landscape is nearly level. The low relief is commonly expressed by low lying, poorly drained areas and areas that are somewhat higher lying and better drained. The areas have a high probability of flooding during winter and spring. Slopes are less than 2 percent.

This unit occupies about 9 percent of the county. About 60 percent of the unit is Cartecay soils, 26 percent Toccoa soils, and the remaining 14 percent soils of minor extent.

Cartecay soils are somewhat poorly drained. Typically, the surface layer is dark brown loam about 7 inches thick. It is underlain by brown and red stratified sandy loam and loamy sand to a depth of about 36 inches. Gray loam mottled with dark brown extends to a depth of about 50 inches. Below is dark gray silty clay loam mottled with strong brown to a depth greater than 60 inches.

Toccoa soils are well drained. Typically, the surface layer is strong brown sandy loam about 8 inches thick. It is underlain by stratified strong brown sandy loam and reddish brown loamy sand to a depth of 34 inches. Below this is a buried soil that is dark grayish brown silt loam several inches thick overlying gray fine sandy clay loam to a depth of 60 inches or more.

The minor soils in this unit are Altavista and Wehadkee. Altavista soils are moderately well drained and commonly occupy higher lying stream terraces. Wehadkee soils are poorly drained and share the same flood plains with the major soils.

This unit is mainly wooded. A few areas are used for cultivated crops and pasture. The potential is high for woodland production, but equipment limitation is a management problem on most of the unit.

This unit has a low potential for farming and urban use. Flooding and wetness are primary concerns in use and management.

2. Cecil-Appling

Gently sloping and strongly sloping, well drained soils that have a red or predominantly yellowish brown clayey subsoil; formed in material weathered from gneiss and schist

This unit consists of upland soils on smooth and convex ridgetops and on hillsides that are mostly smooth or choppy. Slopes range from 2 to 10 percent.

This unit occupies about 21 percent of the county. About 59 percent of the unit is Cecil soils, 33 percent is Appling soils, and the remaining 8 percent is soils of minor extent.

Cecil soils commonly occupy the slightly higher ridgetops. They have a red subsoil. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 58 inches; it is sandy clay loam in the upper few inches, clay in the middle, and sandy clay loam below. The underlying material to a depth of 65 inches or more is red sandy loam mottled with strong brown and pale brown and is mixed with weathered gneiss and schist.

Appling soils commonly occupy the slightly lower ridgetops. They have a predominantly yellowish brown subsoil. Typically, the surface layer is grayish brown sandy loam about 6 inches thick. The subsurface layer is brownish yellow sandy loam that extends to a depth of 10 inches. The subsoil extends to a depth of 45 inches; it is sandy clay loam in the upper few inches and clay mottled with yellowish red, red, and strong brown below. The underlying material to a depth of 60 inches or more is mottled yellowish red, strong brown, and red sandy loam.

The minor soil is this unit is Gwinnett. Gwinnett soils are well drained and share the same upland landscape with Cecil soils.

This unit is used mainly for cultivated crops and pasture. Some areas have reverted to woodland. The potential for intensive cropping is limited unless slopes are protected from erosion.

The soils in this unit have a medium potential for woodland production. The potential for those that are eroded is commonly limited because of the erosion hazard, equipment limitations, and seedling mortality.

The gently sloping soils in the unit have a high potential for most urban uses. The strongly sloping soils have a medium potential. The soils in the unit have a clayey subsoil, which needs to be considered before installing most sanitary facilities and making shallow excavations. Areas that are eroded have a surface layer that is too clayey. If recreational development is planned, this fact also needs to be taken into account.

3. Cecil-Madison-Pacolet

Gently sloping and strongly sloping, well drained soils that have a red clayey subsoil; formed in material weathered from gneiss and schist

This unit consists of upland soils on smooth and convex ridgetops and on hillsides that are mostly smooth or irregular and choppy. Slopes range from 2 to 10 percent.

This soil unit occupies about 50 percent of the county. About 71 percent of the unit is Cecil soils, 11 percent is Madison soils, 9 percent is Pacolet soils, and the remaining 9 percent is soils of minor extent.

Cecil soils commonly occupy ridgetops. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is red and extends to a depth of 58 inches; it is sandy clay loam in the upper few inches, clay in the middle, and sandy clay loam below. The underlying material to a depth of 65 inches or more is red sandy loam mottled with strong brown and pale brown, and is mixed with weathered gneiss and schist.

Madison soils commonly occupy gently sloping ridgetops and strongly sloping hillsides. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is red and extends to a depth of 28 inches; the upper few inches is sandy clay loam, and the lower part is clay. Below this is soft weathered gneiss and schist. Rippable bedrock is at a depth of about 40 inches.

Pacolet soils commonly occupy strongly sloping ridgetops and hillsides. Typically, the surface layer is strong brown sandy loam about 4 inches thick. The subsoil is red and extends to a depth of 33 inches; the upper part is clay, and the lower part is clay loam. Below this is soft weathered gneiss and schist to a depth of 60 inches or more.

The minor soils in this unit are Ashlar and Gwinnett. These soils share the same landscape with the major soils.

This soil unit is used mainly for cultivated crops, pasture, and woodland. Its potential for intensive cropping is limited unless slopes are protected from erosion.

The soils in this unit have a medium potential for woodland production. The potential for those that are eroded is commonly limited because of the erosion hazard, equipment limitations, and seedling mortality.

The gently sloping soils in this unit have a high potential for most urban uses. The strongly sloping soils have a medium potential. The soils in the unit have a clayey subsoil, which needs to be considered before installing most sanitary facilities and making shallow excavations. Those areas that are eroded have a surface layer that is too clayey. If recreational development is planned, this fact also needs to be taken into account.

4. Gwinnett-Davidson

Gently sloping and strongly sloping, well drained soils that have a dark red clayey subsoil; formed in material weathered from diorite, gneiss, and hornblende gneiss

This unit consists of upland soils on smooth and convex ridgetops, and on hillsides that are mostly smooth or irregular and choppy. Slopes range from 2 to 10 percent.

This unit occupies about 2 percent of the county. About 68 percent of the unit is Gwinnett soils, 29 percent is Davidson soils, and the remaining 3 percent is soils of minor extent.

Gwinnett soils commonly occupy the strongly sloping hillsides. Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is a dark red clay that extends to a depth of about 36 inches. It is underlain by soft weathered gneiss and schist to depths of 60 inches or more.

Davidson soils commonly occupy the gently sloping ridgetops. Typically, the surface layer is dusky red loam about 6 inches thick. The subsoil is predominantly clay that extends to a depth of 78 inches or more; it is dusky red in the upper part and dark red below.

The minor soil in this unit is Cecil. Cecil soils share the same landscape as the Davidson and Gwinnett soils.

This unit is used mainly for cultivated crops and pasture. Some areas have reverted to woodland. The potential for intensive cropping is limited unless slopes are protected from erosion.

The soils in this unit have a medium potential for woodland production. The potential for those that are eroded is commonly limited because of the erosion hazard, equipment limitation, and seedling mortality.

The soils in this unit have a medium potential for most urban uses. However, the soils have a clayey subsoil, which needs to be considered before installing most sanitary facilities and making shallow excavations. Those areas that are eroded have a surface layer that is too clayey. If recreational development is planned, this fact also needs to be taken into account. Shrinking and swelling of the soil, a concern in much of the unit, needs attention in those areas used for the construction of roads and buildings.

5. Pacolet-Gwinnett-Madison

Moderately steep and steep, well drained soils that have a red or dark red clayey subsoil; formed in material weathered from granite, gneiss, and schist

This unit consists of upland soils on moderately steep or steep, irregular and convex hillsides. Slopes range from 10 to 25 percent.

This unit occupies about 18 percent of the county. About 58 percent of the unit is Pacolet soils, 19 percent is Gwinnett soils, 14 percent is Madison soils, and the remaining 9 percent is soils of minor extent.

Pacolet soils have a red clayey subsoil. Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil extends to a depth of 36 inches; the upper few inches is clay loam, and the lower part is clay. Below this is soft weathered granite, gneiss, and schist to a depth of 60 inches or more.

Gwinnett soils have a dark red clayey subsoil. Typically, the surface layer is dark reddish brown sandy clay loam about 5 inches thick. The upper part of the subsoil is dusky red clay, and the lower part is dark red sandy clay that extends to a depth of 34 inches. Below this is soft weathered granite, gneiss, or schist to a depth of 60 inches or more.

Madison soils have a red clayey subsoil formed in material weathered from micaceous schist. Typically, the surface layer is brown sandy clay loam about 5 inches thick. The subsoil extends to a depth of about 40 inches; the upper few inches is sandy clay loam, and the lower part is clay. Below this is soft weathered micaceous schist. Rippable bedrock is at a depth of about 50 inches.

The minor soil in this unit is Ashlar. Ashlar soils share the same hillside landscape with the major soils.

This unit has a low potential for farming, urban, and recreational uses. Slope is the primary management concern. The potential for pasture is medium.

This unit has a medium potential for the production of woodland. The potential is limited mainly because of the erosion hazard and equipment limitation.

Broad land use considerations

Deciding what land should be used for urban development is an important issue in the survey area. Each year a considerable acreage is developed for urban uses as the suburban areas of the city of Atlanta continue to increase. It is estimated that about 20,000 acres of the survey area is urban or built-up land. The general soil map is most helpful in planning the general outline of urban areas; it cannot be used for the selection of sites for specific urban structures. In general, in the survey area the soils that have high potential for cultivated crops also have high potential for urban development. The data on specific soils in this survey can be helpful in planning future land use patterns.

Areas where the soils are so unfavorable that urban development is prohibitive are not extensive in the survey area. However, two soil units in the survey area consist of the Cartecay, Toccoa, or Wehadkee soils. These units are on flood plains where flooding and ponding are severe limitations. Also, urban development is very costly on two steep soil units that are made up of the Ashlar, Gwinnett, Pacolet, and Madison soils.

In large areas of the three counties are soils that can be developed for urban uses at lower costs than can the soils named in the foregoing paragraph. These include the Cecil-Appling unit, the Cecil-Appling-Pacolet unit, the Cecil-Madison-Pacolet unit, the Gwinnett-Davidson unit, and the Gwinnett-Cecil unit. These units are excellent farmland, and this potential should not be overlooked when broad land uses are considered. In addition, these units are favorable for residential and other nonfarm uses.

Some areas have high potential for farming but medium or low potential for nonfarm uses. These areas are identified as soil unit 1 on the general soil maps. In this unit wetness and flooding during winter are limitations to nonfarm uses. With major flood control measures and proper drainage, these limitations can commonly be overcome.

Most of the soils in the survey area have medium potential for woodland.

The gently sloping and strongly sloping soils in the three counties commonly have high potential for most recreational uses. However, the two soil units that consist of the Cartecay, Toccoa, and Wehadkee soils that flood and the two steep soil units that are made up of the Ashlar, Gwinnett, Pacolet, and Madison soils have low potential for recreation. All these units provide habitat for many important species of wildlife.

Soil maps for detailed planning

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

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

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

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

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

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

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Cecil-Urban land complex, 2 to 10 percent slopes, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. No associations were mapped in the survey area.

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

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

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

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

AkA—Altavista sandy loam, 0 to 3 percent slopes. This deep, moderately well drained, nearly level and very gently sloping soil is on stream terraces of the Piedmont Upland. Individual areas are 3 to 15 acres.

Typically, the surface layer is brown sandy loam about 7 inches thick. The subsoil is predominantly sandy clay loam and extends to a depth of 36 inches; it is yellowish brown in the upper part, yellowish brown mottled with red and brown in the middle, and strong brown mottled with light brownish gray and red in the lower part. The underlying material to a depth of 60 inches or more is mottled yellowish brown and gray sandy loam.

This soil is low in natural fertility and organic matter content. It is strongly acid throughout except for surface layers that have been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. Although the soil is deep, a water table is commonly at a depth of 18 to 30 inches in winter and early spring limiting depth of root penetration.

Included with this soil in mapping are a few areas of Altavista fine sandy loam. Also included are small areas of Appling, Cartecay, and Toccoa soils that were too small to be mapped separately.

This soil has high potential for growing row crops, small grains, hay, and pasture. Good tilth is easily maintained by returning crop residue to the soil.

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

This soil has low potential for most urban uses. Wetness and flooding are limitations that could be overcome by drainage and flood control measures. Capability subclass IIw; woodland suitability 2w.

AmB—Appling sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on ridgetops of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 5 to 45 acres.

Typically, the surface layer is grayish brown sandy loam about 6 inches thick. The subsurface layer is brownish yellow sandy loam and extends to a depth of 10 inches. The subsoil extends to a depth of 45 inches; it is yellowish brown sandy clay loam in the upper few inches and yellowish brown clay mottled with yellowish red, red, and strong brown below. The underlying material to a depth of 60 inches or more is mottled yellowish red, strong brown, and red sandy loam.

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

Included with this soil in mapping are small areas of Appling fine sandy loam, Appling gravelly sandy loam, and a few eroded spots of Appling sandy clay loam. Also included are small areas of Cecil, Madison, and Pacolet soils that were too small to be mapped separately.

This soil has high potential for growing row crops, small grains, hay, and pasture. Good tilth is easily maintained by returning crop residue to the soil. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

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

This soil has high potential for most urban and recreational uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can commonly be overcome by good design and careful installation procedures. Capability subclass IIe; woodland suitability 3o.

AmC—Appling sandy loam, 6 to 10 percent slopes. This deep, well drained, strongly sloping soil is on long narrow ridgetops and moderately long hillsides of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 5 to 25 acres.

Typically, the surface layer is brown sandy loam about 4 inches thick. The upper few inches of the subsoil is yellowish red sandy clay loam, and the lower part is yellowish red clay that extends to a depth of 43 inches. The underlying material to depths of 60 inches or more is clay loam if crushed.

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

Included with this soil in mapping are areas of Appling gravelly sandy loam and a few eroded spots of Appling sandy clay loam. Also included are a few intermingled areas of Ashlar, Cecil, and Pacolet soils.

This soil has medium potential for growing row crops and small grains, but high yields can be obtained. Its potential is limited because of the size of the area and because of slope. It is high for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has a medium potential for growing loblolly pines, yellow-poplar, and red oak. There are no significant limitations for woodland use and management.

This soil has medium potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can commonly be overcome by good design and careful installation procedures. The clayey subsoil and slope are limitations for most sanitary facilities. Slope is the primary limitation if this soil is used for community development and most recreational purposes. Capability subclass IIIe; woodland suitability 3o.

AnC2—Appling sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, strongly sloping soil is on ridgetops and hillsides of the Piedmont Upland. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are choppy and convex. Individual areas are 5 to 45 acres.

Typically, the surface layer is yellowish brown sandy clay loam about 3 inches thick. The subsoil extends to a depth of 48 inches. It is reddish yellow sandy clay in the upper few inches, strong brown clay in the middle, and yellowish brown sandy clay loam in the lower part. The underlying material to a depth of 60 inches or more consists of highly weathered gneiss, granite, and schist.

This soil is low in natural fertility and organic matter content. It is strongly acid throughout except for surface layers that have been limed. Permeability is moderate, and the available water capacity is medium. This soil has poor tilth because of erosion. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are small uneroded areas of Appling sandy loam. Also included are small areas of Ashlar, Cecil, and Pacolet soils that were too small to be mapped separately.

This soil has low potential for growing row crops and small grains. Its potential is limited because of the poor workability of the surface layer and the choppy topography. It is medium for hay and pasture. Tilth can be improved by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has medium potential for growing loblolly pines, white oak, red oak, and yellow-poplar. There are no significant limitations for woodland use and management.

This soil has medium potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can commonly be overcome by good design and careful installation procedures. The clayey subsoil and slope are limitations for most sanitary facilities. Slope is the primary limitation if this soil is used for community development and most recreational purposes. Capability subclass IVe; woodland suitability 3o.

AsC—Ashlar sandy loam, 2 to 10 percent slopes. This moderately deep, well drained or excessively drained, gently sloping or strongly sloping soil is on ridgetops of the Piedmont Upland. Slopes are choppy and irregular. Individual areas are 5 to 25 acres.

Typically, the surface layer is dark grayish brown sandy loam about 6 inches thick. The subsoil is yellowish brown sandy loam and extends to a depth of 21 inches. Below this is highly weathered rock. Hard rock is at a depth of about 32 inches.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for surface layers that have been limed. Permeability is moderately rapid, and the available water capacity is low. This soil has good tilth and can be worked throughout a wide range of moisture conditions. Penetration of roots is limited to the zone above the hard rock.

Included in the mapping are soils that have more clay in the subsoil than is common to Ashlar soils. Also included are a few small areas that have hard rock at a shallow depth, a few that have a stony surface, and a few intermingled areas of Appling and Pacolet soils.

This soil has medium potential for growing row crops, small grains, and pasture. Its potential is limited because of depth to rock, low available water capacity, and choppy slopes. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has a medium potential for growing loblolly pine and northern red oak. There are no significant limitations for woodland use or management.

This soil has low potential for most urban uses. Depth to rock is the main limitation if sanitary facilities are installed, community development is planned, or playgrounds considered. Capability subclass IIIe; woodland suitability 3o.

AtE—Ashlar sandy loam, very rocky, 10 to 25 percent slopes. This moderately deep, well drained or excessively drained, steep soil is on short hillsides of the Piedmont Upland. Slopes are irregular and convex. Individual areas are 5 to 40 acres.

Typically, the surface layer is dark grayish brown sandy loam about 5 inches thick. The subsoil is yellowish brown sandy loam and extends to a depth of 24 inches. Below this is highly weathered rock that is gravelly sandy loam if crushed. Hard rock is at a depth of about 38 inches. About 1 to 10 percent of each mapped area is rock outcrop.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for surface layers that have been limed. Permeability is moderately rapid, and the available water capacity is low. This soil has good tilth and can be worked throughout a wide range of moisture conditions. Penetration of roots is limited to the zone above the hard rock.

Included in mapping are small soil areas that have more clay in the subsoil than is common to Ashlar soils. Also included are small areas that have hard rock at greater depths than is common to Ashlar soils. Small areas of Appling and Pacolet soils are also included.

This soil has low potential for growing row crops and small grains. Its potential is limited because of depth to rock, low available water capacity, rockiness and slope. It is medium for pasture.

This soil has a medium potential for growing loblolly pine and northern red oak (fig. 3). Erosion hazard and equipment limitations are management problems. These problems can commonly be overcome by good ground cover, logging during drier seasons, and planting after good land preparation.

This soil has low potential for most urban uses. The depth to rock and steep slopes are limitations for most uses. Capability subclass VIe; woodland suitability 3r.

CA—Cartecay soils. This mapping unit consists of deep, somewhat poorly drained, nearly level soils on flood plains. It is flooded commonly for brief periods mostly during winter and early spring (fig. 4). It consists of Cartecay soils and similar soils that are closely associated, but the pattern is irregular. Individual areas of each soil are large enough to map separately, but because of present and predicted use, they were mapped as one unit. Most mapped areas contain Cartecay soils and the similar soils. Some contain only the Cartecay soils, and others only the similar soils.

About 60 percent of the mapping unit is Cartecay soils. Typically, the surface layer is dark brown loam about 7 inches thick. This is underlain by brown and red stratified sandy loam and loamy sand to a depth of about 36 inches. Gray loam mottled with dark brown extends to a depth of about 50 inches. Below is dark gray silty clay loam mottled with strong brown to a depth greater than 60 inches.

Cartecay soils are slightly acid to strongly acid throughout except for surface layers that have been limed. Permeability is moderately rapid, and the available water capacity is high. The root zone is deep, but a water table is commonly within 6 to 18 inches of the surface during winter and spring and limits root penetration.

About 25 percent of the map unit is soils similar to Cartecay soils. Typically, the soils have a higher clay content in the underlying stratified layers than is common in the Cartecay soils.

The soils that are similar to Cartecay soils are slightly acid to strongly acid throughout except for surface layers that have been limed. The permeability is moderate, and the available water capacity is high. The root zone is deep, but a water table is commonly within 6 to 18 inches of the surface during winter and spring and limits root penetration.

Included with these soils in mapping are small areas of Toccoa and Wehadkee soils.

Most of this map unit is wooded. Several small areas of this unit are in pasture or are used for cultivated crops. These soils have high potential for tall fescue pasture.

This map unit has high potential for loblolly pine, yellow-poplar, and sweetgum. Wetness is the main limitation to equipment use in managing and harvesting the tree crop, but this can be overcome by using special equipment and logging during the drier seasons.

This map unit has very low potential for farming and urban use. Wetness and flooding are the main limitations. They can be overcome only by major flood control and drainage measures. Capability subclass Vw; woodland suitability 2w.

CeB—Cecil sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on ridgetops of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 5 to 85 acres.

Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is red and extends to a depth of 58 inches; it is sandy clay loam in the upper few inches, clay in the middle, and sandy clay loam below. The underlying material, to a depth of 65 inches or more, is red sandy loam mottled with strong brown and pale brown and is mixed with weathered gneiss and schist.

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

Included with this soil in mapping are small areas of Cecil fine sandy loam; small eroded areas of Cecil clay loam; a few small areas with gravelly fine sandy loam surface layers; and small areas of Appling, Gwinnett, Madison, and Pacolet soils. The included soils make up about 10 to 20 percent of this map unit, but separate areas are small.

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

This soil has a medium potential for growing loblolly pine and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has high potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields. This can commonly be overcome by good design and careful installation procedures. Capability subclass IIe; woodland suitability 3o.

CeC—Cecil sandy loam, 6 to 10 percent slopes. This deep, well drained, strongly sloping soil is on long, narrow ridgetops and moderately long hillsides of the Piedmont Upland. Slopes are smooth or choppy. Individual areas are 5 to 50 acres.

Typically, the surface layer is yellowish brown sandy loam about 8 inches thick. The upper few inches of the subsoil is yellowish red sandy clay loam, and the lower part is red clay that extends to a depth of 56 inches or more. Below this is soft weathered gneiss and schist.

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

Included with this soil in mapping are small eroded areas of Cecil sandy clay loam and a few shallow gullies. Also included are areas of Appling, Gwinnett, Madison, and Pacolet soils that are too small to be mapped separately. The included soils make up about 10 to 20 percent of this map unit, but separate areas generally are less than 1 acre.

This soil has medium potential for growing row crops and small grains. Its potential is limited in places because the slopes are choppy and some areas are small. It is high for hay and pasture. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a severe hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has medium potential for growing loblolly pine, northern red oak, and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has high potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can commonly be overcome by good design and careful installation procedures. The clayey subsoil is a limitation for most sanitary facilities. Slope is the primary limitation if this soil is used for community development and recreation. Capability subclass IIIe; woodland suitability 3o.

CfC2—Cecil sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained soil is on narrow, gently sloping ridgetops and short, strongly sloping hillsides of the Piedmont Upland. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are choppy and complex. Individual soil areas are 5 to 20 acres.

Typically, the surface layer is brown sandy clay loam about 4 inches thick. The subsoil is red and extends to a depth of about 48 inches. It is sandy clay loam in the upper part and clay below. The underlying material to a depth of 65 inches or more is soft weathered gneiss and schist.

This soil is low in natural fertility and organic matter content. It is strongly acid throughout except for surface layers that have been limed. Permeability is moderate, and the available water capacity is medium. Tilth is poor. The soil can be worked best if it is not too wet or too dry.

Included with this soil in mapping are areas of Cecil sandy loam. Also included are small areas of Appling, Gwinnett, Madison, and Pacolet soils.

This soil has low potential for growing row crops or small grains and a medium potential for growing hay and pasture. Its potential is limited because of the small areas and the choppy, somewhat gullied landscape.

This soil has a medium potential for growing loblolly pine and shortleaf pine. Seedling mortality and equipment limitations are management problems on this soil. These problems can commonly be overcome by good ground cover, logging during drier seasons, and planting after good land preparation.

This soil has medium potential for most urban uses. The gullies are limitations, but the landscape can easily be smoothed or modified for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can commonly be overcome by good design and careful installation procedures. The clayey subsoil is a limitation for most sanitary facilities. Parts of this soil are limited for community development and most kinds of recreation because of strong slopes. Capability subclass IVe; woodland suitability 4c.

CuC—Cecil-Urban land complex, 2 to 10 percent slopes. This complex consists of areas of Cecil soils and Urban land that are so intermingled that they could not be separated at the scale selected for mapping. It is on gently sloping ridgetops and strongly sloping hillsides of the Piedmont Upland. The mapped areas are 5 to 150 acres.

Cecil soils make up about 50 to 75 percent of each mapped area. Typically, Cecil soils have a brown sandy loam surface layer about 6 inches thick. The subsoil is mainly red clay and extends to a depth of about 56 inches. The underlying material to a depth of 65 inches or more is soft weathered gneiss and schist.

Cecil soils are low in natural fertility and organic matter content. These soils are strongly acid or very strongly acid throughout except for surface layers that have been limed. Permeability is moderate, and the available water capacity is medium. Tilth is good. The root zone is deep and easily penetrated by plant roots.

Urban land makes up about 25 to 50 percent of each mapped area. The soils have been altered by cutting, filling, and shaping for community development. Most urban land is used for shopping centers, schools, parking lots, industrial sites, streets, commercial buildings, and private dwellings.

Included with this unit in mapping are areas of Cecil sandy clay loam that are eroded and idle. Most of these eroded areas are dissected by shallow gullies. Also included are small intermingled areas of Appling, Gwinnett, and Madison soils.

This complex has a high potential for most urban uses, including growing gardens, shrubs, shade trees, and other kinds of vegetative cover common to the survey area. Slow percolation is a limitation for septic tank absorption fields, but this can commonly be overcome by a good design and careful installation procedures. The common plants used for landscaping and vegetable gardens grow well on this complex. Erosion, however, is a severe hazard prior to establishment of permanent type cover. Tillage across the slope and winter cover crops will help control erosion on areas used for vegetable gardens. Capability subclass IIIe; woodland suitability 3o.

DgB—Davidson loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on broad ridgetops of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 5 to 25 acres.

Typically, the surface layer is dusky red loam about 6 inches thick. The subsoil is predominantly clay and extends to a depth of 78 inches or more; it is dusky red in the upper part and dark red below.

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

Included with this soil in mapping are areas of Cecil, Gwinnett, and Pacolet soils that were too small to be mapped separately.

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

This soil has a high potential for growing loblolly pine, northern red oak, and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has high potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields. This can commonly be overcome by good design and careful installation procedures. Capability subclass IIe; woodland suitability 3o.

DgC—Davidson loam, 6 to 10 percent slopes. This deep, well drained, strongly sloping soil is on short hillsides of the Piedmont Upland. Slopes are choppy and convex. Individual areas are 5 to 35 acres.

Typically, the surface layer is dark reddish brown loam about 8 inches thick. The subsoil extends to a depth of 72 inches; it is chiefly dark reddish brown clay but is dark red clay loam in the extreme lower part.

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

Included with this soil in mapping are small areas of Cecil and Gwinnett soils that were too small to be mapped separately.

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

This soil has a high potential for growing loblolly pine, northern red oak, and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has medium potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields. This can commonly be overcome by good design and construction. The clayey subsoil is a limitation for most sanitary facilities. Slope is the main limitation if this soil is used for community development and recreation. Capability subclass IIIe; woodland suitability 3o.

GeB—Gwinnett sandy loam, 2 to 6 percent slopes. This deep, well drained gently sloping soil is on broad ridgetops of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 5 to 45 acres.

Typically, the surface layer is dark reddish brown sandy loam about 5 inches thick. The subsoil is a dark red clay that extends to a depth of about 36 inches. It is underlain by soft weathered gneiss or schist to depths of 60 inches or more.

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

Included with this soil in mapping are small eroded areas of Gwinnett sandy clay loam. Also included are a few intermingled areas of Cecil, Davidson, Madison, and Pacolet soils.

This soil has medium potential for growing row crops, small grains, hay, and pasture. Its potential is limited because areas are small and erosion is a hazard. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has medium potential for most urban uses. The clayey subsoil is a limitation for sanitary landfills. Shrink-swell is the main limitation if this soil is used for community development. Capability subclass IIe; woodland suitability 3o.

GwC2—Gwinnett sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, strongly sloping soil is on ridgetops and hillsides of the Piedmont Upland. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and convex. Individual areas are 5 to 25 acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 5 inches thick. The subsoil is dark reddish brown clay that extends to a depth of 36 inches. Below this is soft weathered granite, gneiss, or schist to a depth of 60 inches or more.

This soil is low in natural fertility and organic matter content. It is strongly acid to slightly acid throughout except for surface layers that have been limed. Permeability is moderate, and the available water capacity is medium. The soil has fair tilth. Because of the high clay content in the surface layer, tillage can best be performed during periods when the soil is reasonably dry. The root zone is deep and easily penetrated by plant roots.

This soil has low potential for growing row crops and small grains. Its potential is limited because areas are small and erosion is a severe hazard. It is high for hay and pasture. Tilth can be improved by returning crop residue to the soil. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has medium potential for growing loblolly pine, red oak, and yellow-poplar. Erosion hazard, equipment limitations, and seedling mortality are management problems. These problems can be overcome to some extent by good management.

This soil has medium potential for most urban uses. Slope is the main limiting factor if this soil is used for sanitary facilities, community development, and recreation. Capability subclass IVe; woodland suitability 4c.

GwE2—Gwinnett sandy clay loam, 10 to 25 percent slopes, eroded. This deep, well drained, moderately steep and steep soil is on hillsides of the Piedmont Upland. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and convex. Individual areas are 5 to 20 acres.

Typically, the surface layer is dark reddish brown sandy clay loam about 5 inches thick. The upper part of the subsoil is dusky red clay, and the lower part is dark red sandy clay that extends to a depth of 34 inches. Below this is soft weathered granite, gneiss, or schist to depths of 60 inches or more.

This soil is low in natural fertility and organic matter content. It is strongly acid to slightly acid throughout except for surface layers that have been limed. Permeability is moderate, and the available water capacity is medium. This soil has fair tilth. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are some uneroded areas of Gwinnett sandy loam. Also included are a few intermingled areas of Davidson, Madison, and Pacolet soils.

This soil has low potential for growing row crops and small grains. Its potential is limited because of slope and the severe erosion hazard. It is medium for hay and pasture if management is good.

This soil has medium potential for growing loblolly pine, red oak, and yellow-poplar. Erosion hazard, equipment limitations, and seedling mortality are management problems. These problems can be overcome to some extent by good management.

This soil has low potential for most urban uses. The moderately steep and steep slopes are the primary limiting features for most urban and recreational uses. Capability subclass VIe; woodland suitability 4c.

GwC3—Gwinnett sandy clay loam, 6 to 10 percent slopes, severely eroded. This deep, well drained, strongly sloping soil is on ridgetops and hillsides of the Piedmont Upland. The surface layer is mainly subsoil material. The appearance of the landscape is one of numerous shallow gullies and occasional deep gullies. Slopes are irregular and convex. Individual areas are 5 to 20 acres.

Typically, the surface layer is dark red sandy clay loam about 4 inches thick. The subsoil is dark red and extends to a depth of 35 inches. The upper part is clay, and the lower part is sandy clay. Below this is soft weathered granite, gneiss, or schist to depths of 60 inches or more.

This soil is low in natural fertility and organic matter content. It is strongly acid to slightly acid throughout except for surface layers that have been limed. Permeability is moderate, and the available water capacity is medium. Tilth is poor. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are some areas of Gwinnett sandy clay loam that are less eroded. Also included are a few intermingled areas of Cecil, Davidson, Madison, and Pacolet soils.

This soil has low potential for growing row crops and small grains. Its potential is limited because areas are small and continuing erosion is a severe hazard. It is medium for hay and pasture. Tilth can be improved by returning crop residue to the soil.

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. Erosion hazard, equipment limitations, and seedling mortality are management problems. These problems can be overcome to some extent by a good ground cover, logging during drier seasons, and planting after good land preparation.

This soil has medium potential for most urban uses. Slope is the main limiting factor if this soil is used for sanitary facilities, community development, and recreation. Capability subclass VIe; woodland suitability 4c.

MdB—Madison sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on ridgetops of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 5 to 30 acres.

Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is red and extends to a depth of 28 inches; the upper few inches is sandy clay loam, and the lower part is clay. Below this is soft weathered gneiss and schist. Rippable bedrock is at a depth of about 40 inches.

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

Included with this soil in mapping are some small areas of Madison sandy clay loam that are eroded. Also included are a few intermingled areas of Cecil, Gwinnett, and Pacolet soils.

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

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has high potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can commonly be overcome by good design and careful installation procedures. Low strength is a limitation if this soil is used for local roads and streets. Capability subclass IIe; woodland suitability 3o.

MdC—Madison sandy loam, 6 to 10 percent slopes. This deep, well drained, strongly sloping soil is on narrow ridgetops and short hillsides of the Piedmont Upland. Slopes are irregular and convex. Individual areas are 5 to 20 acres.

Typically, the surface layer is brown sandy loam about 7 inches thick. The subsoil is red and extends to a depth of about 35 inches; the upper few inches is sandy clay loam and the lower part is predominantly clay. Below this is soft weathered gneiss and schist. Rippable bedrock is at a depth of about 52 inches.

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

Included with this soil in mapping are some areas of Madison sandy clay loam that are eroded. Also included are a few intermingled areas of Cecil, Gwinnett, and Pacolet soils.

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

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has medium potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can be overcome by good design and careful installation procedures. Slope is commonly a limitation for most urban and recreational uses. This limitation can commonly be overcome by careful design and construction or modifying the slope. Low strength is a limitation for most community developments. Capability subclass IIe; woodland suitability 3o.

MfC2—Madison sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, strongly sloping soil is on hillsides of the Piedmont Upland. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and convex. Individual areas are 5 to 20 acres.

Typically, the surface layer is brown sandy clay loam about 4 inches thick. The subsoil is red and extends to a depth of about 40 inches; the upper few inches is sandy clay loam, and the lower part is clay. Below this is soft weathered micaceous schist. Rippable bedrock is at a depth of about 50 inches.

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

Included with this soil in mapping are some uneroded areas that have a sandy loam surface layer. Also included are a few intermingled areas of Cecil, Gwinnett and Pacolet soils. The included soils make up about 10 to 20 percent of this mapping unit, but separate areas generally are less than 1 acre.

This soil has a medium potential for growing row crops, small grains, hay and pasture. Its potential is limited because of the small areas and the severe erosion hazard. Tilth can be improved by returning crop residue to the soil. Minimum tillage, and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. Erosion hazard, equipment limitations, and seedling mortality are management problems. These problems can be overcome to some extent by good management.

This soil has medium potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can be overcome by good design and careful installation procedures. Slope is commonly a limitation for most urban and recreational uses. This limitation can commonly be overcome by careful design and construction or modifying the slope. Low strength is a limitation for most community developments. Capability subclass IVe; woodland suitability 4c.

MfE2—Madison sandy clay loam, 10 to 25 percent slopes, eroded. This deep, well drained, moderately steep and steep soil is on hillsides of the Piedmont Upland. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and convex. Individual areas are 5 to 20 acres.

Typically, the surface layer is brown sandy clay loam about 5 inches thick. The subsoil is red and extends to a depth of about 40 inches; the upper few inches is sandy clay loam, and the lower part is clay. Below this is soft weathered micaceous schist. Rippable bedrock is at a depth of about 50 inches.

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

Included with this soil in mapping are some uneroded areas of Madison gravelly sandy loam and Madison sandy loam. Also included are a few intermingled areas of Appling, Cecil, and Pacolet soils.

This soil has low potential for growing row crops and small grains. Its potential is limited because of the slope and the severe erosion hazard. It is medium for hay and pasture if management is good.

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. Erosion hazard, equipment limitations, and seedling mortality are management problems. These problems can be overcome to some extent by good management.

This soil has low potential for most urban uses. The moderately steep and steep slopes are the primary limiting features for most urban and recreational uses. Capability subclass VIe; woodland suitability 3r.

MoC—Molena loamy sand, 2 to 10 percent slopes. This deep, somewhat excessively drained, gently sloping and strongly sloping soil is mainly on stream terraces adjacent to flood plains of the Piedmont Upland. Slopes are smooth and convex. Individual areas are 5 to 15 acres.

Typically, the surface layer is dark brown loamy sand about 9 inches thick. The upper few inches of the subsoil is reddish brown loamy sand, and the lower part is yellowish red loamy sand that extends to a depth of 65 inches. Below this is 10 inches of more yellowish red sand.

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

Included in mapping are a few intermingled areas of Appling, Cecil, and Gwinnett soils.

This soil has low potential for growing row crops and small grains. Its potential is limited because areas are small, and fertility and available water capacity are low. Crop residue returned to the soil will help overcome these limitations. The soil has medium potential for hay and pasture.

This soil has a medium potential for growing loblolly pine and red oak. Equipment limitations and seedling mortality are management problems on this soil.

This soil has medium potential for most urban uses. It is too sandy for most recreational uses, and seepage is a limitation for most sanitary facilities. Capability subclass IVs; woodland suitability 3s.

PaC—Pacolet sandy loam, 6 to 10 percent slopes. This deep, well drained, strongly sloping soil is on narrow ridgetops and short hillsides of the Piedmont Upland. Slopes are irregular and convex. Individual areas are 5 to 20 acres.

Typically, the surface layer is strong brown sandy loam about 4 inches thick. The subsoil is red and extends to a depth of 33 inches; the upper part is clay, and the lower part is clay loam. Below this is soft weathered gneiss and schist to a depth of 60 inches or more.

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

Included with this soil in mapping are some areas of Pacolet sandy clay loam that are eroded. Also included are a few intermingled areas of Appling, Ashlar, Cecil, Gwinnett, and Madison soils.

This soil has medium potential for growing row crops, small grains, hay, and pasture. Its potential is limited because areas are small and erosion is a hazard. Good tilth is easily maintained by returning crop residue to the soil. Erosion is a moderate to severe hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has medium potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this can be overcome by good design and construction. Slope is the main limiting factor if this soil is used for sanitary facilities, community development, and recreation. Capability subclass IIIe; woodland suitability 3o.

PaE—Pacolet sandy loam, 10 to 25 percent slopes. This deep, well drained, moderately steep and steep soil is on hillsides of the Piedmont Upland. Slopes are irregular and convex. Individual areas are 5 to 35 acres.

Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is red and extends to a depth of 36 inches; the upper few inches is clay loam, and the lower part is clay. Below this is soft weathered granite, gneiss, and schist to a depth of 60 inches or more.

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

Included with this soil in mapping are some soils that have a yellowish red sandy clay loam or clay subsoil. Also included are a few intermingled areas of Appling and Ashlar soils. The included soils make up about 10 to 20 percent of this mapping unit, but separate areas generally are less than 1 acre.

This soil has low potential for growing row crops and small grains. Its potential is limited because of slope. It is medium for hay and pasture if management is good.

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. Erosion hazard and equipment limitations are management problems that can be overcome by logging in drier periods and maintaining good ground cover.

This soil has low potential for most urban uses. The moderately steep and steep slopes are the primary limiting features for most urban and recreational uses. Capability subclass VIe; woodland suitability 3r.

PgC2—Pacolet sandy clay loam, 6 to 10 percent slopes, eroded. This deep, well drained, strongly sloping soil is on ridgetops and hillsides of the Piedmont Upland. The surface layer is a mixture of the original surface soil and the upper part of the subsoil. Rills or galled spots, shallow gullies, and an occasional deep gully are common. Slopes are irregular and convex. Individual areas are 5 to 15 acres.

Typically, the surface layer is yellowish red sandy clay loam about 5 inches thick. The subsoil is red and extends to a depth of 38 inches; the upper few inches is clay loam, and the lower part is clay. Below this is soft weathered granite, gneiss, and schist to a depth of 60 inches or more.

This soil is low in natural fertility and organic matter content. It is strongly acid or very strongly acid throughout except for surface layers that have been limed. Permeability is moderate, and the available water capacity is medium. Tilth is fair. Because of the high clay content in the surface layer, tillage can best be performed during periods the soil is reasonable dry. The root zone is deep and easily penetrated by plant roots.

Included with this soil in mapping are some areas that have a sandy loam surface layer. Also included are a few intermingled areas of Appling and Cecil soils. The included soils make up about 10 to 20 percent of this mapping unit, but separate areas generally are less than 1 acre.

This soil has low potential for growing row crops and small grains. Its potential is limited because areas are small and erosion is a severe hazard. It is high for hay and pasture. Tilth can be improved by returning crop residue to the soil. Minimum tillage and the use of cover crops, including grasses and legumes in the cropping system, are practices that help reduce runoff and control erosion.

This soil has a medium potential for growing loblolly pine, red oak, and yellow-poplar. Erosion hazard, equipment limitations, and seedling mortality are management problems. These problems can be overcome to some extent by good management.

This soil has medium potential for most urban uses. The subsoil percs slowly and is a limitation for septic tank absorption fields, but this limitation can be overcome by a good design and construction. Because the soil is strongly sloping or too clayey, it is limited for most sanitary facilities, community development, or recreational uses. Capability subclass IVe; woodland suitability 4c.

PuE—Pacolet-Urban land complex, 10 to 25 percent slopes. This complex consists of Pacolet soils and urban land that are so intermingled that they could not be separated at the scale selected for mapping. It is on moderately steep or steep hillsides of the Piedmont Upland. The mapped areas are 5 to 35 acres in size.

Pacolet soils make up about 50 to 75 percent of each mapped area. Typically, Pacolet soils have brown sandy loam surface layers about 6 inches thick. The subsoil is mainly red clay and extends to a depth of about 36 inches. The underlying saprolite material to a depth of 65 inches or more is soft weathered gneiss and schist.

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

Urban land makes up about 25 to 50 percent of each mapped area. The soils have been altered by cutting, filling, and shaping for community development. Most urban land is used for private dwellings, streets, and commercial buildings.

Included with this unit in mapping are areas of Pacolet sandy clay loam that are eroded and idle. Most of these eroded areas are dissected by shallow gullies.

This complex has a low potential for most urban and recreational uses because of slope. Also, the subsoil percs slowly and is a limitation for septic tank absorption fields. In places, this can be overcome by good design and careful installation procedures or modifying the slope. The common plants used for landscaping and vegetable gardens grow well on this complex. Erosion, however, is a severe hazard prior to establishment of permanent cover. Capability subclass VIe; woodland suitability 3r.

QU—Quarries. This map unit consists of large granite quarries that make up about 100 acres in Clayton and Henry Counties.

These quarries range from 3 to 75 feet in depth and expose granite bedrock and saprolite. Some stockpiled crushed rock is within most mapped areas.

To—Toccoa sandy loam. This deep, nearly level, well drained soil is commonly on the higher lying areas in the flood plain. There is a high probability of occasional brief flooding during winter and early spring. Individual areas are 10 to 20 acres.

Typically, the surface layer is strong brown sandy loam about 8 inches thick. This is underlain by stratified strong brown sandy loam and reddish brown loamy sand to a depth of 34 inches. Below this is a buried soil that is dark grayish brown silt loam several inches thick overlying gray fine sandy clay loam to a depth of 60 inches or more.

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

Included with this soil in mapping are small areas of Altavista soils that are too small to be mapped separately.

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

This soil has high potential for growing loblolly pine, yellow-poplar, and sweetgum. There are no significant limitations for woodland use and management.

This soil has a low potential for urban development. Flooding is the main limitation that could be overcome only by major flood control measures. Capability subclass IIw; woodland suitability 1o.

TS—Toccoa soils. This map unit consists of deep, well drained, nearly level soils on flood plains. There is a high probability of frequent brief flooding during winter and early spring. This unit consists of Toccoa soils and similar soils that are closely associated, but the pattern is irregular. Individual areas of each soil are large enough to map separately, but, because of present and predicted use, they were mapped as one unit. Most mapped areas contain Toccoa soils and the similar soils. Some contain only the Toccoa soils, and others only the similar soils.

About 60 percent of the mapping unit is Toccoa soils. Typically, the surface layer is strong brown sandy loam about 8 inches thick. This is underlain by stratified strong brown sandy loam and reddish brown loamy sand to a depth of 34 inches. Below this is a buried soil that is dark grayish brown silt loam several inches thick overlying gray fine sandy clay loam to a depth of 60 inches or more.

Toccoa soils are slightly acid to strongly acid throughout. Permeability is moderately rapid, and the available water capacity is medium. The root zone is deep, but a water table is commonly within about 36 inches of the surface during winter and spring.

About 25 percent of the map unit is soils similar to Toccoa soils. Typically, these soils have a higher clay content in the underlying stratified layers than is common in the Toccoa soils.

The soils that are similar to Toccoa soils are slightly acid to strongly acid throughout. The permeability is moderate, and the available water capacity is high. The root zone is deep, but a water table is commonly within about 36 inches of the surface during winter and spring and limits root penetration.

Included with these soils in mapping are small areas of Altavista, Cartecay, and Wehadkee soils.

This map unit has a medium potential for cultivated crops, hay, and pasture. Its potential is limited because of frequent flooding.

This map unit has high potential for growing loblolly pine, yellow-poplar, and sweetgum. Frequent flooding during late winter and early spring is the main limitation in managing and harvesting the tree crop. This can be overcome by using equipment and logging during the drier seasons.

This map unit has a low potential for urban and most recreational development. Flooding is the main limitation that could be overcome only by major flood control measures. Capability subclass IIIw; woodland suitability 1o.

UD—Urban land. This map unit consists of a part of Metropolitan Atlanta and the cities of College Park, Forest Park, and Jonesboro. The landscape is mainly ridgetops and hillsides associated with drainageways and flood plains. Commonly the soil has been modified by cutting, filling, shaping, and smoothing. In places, the cuts are deep and expose weathered mica schist, granite, or gneiss. Slopes are 2 to 25 percent.

Urban land makes up more than 85 percent of the mapped area. It includes business districts, shopping centers, schools, churches, parking lots, motels, industries, streets and sidewalks, housing developments, and airport areas. The rest of the mapped area is Cecil and Pacolet soils. A few areas are wooded or in grass.

This map unit is essentially in urban use. Erosion is a severe hazard in most areas under construction. Flooding and sediment from the uplands are hazards in areas on the flood plain.

WH—Wehadkee soils. This map unit consists of deep, nearly level soils in depressions in flood plains. It is flooded commonly for brief periods during winter and spring. It consists of Wehadkee soils and similar soils that are closely associated, but the pattern is irregular. Individual areas of each soil are large enough to be mapped separately, but, because of present and predicted use, they were mapped as one unit. Most mapped areas contain Wehadkee soils and the similar soils. Some contain only the Wehadkee soils, and others only the similar soils.

About 65 percent of the map unit is Wehadkee soils. Typically, Wehadkee soils have a predominantly dark grayish brown silt loam surface layer about 7 inches thick. The subsoil extends to a depth of 50 inches. It is dominantly gray silty clay loam mottled with yellowish brown. Beneath this to a depth of 60 inches or more is gray sandy loam mottled with brown.

Wehadkee soils are slightly acid or medium acid. Permeability is moderate, and the available water capacity is high. The root zone is deep, but a water table is commonly within 0 to 30 inches of the surface during winter and spring.

About 20 percent of the map unit is soils somewhat similar to Wehadkee soils. Typically, these soils have a higher clay content in the underlying layers than is common in the Wehadkee soils.

The soils that are somewhat similar to Wehadkee soils are slightly acid or medium acid. Permeability is slow, and the available water capacity is high. The root zone is deep, but a water table is commonly within 12 inches of the surface during winter and spring.

Included with these soils in mapping are small areas of Cartecay and Toccoa soils.

This map unit is wooded. It has a high potential for growing loblolly pine, yellow-poplar, sweetgum, and eastern cottonwood. Wetness and flooding are the main limitations to seedling mortality and equipment use in managing and harvesting the tree crop. The equipment limitation can be overcome by using special equipment and logging during the drier seasons.

This map unit has very low potential for farming, urban, and recreational uses. Wetness and flooding are the main limitations that could be overcome only by major flood control and drainage measures. Capability subclass VIw; woodland suitability 1w.

Use and management of the soils

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

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

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

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

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

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

Crops and pasture

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

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

Soil erosion is the major soil problem on most of the cropland and pasture in the survey area. If the slope is more than 2 percent, erosion is a hazard.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils with a clayey subsoil, such as the Appling, Cecil, Davidson, Gwinnett, Madison, and Pacolet soils, and on soils with a layer in or below the subsoil that limits the depth of the root zone. Such layers include bedrock, as in Ashlar soils. Erosion also reduces productivity on soils that tend to be droughty, such as Molena soils. Second, soil erosion on farmland results in sediment entering streams. Control of erosion minimizes the pollution of streams by sediment and improves quality of water for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, preparing a good seedbed and tilling are difficult on clayey spots because the original friable surface soil has been eroded away. Such spots are common in areas of eroded Appling, Cecil, and Gwinnett soils.

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

Slopes are so short and irregular that contour tillage or terracing is not practical in most areas of the Appling, Cecil, Davidson, Gwinnett, Madison, and Pacolet soils that occupy hillsides greater than 6 percent. On these soils, cropping systems that provide substantial vegetative cover are required to control erosion unless minimum tillage is practiced. Minimizing tillage and leaving crop residues on the surface help to increase infiltration and reduce the hazards of runoff and erosion. These practices can be adapted to most soils in the survey area but are more difficult to use successfully on soils such as the eroded Appling, Gwinnett, Madison, and Pacolet. No tillage for corn, which is common on an increasing acreage, is effective in reducing erosion on sloping land and can be adapted to most soils in the survey area. It is more difficult to practice successfully, however, on the soils with a sandy clay loam surface layer.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are most practical on deep, well drained gently sloping soils on ridgetops that are smooth and convex. The other soils are less suitable for terracing and diversions because of strong to steep slopes, or bedrock at a depth of less that 40 inches.

Contouring is a widespread erosion control practice in the survey area. It is best adapted to soils with smooth, uniform slopes, including most areas of the gently sloping Appling, Cecil, Gwinnett, Madison, and Pacolet soils.

Information on the design of erosion control practices for each kind of soil is contained in the Technical Guide, available in local offices of the Soil Conservation Service.

Soil drainage is the major management need on about 10 percent of the acreage used for crops and pasture in the survey area. Some soils are naturally so wet that the production of crops common to the area is generally not possible. These are the poorly drained Wehadkee soils, which make up about 10,700 acres in the survey area.

Unless artificially drained, the somewhat poorly drained soils are so wet that crops are damaged during most years. In this category are the Cartecay soils, which make up about 25,000 acres.

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

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage is needed in most areas of the poorly drained and very poorly drained soils used for intensive rowcropping. Drains have to be more closely spaced in soils with slow permeability than in the more permeable soils. Tile drainage is very slow in Wehadkee soils. Finding adequate outlets for tile drainage systems is difficult in many areas of Cartecay and Wehadkee soils.

Information on drainage design for each kind of soil is contained in the Technical Guide, available in local offices of the Soil Conservation Service.

Soil fertility is naturally low in most soils of the uplands in the survey area, but they respond well to fertilization and other good management practices. All the soils are naturally acid. The soils on flood plains, such as Cartecay, Toccoa, and Wehadkee soils, are slightly acid or medium acid and are naturally higher in plant nutrients than most upland soils.

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

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

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

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

Field crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn and cotton, and to an increasing extent soybeans (fig. 5), are the row crops. Vegetables and similar crops can be grown if economic conditions are favorable.

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

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

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

Yields per acre

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

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

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

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork. Accurate fertilizer recommendations for a particular soil and a particular crop can only be accomplished by soil testing. In the absence of a soil test, general recommendations are available in Circular 639 (*3*).

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

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

Capability classes and subclasses

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

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

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

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

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

Woodland management and productivity

W. P. THOMPSON, forester, Soil Conservation Service, assisted in preparing this section.

Virgin forest originally covered most of the land in Clayton, Fayette, and Henry Counties. Presently approximately 61 percent of the total land area is in commercial forest.

Good stands of trees are growing on the forest lands of these counties (fig. 6). Loblolly and shortleaf pine, along with mixed upland hardwood, grow on the ridges and lower slopes. Hardwood consisting of yellow-poplar, sycamore, gum, maple, water oak, red oak, and white oak grow along bottomlands.

The value of the wood products is substantial, though it is below its potential. Other values include wildlife, recreation, natural beauty, and conservation of soil and water. This section has been provided to explain how soils affect tree growth and management in these counties.

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

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

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

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

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

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

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant eastern cottonwoods attain at age 30, that dominant and codominant American sycamores attain at age 35, and that dominant and codominant trees of all other species attain at age 50. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

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

Engineering

JACK G. LAMB, civil engineer, Soil Conservation Service, assisted in preparing this section.

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

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

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

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

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

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

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

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

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

Building site development

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

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

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

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

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

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

Sanitary facilities

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

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

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

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

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

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

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

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

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

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

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

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

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

Construction materials

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

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

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

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

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

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

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

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

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

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

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

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

Water management

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

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

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

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

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

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

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

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

Recreation

The soils in the survey area are suitable for a variety of recreational activities. The population of the three counties and their proximity to Atlanta support many private recreational developments. Activities most common in the survey area are camping, tennis, swimming, golfing, picnicking, and fishing.

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

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

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

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

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

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

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

Wildlife habitat

JESSE MERCER, JR., biologist, Soil Conservation Service, helped prepare this section.

Land use in the counties of this survey area provides habitat for a variety of wildlife species. The large acreage of woodland supports deer, squirrel, raccoon, many nongame animals, and songbirds. Quail, rabbit, and dove are most abundant around cropland areas. The many streams and impoundments provide habitat for waterfowl and other wildlife dependent on an aquatic environment. Beavers are numerous. Their many acres of ponds are especially attractive to woodducks. Hunting and fishing are among the most popular outdoor recreation activities engaged in by residents of the counties of this survey.

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

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

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

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

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

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

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

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

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

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

Wetland plants are annual and perennial vegetation common to moist or wet sites. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, and cordgrass and rushes, sedges, and reeds.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. A dependable water supply is important if water areas are to be developed and managed. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

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

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

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, fox, raccoon, and deer.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Soil properties

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

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

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

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

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

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

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

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*2*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 17. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Ranges in liquid limit and plasticity index are estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 17.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Soil series and morphology." The soil samples were analyzed by the Department of Transportation, State of Georgia, Office of Materials and Research.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials. The codes for Unified classification are those assigned by the American Society for Testing and Materials.

The methods and codes are AASHTO classification (M-145); Unified classification (D-2487); mechanical analysis (T88); liquid limit (T89); plasticity index (T90); moisture-density, method A (T99).

Soil series and morphology

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*5*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil maps for detailed planning."

Altavista series

The Altavista series consists of deep, moderately well drained, moderately permeable soils that formed in loamy sediments. These soils are on low stream terraces of the Piedmont Lowland. The seasonal high water table is within 18 to 30 inches of the surface late in winter and early in the spring. Slope is dominantly less than 2 percent but ranges to 3 percent.

Altavista soils are geographically closely associated with Cartecay, Toccoa, and Wehadkee soils. The associated soils lack argillic horizons and occupy flood plains.

Typical pedon of Altavista sandy loam, in an area of Altavista sandy loam, 0 to 3 percent slopes, in a wooded area 50 yards north of confluence of Flat and Line Creeks; 40 yards west of Ga. Highway 74; Fayette County.

Ap—0 to 7 inches; brown (10YR 4/3) sandy loam; weak fine granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

B1—7 to 9 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; many fine roots; strongly acid; clear smooth boundary.

B21t—9 to 16 inches; yellowish brown (10YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; strongly acid; clear smooth boundary.

B22t—16 to 22 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine prominent red mottles and few fine faint strong brown mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B23t—22 to 36 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct light brownish gray (10YR 6/2) and red (2.5YR 5/8) mottles; weak fine subangular blocky structure; few thin patchy clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

C—36 to 60 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 6/1) sandy loam; massive; very friable; strongly acid.

Solum thickness ranges from 36 to 50 inches. The soil is strongly acid or very strongly acid throughout except for surface layers that have been limed.

The A horizon is 6 to 13 inches thick. The A1 or Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4.

The Bt horizon is 15 to 30 inches thick. It has hue of 7.5YR and 10YR, value of 5 or 6, and chroma of 6 or 8. It includes common and many gray, light grayish brown, and grayish brown mottles. The Bt horizon is dominantly sandy clay loam but includes clay loam.

The B3 horizon, if present, is 4 to 9 inches thick. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8. It includes common to many gray, light grayish brown and grayish brown mottles. The B3 horizon is dominantly sandy loam but includes sandy clay loam.

The C horizon is commonly stratified sand, loamy sand, or sandy loam. Some pedons contain coarse sand or gravel.

Appling series

The Appling series consists of deep, well drained, moderately permeable soils that formed in material weathered from schist, gneiss, and granite. The Appling soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 2 to 10 percent but is dominantly 2 to 8 percent.

Appling soils are geographically closely associated with Ashlar, Cecil, and Pacolet soils. These associated soils share the same landscapes. Ashlar soils have hard bedrock between depths of 22 and 40 inches. Cecil and Pacolet soils have a redder subsoil, and in addition, Pacolet soils have a thinner solum.

Typical pedon of Appling sandy loam, in an area of Appling sandy loam, 2 to 6 percent slopes, in a pasture 10 yards northwest of intersection of Friendship and Woolsey Roads; Fayette County.

Ap—0 to 6 inches; grayish brown (2.5Y 5/2) sandy loam; weak fine granular structure; very friable; many fine and medium roots; few quartz pebbles; strongly acid; abrupt smooth boundary.

A2—6 to 10 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; friable; many fine roots; few quartz pebbles; strongly acid; abrupt smooth boundary.

B1—10 to 16 inches; yellowish brown (10YR 5/6) sandy clay loam; moderate medium angular blocky structure; friable; many fine and medium roots; few quartz pebbles; thin clay films on faces of some peds; strongly acid; clear smooth boundary.

B21t—16 to 29 inches; yellowish brown (10YR 5/6) clay; few medium distinct yellowish red (5YR 4/8) and strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm; few fine roots; few fine flakes of mica; few quartz pebbles; thick clay films on faces of some peds; strongly acid; gradual wavy boundary.

B22t—29 to 45 inches; yellowish brown (10YR 5/6) clay; many coarse prominent yellowish red (5YR 4/8) and red (2.5YR 4/8) mottles, and many coarse distinct strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm; thick clay films on faces of most peds; few white feldspar crystals; strongly acid; clear wavy boundary.

C—45 to 60 inches; mottled yellowish red (5YR 4/8), strong brown (7.5YR 5/6), and red (2.5YR 4/8) sandy loam; massive; friable; few quartz pebbles; strongly acid.

Solum thickness ranges from 41 to 60 inches. The soil is very strongly acid or strongly acid throughout except for surface layers that have been limed.

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

The Bt horizon is 22 to 29 inches thick. It has hue of 5YR to 10YR, value of 4 or 5, and chroma of 4, 6, or 8. This horizon includes few or common red, brown and strong brown mottles.

The B3 horizon, if present, is 5 to 11 inches thick. It has hue of 5YR to 10YR, value of 4 to 6, and chroma of 6 or 8. The B3 horizon is dominantly sandy clay loam but includes clay loam.

Ashlar series

The Ashlar series consists of moderately deep, well drained or excessively drained, moderately rapidly permeable soils that formed in material weathered from granite. These soils are gently sloping to steep and occupy the Piedmont Upland. Slope ranges from 2 to 25 percent but commonly is 6 to 20 percent.

Ashlar soils are geographically closely associated with Appling and Pacolet soils. The associated soils have argillic horizons and lack hard bedrock between depths of 22 and 40 inches. Also, Appling soils are commonly less sloping.

Typical pedon of Ashlar sandy loam, in an area of Ashlar sandy loam, 2 to 10 percent slopes, in a wooded area 0.7 mile west of U.S. Highway 23; 250 yards south of Panther Creek; Clayton County.

Ap—0 to 6 inches; dark grayish-brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; many very fine roots; few fine roots; few fine flakes of mica; medium acid; clear smooth boundary.

B1—6 to 9 inches; yellowish brown (10YR 5/4) sandy loam; weak fine granular structure; very friable; many very fine roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

B2—9 to 21 inches; yellowish brown (10YR 5/6) sandy loam; weak coarse subangular blocky structure; friable; few fine roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—21 to 32 inches, mottled and streaked brown, yellow, white, and black strongly weathered granite rock; firm in place, sandy loam if crushed; few fine flakes of mica; strongly acid; abrupt wavy boundary.

R—32 inches; hard granite rock.

Solum thickness ranges from 14 to 24 inches. Depth to hard rock ranges from 22 to 40 inches. The soil is strongly acid or very strongly acid throughout except for surface layers that have been limed.

The A horizon is 4 to 8 inches thick. It has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Some pedons have up to 18 percent coarse fragments of angular quartz, granite, and gneiss.

The B horizon is 10 to 16 inches thick. It has hue of 7.5YR or 10YR, value of 5, and chroma of 4, 6, or 8.

The C horizon is 10 to 26 inches thick. It includes yellow, brown, white, and black mottles and streaks.

Cartecay series

The Cartecay series consists of deep, somewhat poorly drained, moderately rapidly permeable soils that formed in thick loamy alluvial sediments. These nearly level soils are on flood plains within the Piedmont Upland. They are saturated with water late in winter and early in the spring. Slope is dominantly less than 1 percent but ranges to 2 percent.

Cartecay soils are geographically closely associated with Altavista, Toccoa, and Wehadkee soils. Altavista soils are on higher lying stream terraces or the lower part of hillsides and have an argillic horizon; Toccoa soils are on slightly higher landscapes and are better drained; Wehadkee soils are in slight depressions, are more poorly drained, and have a fine loamy control section.

Typical pedon of Cartecay loam, in an area of Cartecay soils, in a pasture 1.0 mile east of Henry-Clayton County line; 50 feet southeast of Walnut Creek; Henry County.

Ap—0 to 7 inches; dark brown (10YR 4/3) loam; weak fine granular structure; very friable; many very fine and fine roots; few or common fine flakes of mica; slightly acid; clear smooth boundary.

C1—7 to 14 inches; dark brown (7.5YR 4/4) sandy loam; common fine faint dark grayish brown (2.5Y 4/2) mottles; weak fine granular structure; very friable; few fine roots; few or common fine flakes of mica; medium acid; clear smooth boundary.

C2—14 to 20 inches; yellowish red (5YR 5/6) loamy sand; few fine faint dark yellowish brown (10YR 4/4) mottles; single grained; loose; few fine flakes of mica; medium acid; abrupt smooth boundary.

C3—20 to 30 inches; dark grayish brown (10YR 4/2) sandy loam; common fine prominent yellowish red (5YR 5/6) mottles; massive; friable; few fine flakes of mica; slightly acid; abrupt smooth boundary.

C4—30 to 36 inches; strong brown (7.5YR 5/6) loamy sand; single grained; very friable; medium acid; abrupt smooth boundary.

C5—36 to 50 inches; gray (10YR 5/1) loam; common fine distinct dark brown (7.5YR 4/4) mottles; massive; friable; medium acid; clear smooth boundary.

IIC6—50 to 60 inches; dark gray (N/4) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; massive; friable; few or common fine flakes of mica; strongly acid.

Total thickness of stratified layers is 60 to 70 inches or more. These layers are strongly acid throughout except for surface layers that have been limed.

The A horizon is 5 to 15 inches thick. This horizon has hue of 7.5YR and 10YR, value of 4 or 5, and chroma of 2 or 3.

The stratified C horizon is 55 to 60 inches or more thick. It has hue of 5YR to 10YR, value of 4 or 5, and chroma of 1, 2, 4, or 6.

Cecil series

The Cecil series consists of deep, well drained, moderately permeable soils that formed in material weathered from granite, gneiss, and mica schist. The Cecil soils are on broad ridgetops and strongly sloping hillsides of the Piedmont Upland. Slope ranges from 2 to 10 percent but is dominantly 2 to 8 percent.

The Cecil soils are geographically closely associated with Appling, Gwinnett, and Madison soils. Appling soils have subsoils that are less red. Gwinnett, Madison, and Pacolet soils have a thinner solum; in addition, Gwinnett soils are darker red throughout, and Madison soils formed in material weathered from mica schist.

Typical pedon of Cecil sandy loam, in an area of Cecil sandy loam, 2 to 6 percent slopes, at the crest of a ridgetop in cultivated field, 4.5 miles west of McDonough, Georgia, on Ga. Highway 81; 150 yards south of highway, 125 feet northeast of Greenwood Road; Henry County.

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

B1—6 to 10 inches; red (2.5YR 4/6) sandy clay loam; weak fine subangular blocky structure; friable; common fine roots; strongly acid; clear wavy boundary.

B21t—10 to 20 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; common fine roots; patchy clay films on faces of some peds; strongly acid; clear wavy boundary.

B22t—20 to 36 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; few fine roots; patchy clay films on faces of peds; few flakes of mica; strongly acid; clear wavy boundary.

B3—36 to 58 inches; red (10R 4/6) sandy clay loam; few fine prominent strong brown mottles; weak fine subangular blocky structure; friable; few flakes of mica; strongly acid; gradual smooth boundary.

C—58 to 65 inches; red (10R 4/6) sandy loam; many common prominent strong brown and pale brown mottles; massive; few weak gneiss and schist fragments; common flakes of mica; strongly acid.

Solum thickness ranges from 42 to 60 inches. The soil is strongly acid or very strongly acid throughout except for those surface layers that have been limed.

The A horizon is 4 to 8 inches thick. It has hue of 5YR, 7.5R or 10YR, value of 4 or 5, and chroma of 3 to 6.

The B1 horizon, if present, is 3 to 7 inches thick. It has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay loam or clay loam.

The Bt horizon is 20 to 43 inches thick. It has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay or clay.

The B3 horizon is 10 to 36 inches thick. The horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It includes few to many yellowish brown, strong brown, and reddish yellow mottles.

Davidson series

The Davidson series consists of deep, well drained, moderately permeable soils that formed in material weathered from diorite, gneiss, and hornblende gneiss.

These soils are on broad ridgetops and short hillsides of the Piedmont Upland. Slope ranges from 2 to 10 percent but is dominantly 2 to 7 percent.

Davidson soils are geographically closely associated with Cecil and Gwinnett soils. Cecil and Gwinnett soils have thinner solums; in addition, Cecil soils are less red throughout.

Typical pedon of Davidson loam, in an area of Davidson loam, 2 to 6 percent slopes, in a pasture 0.7 mile east of Antioch Creek; 95 feet west of Brook Road; Fayette County.

Ap—0 to 6 inches; dusky red (10R 3/2) loam; weak fine granular structure; very friable; many very fine roots; few black concretions; few quartz pebbles; slightly acid; clear smooth boundary.

B1—6 to 9 inches; dusky red (10R 3/3) clay loam; weak medium subangular blocky structure; friable; many very fine and fine roots; few quartz gravel; few black concretions; few fine pores; thin discontinuous clay films on faces of peds; slightly acid; clear smooth boundary.

B21t—9 to 48 inches; dusky red (10R 3/3) clay; moderate medium subangular blocky structure; firm; few fine roots; few black and yellow concretions; few worm casts; few fine pores; thick clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—48 to 62 inches; dark red (10R 3/6) clay; moderate medium subangular blocky and angular blocky structure; firm; few fine roots; thick clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—62 to 78 inches; dark red (10R 3/6) clay loam; weak medium subangular blocky structure; friable; many black and yellowish brown concretions; thin discontinuous clay films on faces of peds; strongly acid.

Solum thickness ranges from 65 to 78 inches or more. The soil is strongly acid or medium acid throughout except for those surface layers that have been limed.

The A horizon is 6 to 8 inches thick. It has hue of 5YR or 10YR, value of 3, and chroma of 2 to 4.

The Bt horizon is 40 to 73 inches thick. It has hue of 2.5YR or 10R, value of 3, and chroma of 3, 4, or 6. The Bt horizon is sandy clay or clay.

Gwinnett series

The Gwinnett series consists of deep, well drained, moderately permeable soils that formed in material weathered from gneiss and schist. These soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 2 to 25 percent but is dominantly 2 to 18 percent.

Gwinnett soils are geographically closely associated with Cecil, Davidson, Madison, and Pacolet soils. Cecil and Davidson soils have a thicker solum; in addition, Cecil soils are less red. Madison and Pacolet soils are less red. Also, Madison soils contain more mica.

Typical pedon of Gwinnett sandy clay loam, in an area of Gwinnett sandy clay loam, 6 to 10 percent slopes, eroded, in a woodland of loblolly pine and shortleaf pine, 30 yards west of road; 0.35 mile north of Mount Vernon Church; 0.6 mile northwest of Flat Shoal Church; Henry County.

O1—1 inch to 0; pine needles and twigs.

Ap—0 to 5 inches; dark reddish brown (5YR 3/4) sandy clay loam; weak fine granular structure; very friable; common fine roots; common black nodules (10 percent by volume); few fine pebbles; few fine pores; medium acid; abrupt smooth boundary.

B21t—5 to 24 inches; dark reddish brown (2.5YR 3/4) clay; moderate medium subangular structure; firm; few fine and medium roots; few fine clear quartz pebbles; few soft rock fragments; few black nodules; few fine pores; clay films on faces of peds; slightly acid; gradual wavy boundary.

B22t—24 to 36 inches; dark reddish brown (2.5YR 3/4) clay; moderate medium subangular blocky structure; firm; few fine roots; few fine clear quartz pebbles; few soft rock fragments; few fine pores; few soft yellowish brown and weak red nodules; clay films on faces of peds; slightly acid; clear wavy boundary.

Cr—36 to 64 inches; soft weathered red, yellowish red, and black rock with thin dark reddish brown clay loam lenses; massive; rock crushes easily to clay loam; dark reddish brown clay loam lenses are in discontinuous narrow bands or pockets 1/4 to 1/16 inch wide and make up less than 1 percent of horizon by volume; very strongly acid.

Solum thickness ranges from 31 to 39 inches. The soil is slightly acid to very strongly acid throughout except for those surface layers that have been limed.

The A horizon is 4 to 9 inches thick. It has hue of 10R, 2.5YR or 5YR, value of 3, and chroma of 4 or 6. It is sandy loam or sandy clay loam. Some pedons contain few to many pebbles and a few cobbles.

The Bt horizon is 16 to 31 inches thick. It has hue of 10R or 2.5YR, value of 3, and chroma of 4 or 6. It is clay or sandy clay.

The B3 horizon, if present, contains up to 35 percent soft, loose rock fragments.

Madison series

The Madison series consists of deep, well drained, moderately permeable soils that formed in material weathered from micaceous schist or mica gneiss. The Madison soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 2 to 25 percent but is dominantly 2 to 18 percent.

Madison soils are geographically closely associated with Cecil, Gwinnett, and Pacolet soils. The associated soils contain less mica. Cecil soils have a thicker solum. Gwinnett soils are redder.

Typical pedon of Madison sandy loam, in an area of Madison sandy loam, 6 to 10 percent slopes, on hillside 30 yards east of Clark Road; 0.6 mile south of DeKalb County line; Henry County.

Ap—0 to 7 inches; brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; many fine and medium flakes of mica; many fine and medium roots; strongly acid; abrupt smooth boundary.

B1—7 to 10 inches; red (2.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; many fine and medium flakes of mica; common fine roots; strongly acid; clear wavy boundary.

B21t—10 to 19 inches; red (2.5YR 4/6) clay; weak medium subangular blocky structure; firm; common fine roots; patchy clay films on faces of peds; many fine flakes of mica; strongly acid; gradual smooth boundary.

B22t—19 to 35 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm; patchy clay films on faces of peds; many fine and medium flakes of mica; strongly acid; gradual smooth boundary.

B3—35 to 40 inches; red (2.5YR 4/6) sandy loam; very friable; many fine and medium flakes of mica; few schist fragments; strongly acid; gradual wavy boundary.

C1—40 to 52 inches; black, red, olive yellow, and yellowish brown weathered schist rock; pockets of clayey material; rock controlled structure; many fine and medium flakes of mica; strongly acid; gradual irregular boundary.

Cr—52 inches; weathered mica schist rock.

Solum thickness ranges from 20 to 40 inches. The soil is very strongly acid or strongly acid throughout except for those surface layers that have been limed.

The A horizon is 5 to 8 inches thick. It has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3, 4, or 6. It is sandy loam or sandy clay loam. Some A horizons contain few to many pebbles and a few cobbles.

The B horizon is 15 to 32 inches thick. It has hue of 10R, 2.5YR, or 5YR, value of 4 or 5, and chroma of 6 or 8. The Bt horizon is clay or clay loam.

Molena series

The Molena series consists of deep, somewhat excessively drained, rapidly permeable soils that formed in sandy alluvial deposits. The Molena soils are mainly on stream terraces in the Piedmont Upland. Slope ranges from 2 to 10 percent but is dominantly 2 to 7 percent.

Molena soils are geographically closely associated with Appling, Cecil, and Gwinnett soils. The associated soils formed in material weathered from granite. They are less sandy throughout and are not so well drained.

Typical pedon of Molena loamy sand, in an area of Molena loamy sand, 2 to 10 percent slopes, in pasture 1.3 miles north of Spalding County line; 0.5 mile due east of Flint River; Clayton County.

Ap—0 to 9 inches; dark brown (7.5YR 4/4) loamy sand; loose; many fine and very fine roots; very strongly acid; gradual smooth boundary.

B1—9 to 18 inches; reddish brown (5YR 4/4) loamy sand; weak fine granular structure; very friable; many very fine roots; strongly acid; gradual smooth boundary.

B2t—18 to 43 inches; yellowish red (5YR 4/6) loamy sand; weak medium subangular blocky structure; very friable; sand grains coated and bridged with clay; many very fine roots; very strongly acid; gradual smooth boundary.

B3—43 to 65 inches; yellowish red (5YR 5/8) loamy sand; weak medium granular structure; loose; few fine roots; few flakes of mica; very strongly acid; gradual smooth boundary.

C—65 to 75 inches; yellowish red (5YR 5/8) sand; single grained; loose; few fine roots; few flakes of mica; very strongly acid.

Solum thickness ranges from 42 to 67 inches. The soil is very strongly acid or medium acid throughout except for those surface layers that have been limed.

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

The B1 horizon is 9 to 16 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6.

The Bt horizon is 25 to 50 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 or 8.

The B3 horizon, if present, is 10 to 30 inches thick. It has hue of 5YR, value of 4 or 5, and chroma of 6 or 8. Fine flakes of mica range from none to common.

Pacolet series

The Pacolet series consists of deep, well drained, moderately permeable soils that formed in material weathered from granite, gneiss, and mica schist. The Pacolet soils are on ridgetops and hillsides of the Piedmont Upland. Slope ranges from 6 to 25 percent but is dominantly 10 to 22 percent.

Pacolet soils are geographically closely associated with Appling, Ashlar, Cecil, and Madison soils. Appling soils have a thicker solum and a more yellowish B horizon. Ashlar soils have a thinner solum and less clay in the B horizon. Cecil soils have a thicker solum. Madison soils formed primarily from micaceous schist and gneiss and contain more mica throughout.

Typical pedon of Pacolet sandy loam, in an area of Pacolet sandy loam, 6 to 10 percent slopes, in wooded area, 0.5 mile northwest of Kellytown; 0.9 mile southwest of the junction of Camp Creek and South River; Henry County.

Ap—0 to 4 inches; strong brown (7.5YR 5/6) sandy loam; weak fine granular structure; very friable; many fine and medium roots; common quartz pebbles (5 percent by volume); medium acid; abrupt smooth boundary.

B2t—4 to 22 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; friable; few fine roots; few worm casts; clay films prominent on some faces of peds; few fine root channels with dark reddish brown fillings; yellowish brown, white, and olive brown (less than 1 percent by volume) soft rock fragments; common fine flakes of mica; strongly acid; gradual wavy boundary.

B3—22 to 33 inches; red (2.5YR 4/6) clay loam; weak fine and medium angular blocky structure; friable; thin patchy clay films on faces of peds; yellowish brown, yellowish red, and red (15 percent by volume) soft rock; common fine flakes of mica; strongly acid; gradual wavy boundary.

C—33 to 56 inches; yellowish red (5YR 5/8), yellowish brown (10YR 5/6), and very pale brown (10YR 8/4) saprolite that is sandy loam if crushed; few red (2.5YR 4/8) clay lenses 1/4 to 1/16 inch wide (5 to 10 percent by volume); rock structure; friable; very strongly acid.

Solum thickness ranges from 28 to 38 inches. The soil is strongly acid or very strongly acid throughout except for those surface layers that have been limed.

The A horizon is 4 to 8 inches thick. It has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6 or 8.

The B1 horizon, if present, is 2 to 6 inches thick. It has hue of 2.5YR, value of 4 or 5, and chroma of 8. It is sandy clay loam or clay loam.

The Bt horizon is 12 to 18 inches thick. It has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is clay loam or clay.

The B3 horizon is 6 to 14 inches thick. It has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay loam or clay loam.

Toccoa series

The Toccoa series consists of deep, well drained, moderately rapidly permeable soils that formed in predominantly loamy sediments on flood plains. These nearly level soils are near streams that drain from the upland. The water table is 30 to 60 inches from the surface during late winter and early spring; also, there is a high probability of occasional or frequent flooding during this period. Slope is dominantly less than 1 percent but ranges to 2 percent.

Toccoa soils are geographically closely associated with the Altavista, Cartecay, and Wehadkee soils. Altavista soils are on low stream terraces adjacent to flood plains, are less well drained, and have a fine loamy control section. Cartecay and Wehadkee soils occupy somewhat lower bottomland landscapes and are less well drained. In addition, Wehadkee soils have a fine loamy control section.

Typical pedon of Toccoa sandy loam, in an area of Toccoa soils, in an idle field, 150 yards east of Ga. Highway 155; 100 feet north of Mountain Creek; Henry County.

Ap—0 to 8 inches; strong brown (7.5YR 5/6) sandy loam; weak medium granular structure; very friable; many very fine roots; common fine flakes of mica; medium acid; abrupt smooth boundary.

C1—8 to 22 inches; strong brown (7.5YR 5/6) sandy loam; massive; very friable; few very fine roots; common fine flakes of mica; bedding planes of loamy sand 1/4 inch thick, about 4 inches apart; medium acid; gradual wavy boundary.

C2—22 to 34 inches; reddish brown (5YR 5/4) loamy sand; structureless; loose; few fine flakes of mica; medium acid; gradual wavy boundary.

A1b—34 to 42 inches; dark grayish brown (10YR 4/2) silt loam; few fine prominent yellowish red (5YR 4/8) mottles; weak medium granular structure; very friable; few fine flakes of mica; medium acid; gradual wavy boundary.

B2gb—42 to 60 inches; gray (5Y 5/1) sandy clay loam; weak medium subangular blocky structure; friable; few fine flakes of mica; medium acid.

Alluvium ranges from 5 to 10 feet or more in thickness. The soil is strongly acid to slightly acid throughout. Buried A and B horizons are lacking in some places.

The A horizon is 8 to 12 inches thick. It has hue of 5YR or 7.5YR, value of 3, 4, and 5, and chroma of 3, 4, or 6.

The C horizon has hue of 5YR or 7.5YR, value of 3, 4, or 5, and chroma of 3, 4, or 6. Some pedons have few or common, gray, grayish brown, or light brownish gray mottles below a depth of 20 inches. The C horizon is dominantly sandy loam, but thin layers of loamy sand or sand are common.

Wehadkee series

The Wehadkee series consists of deep, poorly drained, moderately permeable soils that formed in thick loamy sediments. These nearly level soils are in slight depressions on flood plains within the Piedmont Upland. They are commonly saturated with water during winter and spring. Slope is less than one percent.

Wehadkee soils are geographically closely associated with Cartecay and Toccoa soils. Cartecay and Toccoa soils occupy somewhat higher lying bottomland landscapes, are better drained, and contain less clay throughout.

Typical pedon of Wehadkee silt loam, in an area of Wehadkee soils, in a wooded area 300 feet south of Cotton Creek; 0.75 mile east-southeast of Church of God on Highway 138; Henry County.

A1—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint brown mottles; weak fine granular structure; sticky; many fine roots; few fine black and dark brown nodules; strongly acid; gradual wavy boundary.

B1g—7 to 18 inches; dark gray (10YR 4/1) silt loam; common fine faint yellowish brown mottles; weak fine and medium subangular blocky structure; slightly sticky; few fine roots; few fine black and dark brown nodules; medium acid; clear smooth boundary.

B21g—18 to 25 inches; gray (N 5/0) silty clay loam; common fine faint yellowish brown mottles; weak medium subangular blocky structure; sticky; medium acid; gradual wavy boundary.

B22g—25 to 50 inches; gray (N 5/0) silty clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak fine and medium subangular blocky structure; slightly plastic; slightly acid; gradual wavy boundary.

Cg—50 to 60 inches; gray (N 5/0) sandy loam; few medium distinct brown (10YR 5/3) mottles; massive; nonsticky; medium acid.

Solum thickness ranges from 42 to 55 inches. The soil is slightly acid or medium acid.

The A horizon is 6 to 10 inches thick. It has hue of 10YR, value of 4 or 5, and chroma of 1 or 2.

The B horizon is 40 to 50 inches thick. It has hue of 10YR or N, value of 4 or 5, and chroma of 0 or 1. It includes common to many yellowish brown or brown mottles. The B horizon is commonly silt loam or silty clay loam, but it also includes loam, sandy clay loam, and clay loam.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*6*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 18, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquents (*Hapl*, meaning simple horizons, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceeding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Haplaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Formation of the soils

GLENN L. BRAMLETT, soil scientist, Soil Conservation Service, assisted in preparing this section.

In this section, the factors of soil formation are described and related to soils in the survey area. The processes of soil formation are explained.

Soil is produced when parent material, climate, relief, and plants and animals interact for a period of time. These factors determine the nature of the soil that forms at any point on the earth. All of these factors affect the formation of each soil, but the relative importance of each factor differs from place to place. In some areas one factor may dominate in the formation of a soil and determine most of the properties. For example, soils that formed in quartz sand generally have faint horizons because quartz sand is highly resistant to weathering. Even in quartz sand, however a distinct profile can be formed under certain types of vegetation if the relief is low and flat and if the water table is high. The five factors of soil formation are discussed in the paragraphs that follow.

Parent material

Parent material is the unconsolidated mass from which soil forms. It is largely responsible for the chemical and mineralogical composition of a soil. Most of the soils in Clayton, Fayette, and Henry Counties formed from residual materials, that is, materials weathered from the underlying rock.

Metamorphic rock is under most of the area(4). Nearly all of the area is underlain by biotite gneiss and schist which includes injection gneiss. The Cecil soils are dominant in this area.

Igneous rocks underlie the remainder of the area. The northern part of Clayton County and a small area in the central part of Fayette County is underlain by granite gneiss and porphyritic granite, which includes diorite injection gneiss. The Pacolet soils are dominant in this area. Small areas in the central part of Fayette County and southwestern part of Clayton County are underlain by hornblende gneiss. The Gwinnett soils are dominant in this area.

The proportion of felsic and mafic minerals in these parent rocks, as well as of quartz that is very resistant to weathering, limits the amount of clay in the soils. Ashlar soils, for example, formed in material weathered from siliceous rock and quartz sand and are very resistant to weathering. These soils, therefore, have faint horizons; in small, scattered areas hard rock is exposed. In contrast, the Davidson and Gwinnett soils formed from parent material less resistant to weathering and contain fairly large quantities of clay, chiefly from feldspars. The Madison soils, on the other hand, also contain appreciable amounts of clay, but the material from which they formed contains muscovite, which is resistant to weathering and is retained in the soil.

Climate

Climate affects the formation of soils through its influence on the rate of weathering of rocks and the decomposition of minerals and organic matter. It also affects biological activity in the soils and the leaching and movement of weathered materials.

Clayton, Fayette, and Henry Counties have a moist, temperate climate. The average daily temperature is about 61.3 degrees F. The average winter temperature is 44 degrees, and average summer temperature 77 degrees. The warm, moist climate promotes rapid weathering of hard rock. Consequently, in much of the area, the soils are 3 to 6 feet deep over a thick layer of loose, disintegrated, weathered rock, which blankets the hard rock underlying the county.

About 48 inches of precipitation falls annually. Much of this percolates through the soil, moves dissolved or suspended materials downward, and leaves the soils generally low in bases. Plant remains decay rapidly and produce organic acids that help to hasten the breakdown of minerals in the underlying rock. Thus, the organic matter content is low in the surface layer of soils that have good drainage.

Relief

Relief influences soil formation through its effect on runoff, movement of water within the soil, plant cover, and, to some extent, soil temperature.

The length, shape, steepness, and aspect of slopes hasten or delay runoff. Runoff is more rapid on steep slopes; therefore, steep soils erode faster than level ones, even if both are of the same material. For example, soils on steep slopes underlain by rock generally are thinner and have a more weakly expressed profile than soils that formed in similar material on broad, fairly level ridgetops. Rock outcrops also are more common.

A level or nearly level surface allows more time for water to penetrate and percolate through the soil profile. This in turn influences the solution and translocation of soluble materials. The moisture available in the soil also determines to a significant extent the amount and kinds of plants that grow. Thus, steep soils that have a slowly permeable surface layer are generally drier than level or nearly level soils and support less vegetation.

Clayton, Fayette, and Henry Counties range from nearly level to steep, but are not extremely hilly. The effect of relief on soil temperature, therefore, is not so pronounced as in more mountainous areas. In general, however, slopes that face south are warmer than those that face north.

Plants and animals

Plants, animals, bacteria, and other organisms are active in the soil forming processes. The changes they bring about depend mainly on the life processes peculiar to each. The kinds of plants and animals that live on and in the soil are determined, in turn, by the climate, the parent material, the relief, and the age of the soil.

Most of the soils in Clayton, Fayette, and Henry Counties formed under a forest of hardwoods and softwoods. These trees supply most of the organic matter available in the soils, though the hardwoods contribute more than the softwoods. The organic matter content in most of the soils is low to medium.

Growing plants provide a cover that helps to reduce erosion and stabilize the surface. Leaves, twigs, roots, and entire plants accumulate on the surface of forest soils and then decompose through the action of percolating water and of micro-organisms, earthworms, and other forms of life. The roots of plants widen cracks in the rocks permitting more water to penetrate. Also, the uprooting of trees by wind influences the formation of soils through the mixing of soil layers and the loosening of underlying material.

Small animals, earthworms, insects, and micro-organisms influence the formation of soils by mixing organic matter into the soil and by accelerating the formation of organic matter by breaking down the remains of plants. Small animals burrow into the soil and mix the layers. Earthworms and other small invertebrates feed on the organic matter in the upper few inches. They slowly but continually mix the soil material and may alter it chemically. Bacteria, fungi, and other micro-organisms hasten the weathering of rocks and the decomposition of organic matter.

Time

Generally, a long time is required for a soil to form. Most of the soils on uplands have been in place long enough for distinct horizons to develop, but some soils that formed in alluvium have not.

Most soils in Clayton, Fayette, and Henry Counties have distinct horizons. The surface layer contains an accumulation of organic matter, and silicate clay minerals have formed and moved downward to produce horizons that are relatively high in clay content. In such soils, oxidation or reduction of iron has had its effect, depending on natural drainage. Many of the soils have been drained well enough to have a red or dark red subsoil, and they contain highly oxidized iron. A few have impaired drainage, and consequently, have a gray subsoil that contains reduced iron. In addition, leaching of soluble calcium, magnesium, potassium, and other weatherable material has caused an increase in exchangeable hydrogen. Cecil and Davidson soils are examples of old soils in Clayton, Fayette, and Henry Counties.

Soils that have essentially the same parent material and drainage sometimes differ in degree of profile development chiefly because of time. Examples are the Molena soils on stream terraces and the Toccoa soils on flood plains. These soils are similar in texture and occupy similar positions on the landscape. The Molena soils, however, have been in place long enough to have a distinct subsoil with an accumulation of clay. The Toccoa soils, on the other hand, have not been in place long enough for distinct horizons to form or for much clay to accumulate.

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Glossary

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single mapping unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bottom land. The normal flood plain of a stream, subject to frequent flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Depth to rock. Bedrock at a depth that adversely affects the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake. The rapid movement of water into the soil.

Favorable. Favorable soil features for the specified use.

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.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered, but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Plant nutrients are nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differencees are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil surveys, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Illustrations

Figure 1.—Subdivision development is common throughout the Cecil-Appling-Pacolet unit in Clayton County. The gently sloping soils have high potential for most urban uses.

Figure 2.—This land is about 85 percent covered with urban development.

Figure 3.—Mixed upland oaks on Ashlar sandy loam, very rocky, 10 to 25 percent slopes. This soil has medium potential for the common wood crops.

Figure 4.—Golf greens on Cartecay soils on the flood plain. Cartecay soils are subject to flooding, but flooding is unlikely during the period of use.

Figure 5.—Soybeans on Madison sandy loam, 2 to 6 percent slopes. This soil has high potential for the commonly grown row crops.

Figure 6.—Loblolly pines on Cecil sandy loam, 2 to 6 percent slopes. This soil has medium potential for the common wood crops.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

[Recorded in the period 1951-74 at Atlanta, Georgia]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	F	F	F	F	F	Units	In	In	In		In
January-----	52.3	33.6	42.6	72	8	44	4.78	3.02	6.37	8	0.5
February----	55.2	35.1	42.2	75	12	63	4.62	2.88	6.18	8	.6
March-------	62.5	41.5	52.1	81	21	159	5.60	3.88	7.17	8	.2
April-------	72.7	50.8	61.8	87	32	354	4.50	3.07	5.81	7	0
May---------	79.9	58.8	69.4	91	41	601	3.70	1.79	5.25	6	0
June--------	85.5	65.9	75.7	97	52	771	3.44	2.06	4.66	7	0
July--------	87.6	69.1	78.4	96	60	880	4.92	2.92	6.69	9	0
August------	87.4	68.7	78.1	95	60	871	3.32	1.51	4.79	6	0
September---	82.1	63.5	72.8	94	47	684	3.11	1.42	4.48	5	0
October-----	72.8	52.1	62.5	88	32	388	2.37	.48	3.84	4	0
November----	62.2	41.3	51.8	81	22	105	3.19	1.88	4.36	5	0
December----	54.0	35.4	44.7	73	13	59	4.64	2.56	6.34	7	.3
Year------	71.2	51.3	61.3	99	6	4,979	48.19	42.43	53.76	80	1.6

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-74 at Atlanta, 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--	March 22	April 4	April 8
2 years in 10 later than--	March 12	March 26	April 3
5 years in 10 later than--	February 20	March 10	March 24
First freezing temperature in fall:			
1 year in 10 earlier than--	November 14	November 6	October 26
2 years in 10 earlier than--	November 21	November 11	October 31
5 years in 10 earlier than--	December 5	November 20	November 8

TABLE 3.--GROWING SEASON LENGTH

[Recorded in the period 1951-74 at Atlanta, 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	248	221	208
8 years in 10	261	232	215
5 years in 10	287	255	228
2 years in 10	313	277	241
1 year in 10	326	289	247

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

[Areas of water greater than 40 acres totals 1,000 acres. These areas are not included in the acreage figures for total land area as given in the table]

Map symbol	Soil name	Clayton County	Fayette County	Henry County	Total-- Area	Total-- Extent
		Acres	Acres	Acres	Acres	Pct
AkA	Altavista sandy loam, 0 to 3 percent slopes	1,040	1,530	670	3,240	0.7
AmB	Appling sandy loam, 2 to 6 percent slopes	5,135	9,190	9,960	24,285	5.6
AmC	Appling sandy loam, 6 to 10 percent slopes	2,580	1,510	3,680	7,770	1.8
AnC2	Appling sandy clay loam, 6 to 10 percent slopes, eroded	265	180	840	1,285	0.3
AsC	Ashlar sandy loam, 2 to 10 percent slopes	955	1,635	1,605	4,195	1.0
AtE	Ashlar sandy loam, very rocky, 10 to 25 percent slopes	2,470	1,340	2,725	6,535	1.5
CA	Cartecay soils	6,255	7,570	11,321	25,146	5.8
CeB	Cecil sandy loam, 2 to 6 percent slopes	22,155	38,075	50,740	110,970	25.5
CeC	Cecil sandy loam, 6 to 10 percent slopes	4,895	19,000	19,335	43,230	10.0
CfC2	Cecil sandy clay loam, 6 to 10 percent slopes, eroded	5,960	25,550	29,975	61,485	14.1
CuC	Cecil-Urban land complex, 2 to 10 percent slopes	7,815	550	970	9,335	2.2
DgB	Davidson loam, 2 to 6 percent slopes	410	2,130	1,175	3,715	0.9
DgC	Davidson loam, 6 to 10 percent slopes	165	900	880	1,945	0.4
GeB	Gwinnett sandy loam, 2 to 6 percent slopes	2,455	1,690	5,420	9,565	2.2
GwC2	Gwinnett sandy clay loam, 6 to 10 percent slopes, eroded	2,065	1,105	4,190	7,360	1.7
GwE2	Gwinnett sandy clay loam, 10 to 25 percent slopes, eroded	1,130	1,340	7,065	9,535	2.2
GwC3	Gwinnett sandy clay loam, 6 to 10 percent slopes, severely eroded	1,380	3,370	5,800	10,550	2.4
MdB	Madison sandy loam, 2 to 6 percent slopes	945	10	3,980	4,935	1.1
MdC	Madison sandy loam, 6 to 10 percent slopes	950	45	4,235	5,230	1.2
MfC2	Madison sandy clay loam, 6 to 10 percent slopes, eroded	250	45	3,470	3,765	0.9
MfE2	Madison sandy clay loam, 10 to 25 percent slopes, eroded	780	50	5,290	6,120	1.4
MoC	Molena loamy sand, 2 to 10 percent slopes	535	0	0	535	0.1
PaC	Pacolet sandy loam, 6 to 10 percent slopes	5,515	590	8,185	14,290	3.3
PaE	Pacolet sandy loam, 10 to 25 percent slopes	8,420	2,820	22,120	33,360	7.7
PgC2	Pacolet sandy clay loam, 6 to 10 percent slopes, eroded	835	10	1,305	2,150	0.5
PuE	Pacolet-Urban land complex, 10 to 25 percent slopes	250	0	35	285	0.1
QU	Quarries	50	0	50	100	*
To	Toccoa sandy loam	500	275	830	1,605	0.4
TS	Toccoa soils	485	420	4,025	4,930	1.1
UD	Urban land	5,630	120	280	6,030	1.4
WH	Wehadkee soils	3,085	5,990	1,620	10,695	2.5
	Total	95,360	127,040	211,776	434,176	100.0

* Less than 0.1 percent.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1976. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Soybeans	Wheat	Oats	Cotton lint	Tall fescue	Pasture
	Bu	Bu	Bu	Bu	Lb	AUM*	AUM*
AkA: Altavista	120	45	55	75	550	---	9.0
AmB: Appling	95	35	45	80	650	---	8.0
AmC: Appling	80	30	40	75	600	---	7.5
AnC2: Appling	60	25	35	70	450	---	7.0
AsC: Ashlar	85	25	60	60	350	---	6.0
AtE: Ashlar	---	---	---	---	---	---	4.0
CA: Cartecay	---	---	---	---	---	7.0	---
CeB: Cecil	95	45	---	90	750	---	6.5
CeC: Cecil	90	40	---	85	700	---	6.5
CfC2: Cecil	60	30	---	60	---	---	5.0
CuC: Cecil	90	40	---	85	700	---	6.5
DgB: Davidson	110	45	---	90	750	8.5	---
DgC: Davidson	95	40	---	80	600	8.0	---
GeB: Gwinnett	85	40	---	75	700	6.0	---
GwC2: Gwinnett	65	35	---	65	450	5.5	---
GwE2: Gwinnett	---	---	---	---	---	4.0	---
GwC3: Gwinnett	---	---	---	---	---	4.0	---
MdB: Madison	90	40	---	85	700	---	7.5
MdC, MfC2: Madison	80	35	---	75	600	---	6.5
MfE2: Madison	---	---	---	---	---	---	5.5
MoC: Molena	55	20	---	---	400	7.5	---

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Soybeans	Wheat	Oats	Cotton lint	Tall fescue	Pasture
	Bu	Bu	Bu	Bu	Lb	AUM*	AUM*
PaC----- Pacolet	75	35	---	65	650	6.5	---
PaE----- Pacolet	---	---	---	---	---	---	---
PgC2----- Pacolet	50	---	---	---	---	5.0	---
PuE----- Pacolet	---	---	---	---	---	---	---
QU**. Quarries							
To----- Toccoa	90	---	---	---	900	6.5	---
TS----- Toccoa	75	---	---	---	---	6.5	---
UD**. Urban land							
WP----- Wehadkee	---	---	---	---	---	---	8.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

** See map unit description for the composition and behavior of the map unit.

TABLE 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas excluded. Absence of an entry means no acreage]

Class	Total acreage	Major management concerns (Subclass)			
		Erosion (e)	Wetness (w)	Soil problem (s)	Climate (c)
		Acres	Acres	Acres	Acres
I	---	---	---	---	---
II	158,315	153,470	4,845	---	---
III	90,925	85,995	4,930	---	---
IV	76,580	76,045	---	535	---
V	25,146	---	25,146	---	---
VI	77,080	66,385	10,695	---	---
VII	---	---	---	---	---
VIII	---	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
AkA----------------- Altavista	2w	Slight	Moderate	Slight	Loblolly pine---------- White oak-------------- Shortleaf pine--------- Sweetgum---------------	91 77 77 84	Loblolly pine, yellow-poplar, black walnut, sweetgum, American sycamore, cherrybark oak.
AmB, AmC, AnC2------ Appling	3o	Slight	Slight	Slight	Loblolly pine---------- Shortleaf pine--------- Scarlet oak------------ Southern red oak------- Yellow-poplar---------- White oak--------------	81 65 68 76 90 71	Eastern redcedar, yellow-poplar, loblolly pine.
AsC----------------- Ashlar	3o	Slight	Slight	Slight	Northern red oak------- Shortleaf pine---------	70 55	Loblolly pine, shortleaf.
AtE----------------- Ashlar	3r	Moderate	Moderate	Slight	Northern red oak------- Shortleaf pine--------- Virginia pine----------	70 55 65	Loblolly pine, shortleaf pine, Virginia pine.
CA*----------------- Cartecay	2w	Slight	Moderate	Slight	Loblolly pine---------- Sweetgum--------------- Yellow-poplar---------- Water oak-------------- Southern red oak-------	95 95 105 --- ---	Loblolly pine, sweetgum, yellow-poplar, cherrybark oak, American sycamore, eastern cottonwood.
CeB, CeC, CuC*------ Cecil	3o	Slight	Slight	Slight	Post oak--------------- Loblolly pine---------- Shortleaf pine--------- Scarlet oak------------ Black oak-------------- Northern red oak-------	65 80 69 80 66 82	Yellow-poplar, loblolly pine.
CfC2---------------- Cecil	4c	Moderate	Moderate	Moderate	Loblolly pine---------- Shortleaf pine---------	72 66	Loblolly pine,
DgB, DgC------------ Davidson	3o	Slight	Slight	Slight	Loblolly pine---------- Shortleaf pine--------- Northern red oak------- Southern red oak------- Sweetgum--------------- White oak-------------- Yellow-poplar----------	81 68 86 72 80 71 80	Loblolly pine, yellow-poplar.
GeB----------------- Gwinnett	3o	Slight	Slight	Slight	Loblolly pine---------- Southern red oak------- White oak--------------	81	Loblolly pine, yellow-poplar.
GwC2---------------- Gwinnett	4c	Moderate	Moderate	Moderate	Loblolly pine---------- Shortleaf pine---------	75 65	Eastern redcedar, loblolly pine,
GwE2---------------- Gwinnett	4c	Severe	Severe	Moderate			
GwC3---------------- Gwinnett	4c	Moderate	Moderate	Moderate	Loblolly pine---------- Shortleaf pine---------	75 65	Eastern redcedar, loblolly pine.
MdB, MdC------------ Madison	3o	Slight	Slight	Slight	Loblolly pine---------- Shortleaf pine--------- Southern red oak------- Yellow-poplar----------	73 66 81 96	Loblolly pine, yellow-poplar.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
MfC2: Madison	4c	Slight	Slight	Slight	Loblolly pine	73	Loblolly pine, yellow-poplar.
					Shortleaf pine	66	
					Southern red oak	81	
					Yellow-poplar	96	
MfE2: Madison	3r	Moderate	Moderate	Slight	Loblolly pine	73	Loblolly pine, yellow-poplar.
					Shortleaf pine	66	
					Southern red oak	81	
					Yellow-poplar	96	
MoC: Molena	3s	Slight	Moderate	Moderate	Loblolly pine	80	Loblolly pine.
					Northern red oak	86	
					White oak	68	
					Shortleaf pine	---	
					Water oak	---	
PaC: Pacolet	3o	Slight	Slight	Slight	Loblolly pine	78	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	70	
					Yellow-poplar	90	
					Northern red oak	79	
					Sweetgum	82	
PaE: Pacolet	3r	Moderate	Moderate	Slight	Loblolly pine	78	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	70	
					Yellow-poplar	90	
					Northern red oak	79	
					Sweetgum	82	
PgC2: Pacolet	4c	Slight	Slight	Slight	Loblolly pine	78	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	70	
					Yellow-poplar	90	
					Northern red oak	79	
					Sweetgum	82	
PuE*: Pacolet	3r	Moderate	Moderate	Slight	Loblolly pine	78	Loblolly pine, shortleaf pine, yellow-poplar.
					Shortleaf pine	70	
					Yellow-poplar	90	
					Northern red oak	79	
					Sweetgum	82	
To, TS*: Toccoa	1o	Slight	Slight	Slight	Loblolly pine	90	Loblolly pine, yellow-poplar, American sycamore, cherrybark oak.
					Yellow-poplar	107	
					Sweetgum	100	
					Southern red oak	---	
WH*: Wehadkee	1w	Slight	Severe	Severe	Loblolly pine	102	Loblolly pine, American sycamore, yellow-poplar, green ash, sweetgum, eastern cottonwood, cherrybark oak.
					Sweetgum	93	
					Yellow-poplar	98	
					Willow oak	90	
					Green ash	96	
					Water oak	86	
					White ash	88	
					Eastern cottonwood	86	

* See map unit description for the composition and behavior of the map unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
AkA----------------- Altavista	Severe: wetness, floods, cutbanks cave.	Severe: floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, low strength.
AmB----------------- Appling	Moderate: too clayey.	Slight------------	Slight------------	Moderate: slope.	Slight.
AmC, AnC2---------- Appling	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
AsC----------------- Ashlar	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.
AtE----------------- Ashlar	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CA*----------------- Cartecay	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
CeB----------------- Cecil	Moderate: too clayey.	Slight------------	Slight------------	Moderate: slope.	Moderate: low strength.
CeC, CfC2---------- Cecil	Moderate: too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
CuC*---------------- Cecil	Moderate: too clayey.	Slight------------	Slight------------	Moderate: slope.	Moderate: low strength.
DgB----------------- Davidson	Moderate: too clayey.	Slight------------	Slight------------	Moderate: slope.	Moderate: low strength.
DgC----------------- Davidson	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
GeB----------------- Gwinnett	Moderate: too clayey, depth to rock.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope.	Moderate: shrink-swell.
GwC2---------------- Gwinnett	Moderate: too clayey, depth to rock.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
GwE2---------------- Gwinnett	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GwC3---------------- Gwinnett	Moderate: too clayey, depth to rock.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
MdB----------------- Madison	Moderate: too clayey.	Slight------------	Slight------------	Moderate: slope.	Moderate: low strength.
MdC, MfC2---------- Madison	Moderate: too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
MfE2---------------- Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
MoC------------------ Molena	Severe: cutbanks cave.	Slight------------	Slight------------	Moderate: slope.	Slight.
PaC------------------ Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
PaE------------------ Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PgC2----------------- Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
PuE*----------------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
QU*. Quarries					
To, TS*-------------- Toccoa	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
UD*. Urban land					
WH*------------------ Wehadkee	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.

* See map unit description for the composition and behavior of the map unit.

TABLE 9.--SANITARY FACILITIES

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AkA-------- Altavista	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods, seepage.	Severe: wetness, floods, seepage.	Good.
AmB-------- Appling	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight-------	Fair: too clayey.
AmC, AnC2-------- Appling	Moderate: slope, percs slowly.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
AsC-------- Ashlar	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: seepage.	Poor: thin layer.
AtE-------- Ashlar	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
CA*-------- Cartecay	Severe: wetness, floods.	Severe: wetness, seepage, floods.	Severe: floods, seepage, wetness.	Severe: floods, seepage, wetness.	Good.
CeB-------- Cecil	Moderate: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight-------	Fair: too clayey.
CeC, CfC2-------- Cecil	Moderate: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey.
CuC*-------- Cecil	Moderate: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight-------	Fair: too clayey.
DgB-------- Davidson	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight-------	Fair: too clayey.
DgC-------- Davidson	Moderate: slope, percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
GeB-------- Gwinnett	Slight-------	Moderate: slope, seepage.	Moderate: too clayey, depth to rock.	Slight-------	Fair: too clayey.
GwC2-------- Gwinnett	Moderate: slope.	Severe: slope.	Moderate: too clayey, depth to rock.	Moderate: slope.	Fair: too clayey.
GwE2-------- Gwinnett	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
GwC3-------- Gwinnett	Moderate: slope.	Severe: slope.	Moderate: too clayey, depth to rock.	Moderate: slope.	Fair: too clayey.
MdB-------- Madison	Moderate: percs slowly.	Moderate: slope, seepage.	Severe: too clayey.	Slight-------	Fair: too clayey.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MdC, MfC2: Madison	Moderate: slope, percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey.
MfE2: Madison	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: slope.
MoC: Molena	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
PaC: Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
PaE: Pacolet	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
PgC2: Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
PuE*: Pacolet	Severe: slope.	Severe: slope.	Moderate: too clayey, slope.	Severe: slope.	Poor: slope.
QU*. Quarries					
To, TS*: Toccoa	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
UD*. Urban land					
WH*: Wehadkee	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: wetness.

* See map unit description for the composition and behavior of the map unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AkA: Altavista	Poor: low strength.	Poor: excess fines.	Unsuited: excess fines.	Good.
AmB, AmC, AnC2: Appling	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
AsC: Ashlar	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, area reclaim.
AtE: Ashlar	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
CA*: Cartecay	Fair: wetness.	Poor: excess fines.	Unsuited: excess fines.	Good.
CeB, CeC, CfC2, CuC*: Cecil	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
DgB: Davidson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
DgC: Davidson	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, slope.
GeB, GwC2, GwE2, GwC3: Gwinnett	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
MdB, MdC, MfC2: Madison	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
MfE2: Madison	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, thin layer.
MoC: Molena	Good	Poor: excess fines.	Poor: excess fines.	Poor: too sandy.
PaC: Pacolet	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
PaE: Pacolet	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
PgC2: Pacolet	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
PuE*: Pacolet	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
QU*. Quarries				
To, TS*: Toccoa	Good	Poor: excess fines.	Unsuited: excess fines.	Good.
UD*. Urban land				

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WH*: Wehadkee	Poor: wetness.	Poor: excess fines.	Unsuited: excess fines.	Poor: wetness.

* See map unit description for the composition and behavior of the map unit.

TABLE 11.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
AkA: Altavista	Moderate: seepage.	Moderate: thin layer, wetness.	Favorable	Wetness, floods.	Not needed	Favorable.
AmB: Appling	Moderate: seepage.	Moderate: low strength.	Not needed	Favorable	Favorable	Favorable.
AmC, AnC2: Appling	Moderate: seepage.	Moderate: low strength.	Not needed	Slope	Slope	Favorable.
AsC, AtE: Ashlar	Severe: depth to rock, seepage, slope.	Severe: thin layer, seepage,	Not needed	Droughty, fast intake, rooting depth.	Depth to rock, rooting depth.	Droughty, rooting depth.
CA*: Cartecay	Moderate: seepage.	Moderate: piping.	Floods	Floods, wetness.	Not needed	Not needed.
CeB, CeC, CfC2, CuC*: Cecil	Moderate: seepage.	Severe: compressible.	Not needed	Complex slope	Complex slope	Complex slope.
DgB: Davidson	Moderate: seepage.	Moderate: hard to pack.	Not needed	Favorable	Favorable	Favorable.
DgC: Davidson	Moderate: seepage.	Moderate: hard to pack.	Not needed	Slope	Favorable	Favorable.
GeB, GwC2: Gwinnett	Moderate: depth to rock, seepage.	Moderate: compressible.	Not needed	Slope	Favorable	Favorable.
GwE2: Gwinnett	Moderate: depth to rock, seepage.	Moderate: compressible.	Not needed	Slope	Slope	Slope.
GwC3: Gwinnett	Moderate: depth to rock, seepage.	Moderate: compressible.	Not needed	Slope	Favorable	Favorable.
MdB: Madison	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed	Favorable	Favorable	Favorable.
MdC, MfC2, MfE2: Madison	Moderate: seepage.	Moderate: hard to pack, piping.	Not needed	Slope, erodes easily.	Erodes easily, slope.	Slope.
MoC: Molena	Severe: seepage.	Moderate: piping, seepage.	Not needed	Fast intake, slope.	Too sandy, erodes easily.	Droughty, erodes easily.
PaC, PaE, PgC2, PuE*: Pacolet	Moderate: seepage.	Moderate: hard to pack.	Not needed	Slope	Slope	Slope.
QU*. Quarries						
To, TS*: Toccoa	Severe: seepage.	Moderate: piping.	Not needed	Floods, seepage.	Not needed	Not needed.
UD*. Urban land						
WH*: Wehadkee	Moderate: seepage.	Moderate: piping.	Poor outlets	Wetness, floods.	Not needed	Not needed.

* See map unit description for the composition and behavior of the map unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
AkA-------- Altavista	Severe: floods.	Moderate: wetness.	Moderate: wetness, floods.	Slight.
AmB-------- Appling	Slight--------	Slight--------	Moderate: slope.	Slight.
AmC, AnC2-------- Appling	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
AsC-------- Ashlar	Slight--------	Slight--------	Severe: slope.	Slight.
AtE-------- Ashlar	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
CA*-------- Cartecay	Severe: floods, wetness.	Moderate: floods, wetness.	Severe: floods, wetness.	Moderate: wetness.
CeB-------- Cecil	Slight--------	Slight--------	Moderate: slope.	Slight.
CeC-------- Cecil	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
CfC2-------- Cecil	Moderate: slope, too clayey.	Moderate: slope, too clayey.	Severe: slope.	Moderate: too clayey.
CuC*-------- Cecil	Slight--------	Slight--------	Severe: slope.	Slight.
DgB-------- Davidson	Slight--------	Slight--------	Moderate: slope.	Slight.
DgC-------- Davidson	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
GeB-------- Gwinnett	Slight--------	Slight--------	Moderate: slope, depth to rock.	Slight.
GwC2-------- Gwinnett	Moderate: slope.	Moderate: slope.	Severe: slope, depth to rock.	Moderate: too clayey.
GwE2-------- Gwinnett	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
GwC3-------- Gwinnett	Moderate: slope.	Moderate: slope.	Severe: slope, depth to rock.	Moderate: too clayey.
MdB-------- Madison	Slight--------	Slight--------	Moderate: slope.	Slight.
MdC-------- Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
MfC2-------- Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: too clayey.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
MfE2: Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
MoC: Molena	Moderate: too sandy.	Moderate: too sandy.	Severe: too sandy, slope.	Moderate: too sandy.
PaC: Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
PaE: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
PgC2: Pacolet	Moderate: too clayey, slope.	Moderate: too clayey, slope.	Severe: slope.	Moderate: too clayey.
PuE*: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
QU*. Quarries				
To, TS*: Toccoa	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
UD*. Urban land				
WH*: Wehadkee	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.

* See map unit description for the composition and behavior of the map unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AkA: Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
AmB: Appling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AmC: Appling	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AnC2: Appling	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
AsC: Ashlar	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
AtE: Ashlar	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CA*: Cartecay	Poor	Fair	Fair	Good	Good	Fair	Poor	Fair	Good	Fair.
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.
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.
DgB: Davidson	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Good	Poor.
DgC: Davidson	Fair	Good	Good	Good	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
GeB: Gwinnett	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GwC2: 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.
GwC3: Gwinnett	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MdB: Madison	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MdC, MfC2: Madison	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MfE2: Madison	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
MoC: Molena	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
PaC: Pacolet	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PaE: Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
PgC2: Pacolet	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PuE*: Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
QU*. Quarries										
To: Toccoa	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TS*: Toccoa	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
UD*. Urban land										
WH*: Wehadkee	Very poor.	Poor	Poor	Fair	Fair	Good	Fair	Poor	Fair	Fair.

* See map unit description for the composition and behavior of the map unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
AkA------------------ Altavista	0-7	Sandy loam-------	SM	A-2	0	95-100	95-100	50-75	15-35	---	NP
	7-36	Clay loam, sandy clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	95-100	95-100	60-95	50-75	20-45	5-26
	36-60	Variable---------	---	---	0	---	---	---	---	---	---
AmB, AmC------------ Appling	0-10	Sandy loam-------	SM, SM-SC	A-2	0-5	86-100	80-100	55-75	15-35	<27	NP-5
	10-45	Sandy clay, clay loam, clay.	MH, CL, ML, SC	A-7	0-5	95-100	95-100	70-92	51-80	41-74	15-30
	45-60	Variable---------	---	---	---	---	---	---	---	---	---
AnC2----------------- Appling	0-3	Sandy clay loam	CL, SC, CL-ML	A-6, A-4	0-5	95-100	90-100	70-95	40-70	20-40	6-20
	3-48	Sandy clay, clay loam, clay.	MH, CL, ML, SC	A-7	0-5	95-100	95-100	70-92	51-80	41-74	15-30
	48-60	Variable---------	---	---	---	---	---	---	---	---	---
AsC, AtE------------ Ashlar	0-6	Sandy loam-------	SC, SM	A-2, A-4, A-1	0-2	70-100	65-100	40-80	20-50	12-21	NP-4
	6-21	Sandy loam, fine sandy loam, gravelly sandy loam.	SC, SM, GM, GC	A-1, A-2, A-4	2-8	55-100	50-100	30-80	15-50	14-23	NP-6
	21-32	Variable---------	---	---	---	---	---	---	---	---	---
	32	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
CA*------------------ Cartecay	0-7	Loam-------------	ML, CL CL-ML	A-4, A-6	0	98-100	95-100	90-100	51-95	<40	NP-15
	7-60	Sandy loam, fine sandy loam, loam.	SM, SC, SM-SC	A-2, A-4	0	90-100	75-100	60-85	25-50	<30	NP-10
CeB, CeC------------ Cecil	0-6	Sandy loam-------	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
	6-58	Clay-------------	MH, ML	A-7	0	97-100	92-100	72-99	55-95	41-80	9-37
	58-65	Variable---------	---	---	---	---	---	---	---	---	---
CfC2----------------- Cecil	0-4	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0	74-100	72-100	68-95	38-81	21-35	3-15
	4-48	Clay-------------	MH, ML	A-7	0	97-100	92-100	72-99	55-95	41-80	9-37
	48-65	Variable---------	---	---	---	---	---	---	---	---	---
CuC*----------------- Cecil	0-6	Sandy loam-------	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
	6-58	Clay-------------	MH, ML	A-7	0	97-100	92-100	72-99	55-95	41-80	9-37
	58-65	Variable---------	---	---	---	---	---	---	---	---	---
DgB, DgC------------ Davidson	0-6	Loam-------------	CL, CL-ML, ML	A-4, A-6	0	94-100	84-100	80-95	60-75	18-30	4-15
	6-9	Clay loam--------	CL	A-6	0	96-100	90-100	75-95	50-75	25-40	11-25
	9-62	Clay-------------	CL, CH, ML, MH	A-7, A-6	0	96-100	95-100	85-100	65-85	35-65	15-35
	62-78	Clay, clay loam, sandy clay loam.	CL, ML	A-4, A-6, A-7	0	95-100	90-100	75-100	50-80	20-50	7-25
GeB------------------ Gwinnett	0-5	Sandy loam-------	SM, SC, SM-SC	A-2, A-4, A-6	0-3	95-100	85-100	65-90	30-50	<32	NP-15
	5-36	Clay, sandy clay	MH, ML, CL, CH	A-7, A-6	0-4	95-100	90-100	75-95	51-80	38-65	16-30
	36-64	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
GwC2, GwE2, GwC3--- Gwinnett	0-5	Sandy clay loam	SM, SC, SM-SC	A-2, A-4, A-6	0-3	95-100	85-100	65-90	30-50	<32	NP-15
	5-36	Clay, sandy clay	MH, ML, CL, CH	A-7, A-6	0-4	95-100	90-100	75-95	51-80	38-65	16-30
	36-64	Weathered bedrock.	---	---	---	---	---	---	---	---	---
MdB, MdC----------- Madison	0-7	Sandy loam-------	SM	A-2, A-4	0-3	85-100	80-100	60-90	26-49	<35	NP-8
	7-35	Clay, clay loam	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-82	12-43
	35-52	Variable---------	---	---	---	---	---	---	---	---	---
MfC2, MfE2--------- Madison	0-5	Sandy clay loam	CL	A-4, A-6	0-3	90-100	85-100	70-95	50-80	20-40	10-20
	5-42	Clay, clay loam	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-82	12-43
	42-52	Variable---------	---	---	---	---	---	---	---	---	---
MoC---------------- Molena	0-9	Loamy sand-------	SM, SP-SM	A-2, A-3	0	100	98-100	55-95	5-15	---	NP
	9-65	Loamy fine sand, loamy sand.	SM, SP-SM	A-2, A-3	0	100	98-100	55-95	7-25	---	NP
	65-75	Sand, coarse sand, gravelly sand.	SP, SP-SM	A-2, A-3	0-5	90-100	60-100	51-80	2-12	---	NP
PaC, PaE----------- Pacolet	0-4	Sandy loam-------	SM	A-2	0-2	85-100	80-100	60-80	20-35	<30	NP-6
	4-33	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-60	11-27
	33-56	Variable---------	---	---	---	---	---	---	---	---	---
PgC2--------------- Pacolet	0-5	Sandy clay loam	SM-SC, SC	A-4, A-6	0-1	95-100	90-100	65-85	36-50	20-40	4-17
	5-38	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-60	11-27
	38-53	Variable---------	---	---	---	---	---	---	---	---	---
PuE*--------------- Pacolet	0-4	Sandy loam-------	SM	A-2	0-2	85-100	80-100	60-80	20-35	<30	NP-6
	4-33	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0	80-100	80-100	60-95	51-75	38-60	11-27
	33-56	Variable---------	---	---	---	---	---	---	---	---	---
QU*. Quarries											
To, TS*------------ Toccoa	0-8	Sandy loam-------	SM, ML	A-2, A-4	0	98-100	95-100	85-100	25-60	<30	NP-4
	8-42	Sandy loam, loam, loamy sand.	SM, ML	A-2, A-4	0	95-100	90-100	60-100	30-55	<30	NP-4
UD*. Urban land											
WH*---------------- Wehadkee	0-18	Silt loam--------	CL, MH, ML	A-6, A-7	0	100	98-100	85-100	51-95	20-58	11-22
	18-50	Silty clay loam--	ML, CL	A-6, A-7	0	100	99-100	90-100	51-85	30-45	11-20
	50-60	Sandy loam-------	SM, ML	A-4	0	95-100	95-100	65-97	36-60	---	NP

* See map unit description for the composition and behavior of the map unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
AkA Altavista	0-7	2.0-20	0.07-0.12	4.5-6.0	Low	Moderate	Moderate	0.20	4
	7-36	0.6-2.0	0.12-0.20	4.5-6.0	Low	Moderate	Moderate	0.24	
	36-60	---	---	---	---	---	---	---	
AmB, AmC Appling	0-10	2.0-6.0	0.10-0.15	4.5-5.5	Low	Moderate	Moderate	0.24	4
	10-45	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	Moderate	Moderate	0.20	
	45-60	---	---	---	---	---	---	---	
AnC2 Appling	0-3	0.6-2.0	0.12-0.15	4.5-5.5	Low	Moderate	Moderate	0.20	3
	3-48	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	Moderate	Moderate	0.20	
	48-60	---	---	---	---	---	---	---	
AsC, AtE Ashlar	0-6	2.0-6.0	0.08-0.15	4.5-6.0	Low	Low	High	0.24	2
	6-21	2.0-6.0	0.04-0.14	4.5-5.5	Low	Low	High	0.43	
	21-32	---	---	---	---	---	---	---	
CA* Cartecay	0-7	2.0-6.0	0.12-0.16	5.1-6.5	Low	Low	Moderate	0.32	5
	7-60	2.0-6.0	0.09-0.12	5.1-6.5	Low	Low	Moderate	0.24	
CeB, CeC Cecil	0-6	2.0-6.0	0.12-0.14	4.5-6.0	Low	Moderate	Moderate	0.28	3
	6-58	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	Moderate	Moderate	0.28	
	58-65	---	---	---	---	---	---	---	
CfC2 Cecil	0-4	0.6-2.0	0.13-0.15	4.5-6.0	Low	Moderate	Moderate	0.28	3
	4-48	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	Moderate	Moderate	0.28	
	48-65	---	---	---	---	---	---	---	
CuC* Cecil	0-6	2.0-6.0	0.12-0.14	4.5-6.0	Low	Moderate	Moderate	0.28	3
	6-58	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	Moderate	Moderate	0.28	
	58-65	---	---	---	---	---	---	---	
DgB, DgC Davidson	0-6	0.6-2.0	0.14-0.18	4.5-6.5	Low	High	Moderate	0.28	5
	6-9	0.6-2.0	0.15-0.18	4.5-6.0	Low	High	Moderate	0.32	
	9-62	0.6-2.0	0.12-0.16	4.5-6.0	Low	High	Moderate	0.24	
	62-78	0.6-2.0	0.12-0.18	4.5-6.0	Low	High	Moderate	0.28	
GeB, GwC2, GwE2, GwC3 Gwinnett	0-5	0.6-2.0	0.11-0.17	5.1-6.5	Low	High	Moderate	0.28	4
	5-36	0.6-2.0	0.11-0.16	5.1-6.5	Moderate	High	Moderate	0.28	
	36-64	---	---	---	---	---	---	---	
MdB, MdC Madison	0-7	2.0-6.0	0.11-0.15	4.5-6.0	Low	High	Moderate	0.32	4
	7-35	0.6-2.0	0.13-0.18	4.5-5.5	Low	High	Moderate	0.32	
	35-52	---	---	---	---	---	---	---	
MfC2, MfE2 Madison	0-5	0.6-2.0	0.12-0.16	4.5-6.0	Low	High	Moderate	0.28	3
	5-42	0.6-2.0	0.13-0.18	4.5-5.5	Low	High	Moderate	0.32	
	42-52	---	---	---	---	---	---	---	
MoC Molena	0-9	6.0-20	0.05-0.07	4.5-6.5	Very low	Low	High	0.17	5
	9-65	6.0-20	0.06-0.09	4.5-6.0	Very low	Low	High	0.17	
	65-75	6.0-20	0.03-0.05	4.5-6.0	Very low	Low	High	0.15	
PaC, PaE Pacolet	0-4	2.0-6.0	0.08-0.12	4.5-6.0	Low	Moderate	High	0.20	3
	4-33	0.6-2.0	0.12-0.15	4.5-6.0	Low	High	High	0.28	
	33-56	---	---	---	---	---	---	---	
PgC2 Pacolet	0-5	0.6-2.0	0.10-0.14	4.5-6.0	Low	Moderate	High	0.24	2
	5-38	0.6-2.0	0.12-0.15	4.5-6.0	Low	High	High	0.28	
	38-53	---	---	---	---	---	---	---	

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete	Erosion factors: K	Erosion factors: T
	In	In/hr	In/in	pH					
PuE*: Pacolet	0-4	2.0-6.0	0.08-0.12	4.5-6.0	Low	Moderate	High	0.20	3
	4-33	0.6-2.0	0.12-0.15	4.5-6.0	Low	High	High	0.28	
	33-56	---	---	---	---	---	---	---	
QU*. Quarries									
To, TS*: Toccoa	0-8	2.0-6.0	0.09-0.12	5.1-6.5	Low	Low	Moderate	0.10	4
	8-60	2.0-6.0	0.06-0.12	5.1-6.5	Low	Low	Moderate	0.10	
UD*. Urban land									
WH*: Wehadkee	0-18	2.0-6.0	0.14-0.18	5.6-7.3	Low	High	Moderate	0.24	---
	18-50	0.6-2.0	0.16-0.20	5.6-7.3	Low	High	Moderate	0.32	
	50-60	2.0-6.0	0.14-0.16	5.6-7.3	Low	High	Moderate	0.28	

* See map unit description for the composition and behavior of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
AkA----------------- Altavista	C	None to occasional.	Very brief	Mar-Jul	1.5-2.5	Apparent	Dec-Mar	>60	---
AmB, AmC, AnC2----- Appling	B	None----------	---	---	>6.0	---	---	>60	---
AsC, AtE----------- Ashlar	B	None----------	---	---	4.0-6.0	Apparent	---	22-40	Hard
CA*---------------- Cartecay	C	Common--------	Brief------	Dec-Mar	0.5-1.5	Apparent	Jan-Apr	>60	---
CeB, CeC, CfC2, CuC*--------------- Cecil	B	None----------	---	---	>6.0	---	---	>60	---
DgB, DgC----------- Davidson	B	None----------	---	---	>6.0	---	---	>60	---
GeB, GwC2, GwE2, GwC3-------------- Gwinnett	B	None----------	---	---	>6.0	---	---	20-40	Rippable
MdB, MdC, MfC2, MfE2--------------- Madison	B	None----------	---	---	>6.0	---	---	>60	---
MoC---------------- Molena	A	None to rare	---	---	>6.0	---	---	>60	---
PaC, PaE, PgC2, PuE*--------------- Pacolet	B	None----------	---	---	>6.0	---	---	>60	---
QU*. Quarries									
To, TS*------------ Toccoa	B	Common--------	Brief------	Jan-Dec	2.5-5.0	Apparent	Dec-Apr	>60	---
UD*. Urban land									
WH*----------------	D	Common-------	Brief------	Nov-Jun	0-2.5	Apparent	Nov-Jun	>60	---

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 17.--ENGINEERING TEST DATA

[Tests performed by State of Georgia, Department of Highways, Materials Division. NP means nonplastic. SIC means slips in cup]

Soil name and report number	Depth	Moisture density: Max. dry density	Moisture density: Optimum moisture	Volume change: Shrinkage	Volume change: Swell	Volume change: Total	Mechanical analysis[1] Percentage passing sieve--: 3/4 in.	3/8 in.	No. 4	No. 10	No. 40	No. 200	Percentage smaller than--: 0.05mm	0.02mm	0.005mm	0.002mm	Liquid limit	Plasticity index	Classification: AASHTO	Classification: Unified
	In	Pcf	Pct	Pct	Pct	Pct											Pct			
Ashlar sandy loam																				
S73GA-31-1-1---------	0-6	105	14	1.1	5.6	6.7	100	100	100	99	75	24	20	15	6	5	SIC	NP	A-2-4(0)	SM
S73GA-31-1-3---------	9-23	116	11	0.7	3.4	4.1	100	100	100	99	78	28	25	17	10	7	SIC	NP	A-2-4(0)	SM
Cecil sandy loam																				
S72GA-16-1-6---------	21-31	98	23	10.7	6.0	16.7	100	100	100	100	91	71	69	64	50	43	54	23	A-7-5(14)	MH
S72GA-16-1-8---------	40-56	92	25	14.5	6.3	20.8	100	100	100	100	91	69	67	61	48	41	50	17	A-7-5(13)	MH
Davidson loam																				
S72GA-56-2-3---------	9-70	98	24	8.9	6.0	14.9	100	100	99	96	88	66	64	57	49	44	45	18	A-7-6(11)	ML
S72GA-56-2-5---------	78-88	112	16	5.2	4.7	9.9	100	99	95	89	72	43	40	35	27	24	34	9	A-4(1)	SM
Gwinnett sandy clay																				
S72-GA-75-1-4--------	24-36	86	30	9.8	5.0	14.8	100	100	99	96	91	70	74	68	57	53	61	26	A-7-5(22)	MH
S72-GA-75-1-5--------	36-47	86	30	2.7	1.7	4.4	100	100	98	96	88	63	58	47	34	30	50	16	A-7-5(10)	MH

[1] Mechanical analysis according to AASHTO Designation T 99-57 (1). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-sized fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-sized fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Appling	Clayey, kaolinitic, thermic Typic Hapludults
Ashlar	Coarse-loamy, mixed, thermic Typic Dystrochrepts
Cartecay	Coarse-loamy, mixed, nonacid, thermic Aquic Udifluvents
Cecil	Clayey, kaolinitic, thermic Typic Hapludults
Davidson	Clayey, kaolinitic, thermic Rhodic Paleudults
Gwinnett	Clayey, kaolinitic, thermic Typic Rhodudults
Madison	Clayey, kaolinitic, thermic Typic Hapludults
Molena	Sandy, mixed, thermic Psammentic Hapludults
Pacolet	Clayey, kaolinitic, thermic Typic Hapludults
Toccoa	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents
Wehadkee	Fine-loamy, mixed, nonacid, thermic Typic Fluvaquents

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