SOIL SURVEY OF

Orange County, North Carolina

United States Department of Agriculture
Soil Conservation Service

In cooperation with

North Carolina Agricultural Experiment Station and
Orange County Board of Commissioners

How To Use This Soil Survey

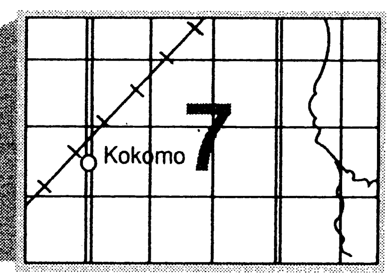
General Soil Map

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

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

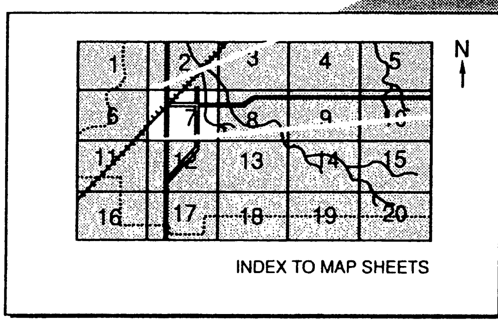
Detailed Soil Maps

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



MAP SHEET

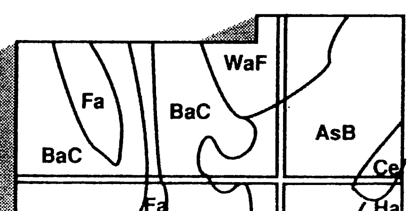
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

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

MAP SHEET



AREA OF INTEREST

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

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

This 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 1970-1975. Soil names and descriptions were approved in 1975. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1975. This survey was made cooperatively by the Soil Conservation Service, the Orange County Board of Commissioners, and the North Carolina Agricultural Experiment Station. It is part of the technical assistance furnished to the Orange County 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: The well drained and moderately permeable Herndon and Georgeville soils in Orange County are used for crops and community development.

Contents

Issued June 1977

Index to Soil Mapping Units

Summary of Tables

Foreword

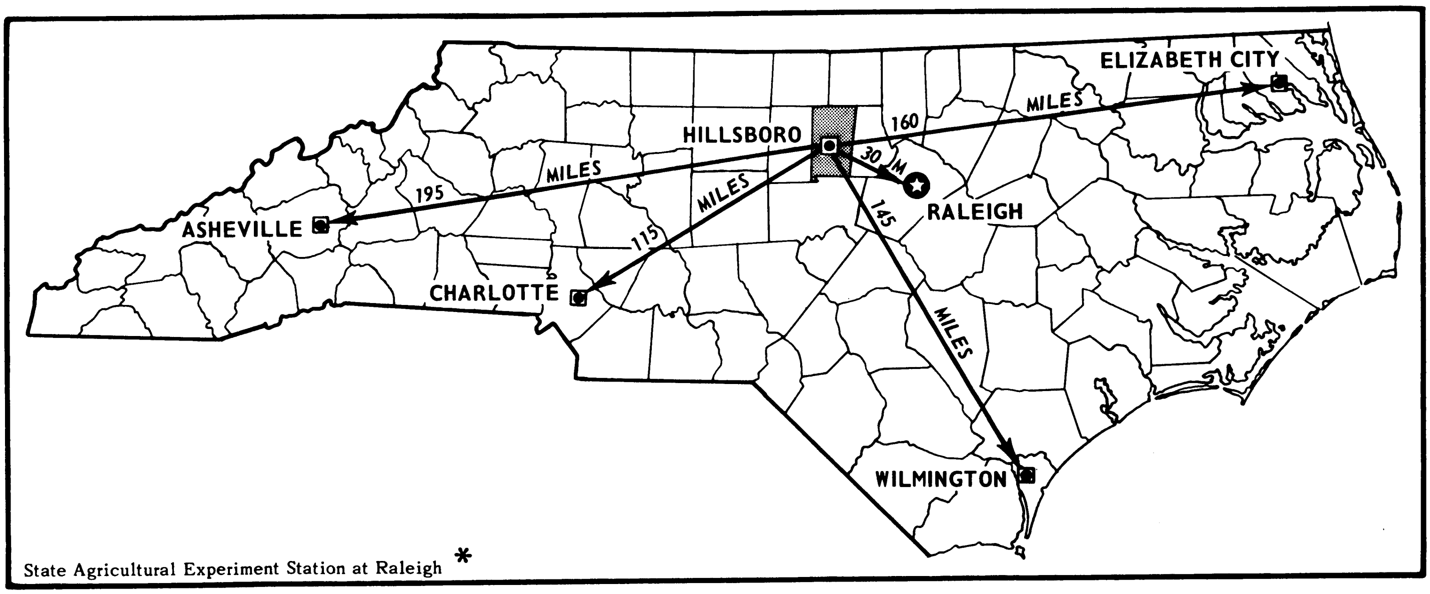
The Soil Survey of Orange County, North Carolina contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed 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.

Many people assume that soils are all more or less alike. They are unaware that 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.

We believe that this soil survey can help bring us a better environment and a better life. Its widespread use can greatly assist us in the conservation, development, and productive use of our soil, water, and other resources.



Location of Orange County in North Carolina.

SOIL SURVEY OF ORANGE COUNTY, NORTH CAROLINA

By James Dunn, Soil Conservation Service

Soils surveyed by James Dunn, Robert M. Kirby, Marcus R. Bostian, Michael L. Sherrill, Soil Conservation Service; and W. Edward Casavant, North Carolina Agricultural Experiment Station

United States Department of Agriculture, Soil Conservation Service, in cooperation with the North Carolina Agricultural Experiment Station and the Orange County Board of Commissioners

Introduction

ORANGE COUNTY is in the North Central Piedmont region of North Carolina. The 1970 U.S. Census reported a population of 57,707; Hillsborough, the county seat, had 3,140 people, and Chapel Hill had 25,533. Fifty percent of the population is considered urban. The county has an area of 254,720 acres, or 398 square miles.

The county lies across the divides of three major river basins. The northern edge drains into the Roanoke River Basin; the northeastern part drains into the Neuse River Basin; and the western and southern parts drain into the Cape Fear River Basin. The Haw River, a tributary of the Cape Fear, forms approximately 3 miles of the southwest boundary.

Elevation ranges from undulating terrain at 700 to 800 feet above mean sea level, along the major river basin divides in the northern part of the county, to 230 feet on the flood plains of Morgan Creek in the southeastern part on the Cape Fear watershed. The highest point in the county is Occoneechee Mountain at Hillsborough; it has an elevation of 860 feet.

General Nature of the County

This section gives general information concerning the county. It discusses settlement, climate, water supply, and land use.

Settlement

In 1740 a few settlers were scattered along the Eno, Hyco, and Haw Rivers in what later became Orange County. In 1754 William Churton surveyed and laid out 400 acres for the town that is now Hillsborough. Orange County at that time included what are now Alamance, Caswell, Person, Durham, and Chatham counties and parts of Randolph, Guilford, Rockingham, Lee, and Wake counties. The formation of these counties reduced Orange County to its present boundaries, which have remained constant since 1881.

The Third Provincial Congress was held in Hillsborough in 1775. Hillsborough served as the temporary capital of North Carolina.

In 1792 a high, heavily forested ridge in the southeastern corner of what is now Orange County was selected as the site of the first American state university—the University of North Carolina at Chapel Hill.

In 1939 the Neuse River Soil and Water Conservation District was organized. It included Orange, Durham, Wake, Wilson, and Johnston Counties. It was dissolved in 1964 so that each of the member counties could set up its own soil and water conservation district. Since then, the Orange Conservation District has conducted a comprehensive program of natural resource conservation.

Climate

Orange County is mostly rolling country. The elevation in the northern part of the county is 700 to 800 feet above mean sea level. In the southern part of the county, some streambeds are at an elevation of about 200 feet, and the highest elevation is about 500 feet. The Blue Ridge Mountains, about 90 miles to the northwest, form a northeast-southwest barrier at an elevation of 3,000 to 5,000 feet; in the opposite direction the topography slopes gradually down to the Atlantic Ocean about 150 miles away. These features and the latitude and position are the principal factors influencing the climate. Data on temperature and precipitation are given in tables 1 and 2.

The average growing season in the county is 200 days—from the second week in April until the last week in October. Table 2 shows the probabilities of freezing temperatures in spring and fall. The temperature falls below freezing on more than half the days in winter but rarely remains that low for 24 hours. It drops to 0 degrees F less than once in 10 years. On the average, it rises to about 100 degrees F perhaps once every 3 years. A temperature of 90 degrees occurs about 50 times from late in March until well into October.

Much of the rain in the growing season comes from summer thunderstorms and varies widely from place to place and from one season to the next. An area can be without significant rain for 1 to 3 weeks. Irrigation is used in these areas to increase crop production. In winter, rain results mainly from low-pressure storms moving through or near the area, and it is less variable than in summer. There are no distinct wet and dry seasons. Measurable rain falls on an average of 2 days per week.

Some snow falls in Orange County every winter, but total amounts vary from 1 inch to 18 inches. The annual average is about 6 inches. Generally only a few inches accumulate at one time, and such accumulations generally melt within a few days. Once in several years, however, 8 or 10 inches fall at one time. About as often, snow covers the ground for a week or more. In 1960, the total amount of snow in February and March was 27 inches. Snow accumulated on the ground to a depth of 13 inches and remained on the ground in varying amounts continuously from March 2 to March 18.

On the average, slightly more than half the sky is covered with clouds during daylight hours. The greatest amount of cloudiness occurs in winter and the least in autumn. The sun shines during about half of the daylight hours in winter and nearly two-thirds of the daylight hours in other seasons. The average relative humidity is near 85 percent at sunrise but drops off to around 50 percent by midafternoon.

Tropical storms from the Atlantic Ocean and Gulf of Mexico are greatly weakened when they move inland as far as Orange County. Highest winds most often result from summer thunderstorms. Such winds affect limited areas and are of short duration. Hail falls in the county every few years, but damage generally is restricted to 1 or 2 square miles. Destructive tornadoes occur rarely.

The direction of the wind varies in all seasons. Winds from the southwest and northeast are dominant and come from the two opposite directions with almost equal frequency. Northeasterly winds prevail late in summer and in autumn, and southwesterly winds prevail at other seasons. Highest winds quite often come from the northwest. The average windspeed is about 8 miles per hour.

Water Supply

For most of the industry, research facilities, educational institutions, and towns in Orange County, water comes from Lake Orange, Lake Michael, and University Lake. Chapel Hill in emergencies uses water from the City of Durham.

Drilled wells, rather than dug wells, are the most dependable source of ground water. Wells drilled in volcanic rocks yield nearly twice as much water per foot of uncased well as wells in Triassic rocks. Wells that penetrate the metavolcanic rocks to an average depth of 108 feet yield approximately 12 gallons per minute.

Ground water in Orange County is principally a calcium bicarbonate type suitable for most domestic, municipal, and industrial purposes.

A thick layer of soil material and soft weathered rock overlies the bedrock throughout most of the county. In some places where roadbanks are deep, this soft weathered material is exposed to a depth of more than 15 feet.

The county is drained by the Neuse, Cape Fear, and Roanoke River systems. Major streams include the Eno River and the North and South Forks of Little River in the Neuse Basin and New Hope, Little, Morgan, Cane, and Collins Creeks in the Cape Fear Basin. Several small streams flow north in the Roanoke River Basin. These minor streams rise in Orange County, and leave it with only the water falling within their boundaries. Natural surface drainage is generally medium to rapid, but it is slow on nearly level interstream divides and on flood plains.

Land Use

Land use in Orange County is as follows: cropland, 49,025 acres; pasture, 25,116 acres; woodland, 154,500 acres; and urban land and other uses, 26,079 acres.

It is estimated that 77 percent of the land in the county could be used as cropland if the land were adequately protected from erosion; an additional 9 percent could be used as cropland, but either wetness or a flooding hazard is a concern; 14 percent is not suitable for cultivation because of steep slopes or a very severe erosion hazard, but the land can be used for pasture or trees.

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 mapping units. Some mapping 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. Mapping units are discussed in the section "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 their interpretations 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 useful to different groups of users, among them farmers, managers of woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

Orange County adjoins Alamance County and Durham County. In the soil surveys of these three counties, the soil names and boundaries match with only a few exceptions. The minor differences are the result of minor acreage inclusions or changes in the concept of a series as a result of refinements in soil classification.

General Soil Map for Broad Land Use Planning

The general soil map at the back of this publication shows, in color, the soil associations for broad land use planning described in this survey. Each soil association is a unique natural landscape that has a distinct pattern of soils and of relief and drainage features. An association typically consists of one or more soils of major extent and some soils of minor extent. It is named for the major soils. The kinds of soil in one association can occur in other soil associations but in a different pattern.

The 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 generally suitable for certain kinds of farming or 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 soils in any one soil association ordinarily differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

Descriptions of Soil Associations

Nearly Level to Steep Soils on Uplands

The soils in the associations in this group formed on the uplands in material that weathered mainly from granite and gneiss. These associations make up about 25 percent of the county. They are used as cropland mostly and as woodland and pasture.

1. Appling-Helena Association

Gently sloping and sloping, well drained and moderately well drained soils that have a surface layer of sandy loam and a subsoil of sandy clay loam, clay, or sandy clay; on uplands

This association is on broad ridges and narrow side slopes between intermittent and perennial streams. It makes up 16 percent of the county. It is about 40 percent Appling soils and 30 percent Helena soils. Soils of minor extent make up 30 percent of this association. These are the Vance, Cecil, Enon, Wedowee, and Wilkes soils.

The gently sloping to sloping Appling soils are well drained. The surface layer is brown sandy loam. The subsurface layer is light yellowish brown sandy loam. The upper part of the subsoil is reddish yellow sandy clay loam, the middle part is mottled reddish yellow and strong brown clay, and the lower part is mottled strong brown sandy clay loam. The underlying material is yellowish red, reddish yellow, and light gray saprolite that crushes to sandy clay loam.

The gently sloping to sloping Helena soils are moderately well drained. The surface layer is grayish brown sandy loam. The subsurface layer is very pale brown sandy loam. The upper part of the subsoil is pale brown sandy clay loam, the middle part is mottled brownish yellow sandy clay, and the lower part is mottled brownish yellow sandy clay loam. The underlying material is mottled reddish yellow saprolite that crushes to sandy loam.

This soil association is used mainly as cropland and to a lesser extent as pasture and woodland. Wetness, slope, shrink-swell potential, and permeability are the main limitations to use and management.

This association has high potential for crops, for most urban uses, and for use as woodland.

2. Lignum-Enon-Orange Association

Nearly level to strongly sloping, moderately well drained and well drained soils that have a surface layer of silt loam and loam and a subsoil of silty clay loam, silty clay, clay, and clay loam; on uplands

This association is on broad ridges. It makes up 3 percent of the county. It is 40 percent Lignum soils, 25 percent Enon soils, and 15 percent Orange soils. Soils of minor extent make up 20 percent of this association. These are the Georgeville, Herndon, and Chewacla soils.

The nearly level to gently sloping Lignum soils are moderately well drained. The surface layer is grayish brown silt loam. The subsurface layer is very pale brown silt loam. The subsoil is mottled brownish yellow silty clay loam in the upper part, mottled brownish yellow and strong brown silty clay and clay in the middle part, and mottled light gray clay in the lower part. The underlying material is mottled light gray saprolite that crushes to silt loam.

The gently sloping to strongly sloping Enon soils are well drained. The surface layer is brown loam. The subsoil is mottled reddish yellow clay loam in the upper part, mottled strong brown clay in the middle part, and mottled strong brown clay loam in the lower part. The underlying material is strong brown, yellowish brown, and very pale brown saprolite that crushes to loam.

The nearly level and gently sloping Orange soils are moderately well drained. The surface layer is grayish brown silt loam. The subsurface layer is pale yellow silt loam. The subsoil is mottled yellowish brown clay in the upper part and mottled light yellowish brown silty clay loam in the lower part. The underlying material is mottled light gray saprolite that crushes to silt loam.

This soil association is used mainly as woodland. Some areas are in crops. Wetness, shrink-swell potential, and permeability are the main limitations to use and management.

This association has low potential for crops and for most urban uses and medium potential for use as woodland.

3. Iredell-Enon Association

Nearly level to strongly sloping, moderately well drained and well drained soils that have a surface layer of gravelly loam and loam and a subsoil of clay and clay loam; on uplands

This association is on broad ridges. It makes up 2 percent of the county. It is 60 percent Iredell soils and 30 percent Enon soils. Soils of minor extent make up 10 percent of this association. These are the Georgeville, Herndon, Lignum, Wilkes, and Chewacla soils.

The nearly level and gently sloping Iredell soils are moderately well drained. The surface layer is dark grayish brown gravelly loam. The subsurface layer is brown gravelly loam. The subsoil is dark yellowish brown and yellowish brown clay in the upper part and mottled light olive brown clay in the lower part. The underlying material is mottled brown saprolite that crushes to loam.

The gently sloping to strongly sloping Enon soils are well drained. The surface layer is brown loam. The subsoil is mottled reddish yellow clay loam in the upper part, mottled strong brown clay in the middle part, and mottled strong brown clay loam in the lower part. The underlying material is strong brown, yellowish brown, and very pale brown saprolite that crushes to loam.

This soil association is used mainly as woodland and to a lesser extent as cropland and pasture. Wetness, shrink-swell potential, and permeability are the main limitations to use and management.

This association has low potential for crops and for most urban uses and medium potential for use as woodland.

4. Wedowee-Louisburg Association

Sloping to steep, well drained to excessively drained soils that have a surface layer of sandy loam and a subsoil of sandy clay loam, sandy clay, and coarse sandy loam; on uplands

This association is on side slopes adjacent to the major drainageways. It makes up 4 percent of the county. It is 45 percent Wedowee soils and 35 percent Louisburg soils. Soils of minor extent make up 20 percent of this association. These are the Appling, Chewacla, Enon, and Vance soils.

The sloping to moderately steep Wedowee soils are well drained. The surface layer is dark grayish brown sandy loam. The subsurface layer is yellowish brown sandy loam. The subsoil is mottled strong brown sandy clay loam in the upper part, mottled yellowish brown sandy clay in the middle part, and mottled yellowish red sandy clay loam in the lower part. The underlying material is mottled yellowish red sandy loam.

The sloping to steep Louisburg soils are well drained to excessively drained. The surface layer is yellowish brown sandy loam. The subsoil is strong brown coarse sandy loam. The underlying material is strong brown and yellowish red saprolite that crushes to gravelly sandy loam.

This soil association is used mainly as woodland. Some areas are in pasture. Slope, depth to rock, and erosion are the main limitations to use and management.

This association has low potential for crops and most urban uses and high potential for use as woodland.

Gently Sloping to Steep Soils on Uplands

The soils in this group formed on uplands in material that weathered mainly from slate. They make up 72 percent of the county and are used mainly as cropland and to a lesser extent as pasture and woodland.

5. Georgeville-Herndon Association

Gently sloping and sloping, well drained soils that have a surface layer of silt loam and a subsoil of clay loam, silty clay, silty clay loam, and clay; on uplands

This association is on broad ridges and narrow side slopes. It makes up 53 percent of the county. It is 45 percent Georgeville soils and 30 percent Herndon soils. Soils of minor extent make up 25 percent of the association.

These include the Tatum, Enon, Hiwassee, Goldston, Chewacla, and Orange soils.

The gently sloping and sloping Georgeville soils are well drained. The surface layer is yellowish red silt loam. The subsoil is mottled red clay loam and silty clay in the upper part and mottled red silty clay loam in the lower part.

The gently sloping and sloping Herndon soils are well drained. The surface layer is dark yellowish brown silt loam. The subsurface layer is yellow silt loam. The subsoil is reddish yellow silty clay loam in the upper part, mottled yellowish red silty clay loam and mottled strong brown clay in the middle part, and mottled reddish yellow silty clay loam in the lower part. The underlying material, is mottled yellowish red, light gray, and yellowish brown silt loam.

This soil association is used mainly as cropland. Some areas are used as woodland and pasture. Erosion and low strength are the main limitations to use and management.

This association has high potential for crops, for most urban uses, and for use as woodland.

6. Georgeville-Herndon-Tatum Association

Gently sloping to moderately steep, well drained soils that have a surface layer of silt loam and a subsoil of clay loam, silty clay loam, silty clay, and clay; on uplands

This association is on broad ridges and narrow side slopes. It makes up 15 percent of the county. It is 20 percent Georgeville soils, 20 percent Herndon soils, and 20 percent Tatum soils. Soils of minor extent make up 40 percent of this association. These are mainly the Hiwassee, Goldston, Chewacla, and Orange soils.

The gently sloping and sloping Georgeville soils are well drained. The surface layer is yellowish red silt loam. The subsoil is mottled red clay loam and silty clay in the upper part and mottled red silty clay loam in the lower part.

The gently sloping and sloping Herndon soils are well drained. The surface layer is dark yellowish brown silt loam. The subsurface layer is yellow silt loam. The subsoil is reddish yellow silty clay loam in the upper part, mottled yellowish red silty clay loam and mottled strong brown clay in the middle part, and mottled reddish yellow silty clay loam in the lower part. The underlying material is mottled yellowish red, light gray, and yellowish brown silt loam.

The sloping to moderately steep Tatum soils are well drained. The surface layer is strong brown silt loam. The subsoil is red silty clay in the upper part and red silty clay loam in the lower part. The underlying material is mottled red saprolite that crushes to loam.

This association is used mainly as cropland and to a lesser extent as woodland and pasture. Slope, erosion hazard, low strength, and depth to rock are the main limitations to use and management.

This association has high potential for use as cropland, moderately high potential for most urban uses, and high potential for use as woodland.

7. Tatum-Goldston Association

Sloping to steep, well drained soils that have a surface layer of silt loam and slaty silt loam and a subsoil of silty clay, silty clay loam, and slaty silt loam; on uplands

This association is on side slopes adjacent to the major drainageways. It makes up 4 percent of the county. It is 80 percent Tatum soils and 10 percent Goldston soils (fig. 1). Soils of minor extent make up 10 percent of this association. These are the Georgeville, Herndon, and Wilkes soils.

The sloping to moderately steep Tatum soils are well drained. The surface layer is strong brown silt loam. The subsoil is red silty clay in the upper part and red silty clay loam in the lower part. The underlying material is mottled red saprolite that crushes to loam.

The sloping to steep Goldston soils are well drained. The surface layer is pale brown slaty silt loam. The subsoil is mottled light yellowish brown slaty silt loam. The underlying material is mottled pale brown and strong brown saprolite that crushes to silt loam.

This association is used mainly as woodland and to a lesser extent as cropland and pasture. Depth to rock, slope, and erosion hazard are the main limitations to use and management.

This association has low potential for crops and for most urban uses and high potential for use as woodland.

Gently Sloping to Strongly Sloping Soils on Uplands

The soils in this group formed on the uplands in material that weathered from shale and sandstone. The association makes up 2 percent of the county. It is used mainly as woodland. Some areas are in crops and pasture.

8. White Store-Creedmoor Association

Gently sloping to strongly sloping, moderately well drained soils that have a surface layer of loam and fine sandy loam and a subsoil of clay loam, clay, silty clay, silty clay loam, and sandy clay loam; on uplands

This association is on broad ridges. It makes up 2 percent of the county. It is 55 percent White Store soils, 10 percent Creedmoor soils, and 35 percent Altavista, Appling, and Chewacla soils and Urban land.

The gently sloping to strongly sloping White Store soils are moderately well drained. The surface layer is yellowish brown loam. The subsoil is reddish brown clay loam in the upper part, mottled yellowish red clay, reddish brown clay, and mottled dark reddish brown silty clay in the middle part, and reddish brown silty clay loam in the lower part. The underlying layer is reddish brown saprolite that crushes to silt loam.

The gently sloping and sloping Creedmoor soils are moderately well drained. The surface layer is grayish brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is mottled strong brown sandy clay loam in the upper part, mottled strong brown clay and mottled yellowish brown silty clay in the middle part, and brownish yellow, strong brown, light gray, and pinkish gray silty clay loam in the lower part. The underlying material is reddish yellow and light brownish gray saprolite that crushes to silt loam.

This soil association is used as woodland mainly and as cropland and pasture. Shrink-swell potential, wetness, and an erosion hazard are the main limitations to use and management.

This association has low potential for use as cropland and for most urban uses and moderate potential for use as woodland.

Nearly Level Soils on Flood Plains

The soils in this group formed in recent alluvial sediments. These make up 1 percent of the county and are used as woodland mainly and for crops and pasture.

9. Chewacla-Congaree Association

Nearly level, somewhat poorly drained and well drained soils that have a surface layer of loam and fine sandy loam, a subsoil of loam, sandy clay loam, and clay loam, and an underlying layer of sandy loam, sandy clay loam, and silt loam; on flood plains

This association is in long flat areas or narrow bands parallel to streams. It makes up 1 percent of the county. It is 70 percent Chewacla soils and 20 percent Congaree soils. Soils of minor extent, mainly Altavista soils, make up 10 percent of the association.

The nearly level Chewacla soils are somewhat poorly drained. The surface layer is dark brown loam. The subsoil is mottled light yellowish brown loam in the upper part; mottled light yellowish brown, yellowish brown, light gray, and very pale brown sandy clay loam and clay loam in the middle part; and mottled light gray sandy clay loam in the lower part. The underlying material is mottled light gray stratified sandy loam.

The nearly level Congaree soils are well drained. The surface layer is brown fine sandy loam. The underlying material is mottled dark yellowish brown sandy loam in the upper part, mottled yellowish brown sandy clay loam and brown and yellowish brown sandy loam in the middle part, and mottled light gray silt loam in the lower part.

This soil association is used mainly as woodland. Some areas are in crops and pasture. Wetness and flooding are the main limitations to use and management.

This association has high potential for use as cropland, low potential for most urban uses, and high potential for use as woodland.

Soil Maps for Detailed Planning

The kinds of soil (mapping units) shown on the detailed soil maps at the back of this publication 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 soil is given in the section "Use and Management of the Soils."

Preceding the name of each mapping unit is the symbol that identifies the unit on the detailed soil map. Each mapping unit 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.

A soil mapping unit represents an area on the landscape and consists mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map at the back of this publication are phases of soil series.

Soils that have profiles that are almost alike make up a *soil series*. Except for allowable differences in texture of the surface layer or of the underlying 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. All the soils in the United States having the same series name have essentially the same properties that affect their use and their response to management practices.

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 characteristic that affects the use of the soils. 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, Georgeville silt loam, 6 to 10 percent slopes, is one of several phases within the Georgeville series.

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 of a complex contains some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Iredell-Urban land complex, 1 to 8 percent slopes, is an example.

Most mapping units include small, scattered areas of soils other than those that appear in the name of the mapping 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 mapping unit. The soils that are included in mapping are recognized in the description of each mapping unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Pits 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 mapping unit are given in table 3, and additional information on properties, limitations, capabilities, and potentials for many soil uses are 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.

Soil Descriptions

Aa—Altavista fine sandy loam, 0 to 3 percent slopes. This moderately well drained soil is on broad stream terraces. Mapped areas are elliptical and are 5 to 30 acres in size.

Typically, the surface layer is yellowish brown fine sandy loam 6 inches thick. The subsoil is 44 inches thick. It is yellowish brown loam in the upper part, mottled yellowish brown and brown sandy clay loam in the middle part, and mottled strong brown sandy loam in the lower part. The underlying material, extending to a depth of 80 inches, is mottled strong brown and light gray sandy loam.

Included with this soil in mapping are a few small areas of Congaree and Chewacla soils.

The organic matter content in the surface layer is low. Permeability is moderate, the available water capacity is high, and the shrink-swell potential is low. Reaction of the subsoil is strongly acid or medium acid. The seasonal high water table is at a depth of about 18 to 30 inches late in winter and early in spring. This soil is flooded occasionally for very brief periods.

Most of this soil is used as woodland. Small areas are used for crops, hay, and pasture. Wetness, flooding, and moderate permeability are the main limitations to use and management of this soil.

This soil has high potential for corn, soybeans, tobacco, and small grain. Flooding is a hazard during spring and summer. Winter cover crops, minimum tillage, and crop residue management aid in maintaining tilth and production. Conservation practices such as diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water. Tillage operations may be delayed during wet seasons. Some crops, such as tobacco, require surface drainage. The potential for growing hay and pasture forage is high. Proper pasture management helps to insure adequate protective cover.

The potential for most urban uses, such as dwellings, roads, and septic tank absorption fields is low because of the soil's wetness and moderate permeability and the hazard of flooding. The wetness and flooding are difficult and costly to overcome. The moderate permeability affects the performance of septic tank absorption fields, but it generally can be overcome by modifying the field or increasing the size of the absorption area. The recreation potential is medium for most uses because of wetness.

This soil has high potential for broad-leaved and needle-leaved trees. The dominant trees are sycamore, yellow-poplar, sweetgum, walnut, persimmon, hickory, maple, birch, beech, willow oak, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, loblolly pine, and shortleaf pine. The understory is mainly dogwood, sourwood, redbud, holly, black cherry, and sassafras. Wetness is the main limitation to use as woodland. Capability subclass IIw, woodland group 2w.

ApB—Appling sandy loam, 2 to 6 percent slopes. This well drained soil is on broad ridges that are crossed by intermittent drainageways on the uplands. Mapped areas are generally elliptical in shape and are 4 to 20 acres in size.

Typically, the surface layer is brown sandy loam 9 inches thick. The subsurface layer is light yellowish brown sandy loam 2 inches thick. The subsoil is 37 inches thick. The upper part is reddish yellow sandy clay loam. The middle part is mottled reddish yellow and strong brown clay. The lower part is mottled strong brown sandy clay loam. The underlying material, extending to a depth of 60 inches, is yellowish red, reddish yellow, and light gray saprolite that crushes to sandy clay loam.

Included with this soil in mapping are a few small areas of soils that have a gravelly surface layer and a few small areas of eroded soils. Also included are small areas of Cecil and Helena soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is moderate. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is used as cropland. Some areas are used for hay and pasture. Other areas are forested. Slope, surface runoff, erosion, and moderate permeability are the main limitations to use and management of this soil.

This soil has high potential for tobacco, corn, soybeans, and small grain and for such horticultural crops as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas. Slope, surface runoff, and erosion are the main limitations. Minimum tillage and crop residue management aid in controlling runoff and erosion. Conservation practices, such as maintaining drainageways in sod, terraces and diversions, stripcropping, field borders, and crop rotations that include close-growing crops, also help to conserve soil and water.

The soil has high potential for hay and pasture forage. Proper pasture management helps to insure adequate protective cover.

This soil has high potential for most urban uses. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. The recreation potential is also high.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are yellow-poplar, sweetgum, hickory, ash, sycamore, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, loblolly pine, and shortleaf pine. The understory is mainly dogwood, sourwood, redbud, holly, black cherry, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIe, woodland group 3o.

ApC—Appling sandy loam, 6 to 10 percent slopes. This well drained soil is on narrow side slopes that are crossed by intermittent drainageways on the uplands. The areas are long, narrow, roughly rectangular bands 2 to 10 acres in size.

Typically, the surface layer is brown sandy loam 9 inches thick. The subsurface layer is light yellowish brown sandy loam 2 inches thick. The subsoil is 37 inches thick. The upper part is reddish yellow sandy clay loam. The middle part is mottled reddish yellow and strong brown clay. The lower part is mottled strong brown sandy clay loam. The underlying material, extending to a depth of 60 inches, is yellowish red, reddish yellow, and light gray saprolite that crushes to sandy clay loam.

Included with this soil in mapping are a few small areas of soils that have a gravelly or stony surface layer and a few small areas of eroded soils. Also included are a few small areas of Cecil and Wedowee soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is moderate. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is used as woodland and pasture. Some is used as cropland. Slope, surface runoff, erosion, and moderate permeability are the main limitations to use and management of this soil.

This soil has medium potential for tobacco, corn, oats, barley, and soybeans and for such horticultural crops as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas. Slope, surface runoff, and erosion are the main limitations. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, stripcropping, contour farming, field borders, and crop rotations that include close-growing crops also aid in conserving soil and water. The potential is moderately high for hay and pasture forage using plants such as ladino clover, red clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban uses is medium because of slope and moderate permeability. The limitation of slope can be reduced or modified by special planning, design, and maintenance. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. Erosion is a hazard when ground cover is removed. The recreation potential is medium because of slope.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The main trees are yellow-poplar, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, sweetgum, hickory, sycamore, ash, loblolly pine, and shortleaf pine. The understory is mainly dogwood, sourwood, redbud, holly, black cherry, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIIe, woodland group 3o.

AuC—Appling-Urban land complex, 2 to 10 percent slopes. This complex consists of areas of Appling soils and Urban land that are too small or too intricately mixed to be mapped separately at the scale used. This complex is about 25 to 50 percent Appling soils and 20 to 40 percent Urban land. In about 30 percent of each mapped area, the Appling soils have been covered with as much as 18 inches of fill material or have had as much as two-thirds of the original soil material removed.

The well drained Appling soils are on broad ridges on the uplands. Typically, the surface layer is brown sandy loam 9 inches thick. The subsurface layer is light yellowish brown sandy loam 2 inches thick. The subsoil is 37 inches thick. The upper part is reddish yellow sandy clay loam. The middle part is reddish yellow and strong brown clay. The lower part is strong brown sandy clay loam. The underlying material, extending to a depth of 60 inches, is yellowish red, reddish yellow, and light gray saprolite that crushes to sandy clay loam.

Urban land consists of areas where the original soil has been cut, filled, graded, paved, or otherwise changed to the extent that a distinguishable soil is not apparent. These areas are used for shopping centers, factories, municipal buildings, apartment complexes, parking lots, and other such uses. The extent of site modification varies greatly. Many areas have been disturbed little, but slope is generally modified to fit the use.

Included in mapping are a few areas of Cecil and Enon soils.

Use and management of this complex should be based on onsite investigation. No capability subclass; Appling soil in woodland group 3o, Urban land not assigned.

CfB—Cecil fine sandy loam, 2 to 6 percent slopes. This well drained soil is on broad ridges on the uplands. Mapped areas are generally elliptical and are 2 to 15 acres in size.

Typically, the surface layer is yellowish red fine sandy loam 4 inches thick. The subsoil is 42 inches thick. It is yellowish red sandy clay loam in the upper part. The middle part is mottled red clay. The lower part is mottled red clay loam. The underlying material, extending to a depth of 61 inches, is mottled red and yellowish red saprolite that crushes to loam.

Included with this soil in mapping are small areas of soils that have a gravelly surface layer and a few small areas of eroded soils. Also included are small areas of Appling, Georgeville, and Wilkes soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is moderate. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is used as cropland. Some areas are used for pasture and as woodland. Slope, surface runoff, erosion, and permeability are the main limitations to the use and management of this soil.

This soil has high potential for corn, soybeans, and small grain and for such horticultural crops as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas. Slope and erosion are the main limitations. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture forage is also high. Proper pasture management helps to insure adequate protection.

This soil has medium potential for most urban uses such as dwellings and roads. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the absorption field or by increasing the size of the absorption area. The potential for most recreation uses is high.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The main trees are ash, hickory, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, and sycamore. The understory is mainly dogwood, sourwood, redbud, holly, black cherry, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIe, woodland group 3o.

CfC—Cecil fine sandy loam, 6 to 10 percent slopes. This well drained soil is on narrow side slopes on the uplands. The areas are long, narrow, roughly rectangular bands 2 to 15 acres in size.

Typically, the surface layer is yellowish red fine sandy loam 4 inches thick. The subsoil is 42 inches thick. It is yellowish red sandy clay loam in the upper part. The middle part is mottled red clay. The lower part is mottled red clay loam. The underlying material, extending to a depth of 61 inches, is mottled red and yellowish red saprolite that crushes to loam.

Included with this soil in mapping are a few areas of soils that have a gravelly surface layer, small areas of soils that have a coarse sandy loam surface layer, and a few small areas of eroded soils. Also included are a few small areas of Georgeville and Appling soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is moderate. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is used as cropland. Some areas are used for hay and pasture and as woodland. Slope, surface runoff, permeability, and erosion are the main limitations in the use and management of this soil.

This soil has medium potential for corn and soybeans and for such horticultural crops as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas.

Slope and erosion are the main limitations. Minimum tillage and crop residue management aid in controlling runoff and erosion. Conservation practices such as installing drainageways and maintaining them in sod, terraces and diversions, stripcropping, field borders, contour farming, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for the production of hay and pasture forage is moderately high using plants such as ladino clover, red clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

This soil has medium potential for most urban uses because of slope and moderate permeability. The limitation of slope can be reduced or modified by special planning, design, or maintenance. Erosion is a hazard when ground cover is removed. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. The recreation potential is medium.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The trees are mainly ash, yellow-poplar, hickory, sweetgum, maple, sycamore, white oak, black oak, post oak, northern red oak, southern red oak, and crimson oak. The understory is mainly dogwood, sourwood, redbud, holly, black cherry, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIIe, woodland group 3o.

Ch—Chewacla loam. This nearly level, somewhat poorly drained soil is on long, flat areas parallel to the major streams on the flood plains. Mapped areas are 5 to more than 50 acres in size.

Typically, the surface layer is dark brown loam 6 inches thick. The subsoil is 46 inches thick. The upper part is mottled light yellowish brown loam. The middle part is mottled light yellowish brown, yellowish brown, light gray, and very pale brown sandy clay loam and clay loam. The lower part is mottled light gray sandy clay loam. The underlying material to a depth of 60 inches is mottled light gray, stratified sandy loam.

Included with this soil in mapping are small areas of Congaree soils. Also included are small areas of soils that are poorly drained and spots of soils that are very wet.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is low. Reaction of the subsoil is strongly acid to slightly acid. Depth to bedrock is more than 60 inches. Depth to the seasonal high water table is about 6 to 18 inches during late winter and early in spring. This soil is flooded commonly and for brief periods.

Most of this soil is used as woodland. A few areas are used for pasture and as cropland. Wetness, flooding, and moderate permeability are the main limitations to the use and management of this soil.

This soil has medium potential for water-tolerant row crops such as corn and soybeans. Because of flooding, however, these crops can be damaged. Drainage and flood prevention are needed in most uses. Minimum tillage, cover crops, and grasses and legumes in the conservation cropping system help to maintain soil tilth and production. Tillage may be delayed in spring because of wetness. Conservation practices such as sod drainageways, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops aid in conserving soil and water. Lack of suitable outlets is a limitation to the installation of drainage systems.

The potential for hay and pasture forage is medium. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban and recreation uses is low. The flooding and wetness are difficult and costly to overcome.

This soil has very high potential for broad-leaved and needle-leaved trees. The dominant trees are walnut, yellow-poplar, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, sweetgum, persimmon, beech, ash, birch, willow oaks, and loblolly pine. The understory is mainly dogwood, sourwood, alders, and hophornbean. Wetness is the main limitation for woodland use and management. Capability subclass IIIw, woodland group 1w.

Cp—Congaree fine sandy loam. This nearly level, well drained soil is on narrow bands parallel to the streams on the flood plains. Mapped areas are 2 to 50 acres in size.

Typically, the surface layer is brown fine sandy loam 7 inches thick. The underlying material, extending to a depth of 63 inches, is mottled dark yellowish brown sandy loam in the upper part. The middle part is mottled yellowish brown sandy clay loam and brown and yellowish brown sandy loam. The lower part is mottled light gray silt loam.

Included with this soil in mapping are a few small areas of soils that have a sandy loam surface layer. Also included are small areas of Chewacla soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is high, and the shrink-swell potential is low. Reaction of the subsoil is medium acid to slightly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of about 30 to 48 inches late in winter and early in spring. This soil is flooded frequently and for brief periods.

Most of this soil is used as cropland and for pasture. Some is woodland. Flooding, wetness, and moderate permeability are the main limitations to use and management.

This soil has high potential for corn, small grain, oats, soybeans, wheat, and barley. Minimum tillage and crop residue management aid in controlling runoff and erosion. Conservation practices such as diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water. Tillage operations may be delayed during wet seasons.

The potential for hay and pasture forage is high. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

This soil has low potential for most urban and recreation uses because of wetness and flooding. The wetness and flooding are difficult and costly to overcome.

This soil has very high potential for broad-leaved and needle-leaved trees. The dominant trees are yellow-poplar, sweetgum, sycamore, walnut, persimmon, willow oak, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, beech, birch, and loblolly pine. The understory is mainly dogwood, sourwood, redbud, and hophornbean. There are no significant limitations for woodland use and management. Capability subclass IIw, woodland group 1o.

CrB—Creedmoor fine sandy loam, 2 to 8 percent slopes. This moderately well drained soil is on broad ridges on the uplands. Mapped areas are generally elliptical and are 2 to 15 acres in size.

Typically, the surface layer is grayish brown fine sandy loam 5 inches thick. The subsurface layer is light yellowish brown fine sandy loam 3 inches thick. The subsoil is 35 inches thick. It is mottled strong brown sandy clay loam in the upper part. The middle part is mottled strong brown clay and mottled yellowish brown silty clay. The lower part is brownish yellow, strong brown, light gray, and pinkish gray silty clay loam. The underlying material, extending to a depth of 60 inches, is reddish yellow and light brownish gray saprolite that crushes to silt loam.

The organic matter content of the surface layer is low. The permeability is very slow, the available water capacity is medium, and the shrink-swell potential is high. Reaction of the subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is normally below a depth of 60 inches, but because the subsoil is slowly permeable, a perched water table is about 12 to 24 inches below the surface layer during wet seasons.

Most of this soil is woodland. Some is cropland and pasture. Slope, surface runoff, erosion, wetness, and a high shrink-swell potential are the main limitations to the use and management of this soil.

This soil has medium potential for corn, tobacco, and small grain. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as sod drainageways, terraces and diversions, stripcropping, field borders, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture forage from white clover and locally adapted grasses is high. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban uses is low. Wetness and high shrink-swell potential are the main limitations. The recreation potential is medium or high.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are sweetgum, yellow-poplar, sycamore, walnut, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, and loblolly pine. The understory is mainly dogwood and sourwood. Wetness is the main limitation for woodland use and management. Capability subclass IIe, woodland group 3w.

EnB—Enon loam, 2 to 6 percent slopes. This well drained soil is on broad ridges on the uplands. The areas are oblong and are 2 to 8 acres in size.

Typically, the surface layer is brown loam 5 inches thick. The subsoil is 25 inches thick. The upper part is mottled reddish yellow clay loam. The middle part is mottled strong brown clay. The lower part is mottled strong brown clay loam. The underlying material, extending to a depth of 68 inches, is strong brown, yellowish brown, and very pale brown saprolite that crushes to loam.

Included with this soil in mapping are a few small areas of soils that have a sandy loam surface layer, a few small areas of soils that are redder than the Enon soils, and a few small areas of soils that have stones on the surface. Also included are small areas of Iredell and Helena soils.

The organic matter content of the surface layer is low. The permeability is slow, the available water capacity is medium, and the shrink-swell potential is high. Reaction of the subsoil is medium acid to neutral. Depth to bedrock is more than 60 inches. The seasonal high water table is 12 to 24 inches below the surface.

Most of this soil is cropland. Some is pasture and woodland. Slope, surface runoff, high shrink-swell potential, and erosion are the main limitations to the use and management of this soil.

This soil has medium potential for corn, soybeans, tobacco, and small grain. This soil has high potential for horticultural crops such as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas. Slope and erosion are the main limitations.

Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential is high for hay and pasture forage using plants such as sericea, red clover, white clover, fescue, and orchardgrass. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for urban uses such as houses and streets is low because of the soil's slow permeability and high shrink-swell potential. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. Erosion is a hazard if ground cover is removed. The potential for recreation uses is medium or high.

This soil has medium potential for broad-leaved and needle-leaved trees. The dominant trees are yellow-poplar, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, sweetgum, hickory, cedar, blackjack oak, willow oak, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, sourwood, and redbud. There are no significant limitations for woodland use and management. Capability subclass IIIe, woodland group 4c.

EnC—Enon loam, 6 to 12 percent slopes. This well drained soil is on side slopes adjacent to ridges on the uplands. Mapped areas are generally elliptical in shape and are 2 to 15 acres in size.

Typically, the surface layer is brown loam 5 inches thick. The subsoil is 25 inches thick. The upper part is mottled reddish yellow clay loam. The middle part is mottled strong brown clay. The lower part is mottled strong brown clay loam. The underlying material, extending to a depth of 68 inches, is strong brown, yellowish brown, and very pale brown saprolite that crushes to loam.

Included with this soil in mapping are a few small areas of soils that are redder than normal for the Enon series. Also included are some small areas of Iredell and Wilkes soils.

The organic matter content of the surface layer is low. The permeability is slow, the available water capacity is low, and the shrink-swell potential is high. Reaction of the subsoil is medium acid to neutral. Depth to bedrock is more than 60 inches. The seasonal high water table is 12 to 24 inches below the surface.

Most of this soil is in crops and pasture. Some is used as woodland. Slope, surface runoff, erosion, high shrink-swell potential, and slow permeability are the main limitations to use and management.

This soil has medium potential for tobacco, corn, soybeans, oats, and barley and for such horticultural crops as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas. Slope, surface runoff, and erosion are the main limitations. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, contour farming, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture forage is moderately high using plants such as ladino clover, red clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for urban uses such as houses and streets is low because of the soil's slow permeability and high shrink-swell potential. The potential for recreation uses is medium because of permeability, slope, and traffic-supporting capacity.

This soil has medium potential for broad-leaved and needle-leaved trees. The dominant trees are loblolly pine, shortleaf pine, Virginia pine, and redcedar. The understory is mainly dogwood, sourwood, and redbud. There are no significant limitations for woodland use and management. Capability subclass IVe, woodland group 4c.

GeB—Georgeville silt loam, 2 to 6 percent slopes. This well drained soil is on broad ridges on the uplands. Mapped areas are generally elliptical in shape and are 5 to 100 acres or more in size.

Typically, the surface layer is yellowish red silt loam 7 inches thick. The subsoil, extending to a depth of 65 inches, is mottled red clay loam and silty clay in the upper part and mottled red silty clay loam in the lower part.

Included with this soil in mapping are small areas of soils that have a gravelly surface layer and a few small areas of eroded soils. Also included are small areas of Hiwassee, Goldston, and Herndon soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is high, and the shrink-swell potential is low. Reaction of the subsoil is medium acid to very strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is used as cropland. Some is used for pasture and some as woodland. Slope, surface runoff, erosion, and moderate permeability are the main limitations to the use and management of this soil.

This soil has high potential for corn, soybeans, tobacco, and small grain. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

There is high potential for hay and pasture forage from sericea lespedeza, red clover, white clover, fescue, and orchardgrass (fig. 2). Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban uses is high. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. This soil has high potential for all forms of recreation.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, hickory, maple, beech, ash, chestnut oak, and loblolly pine. The understory is mainly dogwood, sourwood, redbud, holly, black cherry, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIe, woodland group 3o.

GeC—Georgeville silt loam, 6 to 10 percent slopes. This well drained soil is on narrow side slopes in the uplands. Mapped areas are long, narrow, roughly rectangular bands 5 to 100 acres in size.

Typically, the surface layer is yellowish red silt loam 7 inches thick. The subsoil, extending to a depth of 65 inches, is mottled red clay loam and silty clay in the upper part and mottled red silty clay loam in the lower part.

Included with this soil in mapping are small areas of soils that have a gravelly surface layer and a few small areas of eroded soils. Also included are Hiwassee, Goldston, and Herndon soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is high, and the shrink-swell potential is low. The subsoil is medium acid to very strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is in crops. Some is in pasture, and some is used as woodland. Moderate permeability, slope, surface runoff, and erosion are the main limitations to the use and management of this soil.

This soil has medium potential for corn, soybeans, tobacco, and small grain. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as sod drainageways, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture plants such as sericea lespedeza, red clover, white clover, fescue, and orchardgrass is moderately high. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban and recreation uses is medium because of slope and moderate permeability. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. Erosion is a hazard if ground cover is removed. The potential for recreation uses is medium because of slope.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, hickory, maple, beech, ash, chestnut oak, and loblolly pine. The understory is mainly dogwood, sourwood, redbud, holly, black cherry, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIIe, woodland group 3o.

GhC—Georgeville-Urban land complex, 2 to 10 percent slopes. This complex consists of areas of Georgeville soils and Urban land that are too small and too intricately mixed to be mapped separately at the scale used. This complex is about 25 to 50 percent Georgeville soils and 20 to 40 percent Urban land. In about 30 percent of each mapped area, the Georgeville soils have been covered with as much as 18 inches of fill material or have as much as two-thirds of the original soil material removed.

The well drained Georgeville soils are on narrow side slopes on the uplands. Typically, the surface layer is yellowish red silt loam 7 inches thick. The subsoil, extending to a depth of 65 inches, is mottled red clay loam and silty clay in the upper part and mottled red silty clay loam in the lower part.

Urban land consists of areas where the original soil has been cut, filled, graded, paved, or otherwise changed to the extent that a distinguishable soil is not apparent. These areas are used for shopping centers, factories, municipal buildings, apartment complexes, parking lots, and other such uses. The extent of site modification varies greatly. Many areas have been disturbed little, but slope is generally modified to fit the use.

Included in mapping are small areas of Hiwassee, Enon, and Herndon soils.

Use and management of this complex should be based on onsite investigations. No capability subclass; Georgeville soil in woodland group 3o, Urban land not assigned.

GlD—Goldston slaty silt loam, 6 to 15 percent slopes. This well drained soil is on side slopes adjacent to the major drainageways. Mapped areas are narrow, roughly rectangular bands 2 to 10 acres in size.

Typically, the surface layer is pale brown slaty silt loam 10 inches thick. The subsoil is mottled light yellowish brown slaty silt loam 8 inches thick. The underlying material, extending to a depth of 24 inches, is mottled pale brown and strong brown saprolite that crushes to silt loam.

Included with this soil in mapping are a few areas of soils that have slopes of less than 6 percent. Also included are small areas of Herndon, Tatum, and Wilkes soils.

The organic matter content of the surface layer is low. The permeability is moderately rapid, the available water capacity is very low, and the shrink-swell potential is low. The subsoil is strongly acid to medium acid. Depth to bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 72 inches.

Most of the soil is woodland and pasture. Slope, surface runoff, erosion, and depth to rock are the main limitations to the use and management of this soil.

This soil has low potential for crops. It is limited by slope, erosion, and surface runoff. It has medium potential for hay and pasture forage plants such as fescue, orchardgrass, and white clover. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for urban uses is low. This soil is limited by slope and depth to bedrock. Onsite evaluation and planning are needed if this soil is used for septic tank filter fields, roads, or dwellings. Where practical, because of rock near the surface, sewerlines, gas lines, and other underground utility lines should be routed around these areas. The potential for recreation use is medium.

This soil has medium potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, sweetgum, hickory, maple, beech, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly holly, dogwood, sourwood, laurel, and hophornbean. There are no significant limitations for the use and management of this soil for woodland. Capability subclass VIs, woodland group 4o.

GlF—Goldston slaty silt loam, 15 to 45 percent slopes. This well drained soil is on side slopes adjacent to the major drainageways. The mapped areas are narrow, roughly rectangular bands and are 4 to 10 acres in size.

Typically, the surface layer is pale brown slaty silt loam 10 inches thick. The subsoil is mottled light yellowish brown slaty silt loam 8 inches thick. The underlying material, extending to a depth of 24 inches, is mottled pale brown and strong brown saprolite that crushes to silt loam.

Included with this soil in mapping are a few small areas of Tatum and Wilkes soils.

The organic matter content of the surface layer is low. The permeability is moderately rapid, the available water capacity is very low, and the shrink-swell potential is low. Reaction of the subsoil is strongly acid to medium acid. Depth to bedrock is 20 to 40 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is used as woodland and for pasture. Slope, surface runoff, erosion, and depth to rock are the main limitations to use and management.

This soil has a low potential for crops and medium potential for pasture forage plants such as fescue, orchardgrass, and white clover. It is limited by slope, erosion, and surface runoff. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for urban and recreation uses is low. This soil is limited by slope and depth to bedrock. Onsite evaluation and planning are needed when this soil is used for septic tank filter fields, roads, or dwellings. Where practical, because of rock near the surface, sewerlines, gas lines, and other underground utility lines should be routed around these areas.

This soil has medium potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, sweetgum, hickory, maple, beech, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly holly, dogwood, sourwood, laurel, and hophornbean. Slope is the main limitation in the use and management of this soil for woodland. Capability subclass VIIs, woodland group 4r.

HeB—Helena sandy loam, 2 to 8 percent slopes. This moderately well drained soil is on broad ridges of the uplands. The areas are generally elliptical in shape and are 4 to 30 acres in size.

Typically, the surface layer is grayish brown sandy loam 5 inches thick. The subsurface layer is very pale brown sandy loam 9 inches thick. The subsoil is 22 inches thick. The upper part is pale yellow sandy clay loam. The middle part is mottled brownish yellow sandy clay. The lower part is mottled brownish yellow sandy clay loam. The underlying material, extending to a depth of 60 inches, is mottled reddish yellow saprolite that crushes to sandy loam (fig. 3).

Included with this soil in mapping are some small areas of soils that have a gravelly surface layer and a few small areas of eroded soils. Also included are a few small areas of soils that are wetter than Helena soils and some small areas of Appling soils.

The organic matter content of the surface layer is low. The permeability is slow, the available water capacity is low, and the shrink-swell potential is high. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is more than 48 inches. The seasonal high water table is normally below a depth of 60 inches, but because of the slowly permeable subsoil, a perched water table is 12 to 30 inches below the surface during wet seasons.

Most of this soil is in crops and pasture. Some is in trees. Slope, surface runoff, erosion, wetness, and high shrink-swell potential are the main limitations to the use and management of this soil.

This soil has high potential for tobacco (fig. 4), corn, milo, and small grain and for such horticultural crops as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas. Slope and wetness are the main limitations. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as sod drainageways, terraces and diversions, stripcropping, field borders, contour farming, and crop rotations that include close-growing crops also help to conserve soil and water.

The potential for hay and pasture forage is moderately high using plants such as ladino clover, red clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for urban uses such as houses and streets is low because of the soil's slope, slow permeability, and high shrink-swell potential. Slopes can be reduced or modified. Permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. The potential for recreation uses is medium because of slow permeability.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are yellow-poplar, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, sweetgum, hickory, maple, blackjack oak, willow oak, cedar, chestnut oak, Virginia pine, loblolly pine, and shortleaf pine. The understory is mainly dogwood, holly, sourwood, redbud, black cherry, and sassafras. Wetness is the main limitation for woodland use and management. Capability subclass IIe, woodland group 3w.

HhA—Helena-Sedgefield sandy loams, 0 to 2 percent slopes. This complex consists of moderately well drained to somewhat poorly drained, nearly level soils. The soils are so intermingled that it was not practical to separate them at the scale used in mapping. They are in flat and concave areas and around the head of intermittent drainageways on broad ridges. These soils receive surface and subsurface runoff from the surrounding higher areas. The Helena soils make up about 45 percent of the mapped areas, and the Sedgefield soils make up 40 percent.

Typically, Helena soils have a grayish brown sandy loam surface layer 5 inches thick. The subsurface layer is very pale brown sandy loam 9 inches thick. The subsoil is 22 inches thick. The upper part is pale yellow sandy clay loam. The middle part is mottled brownish yellow sandy clay. The lower part is mottled brownish yellow sandy clay loam. The underlying material, extending to a depth of 60 inches, is mottled reddish yellow saprolite that crushes to sandy loam.

The organic matter content of the surface layer is low. The permeability is moderately slow, the available water capacity is low, and the shrink-swell potential is high. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is more than 48 inches. The seasonal high water table is normally below a depth of 60 inches, but because of the slowly permeable subsoil, a perched water table is about 18 inches below the surface in places during wet seasons.

Typically, Sedgefield soils have a gray sandy loam surface layer 3 inches thick. The subsurface layer is mottled very pale brown sandy loam 4 inches thick. The subsoil is 30 inches thick. The upper part is yellowish brown sandy loam. The middle part is mottled brownish yellow and strong brown clay. The lower part is mottled gray sandy clay loam. The underlying material, extending to a depth of 65 inches, is light gray, yellow, and brownish yellow saprolite that crushes to sandy loam.

The organic matter content of the surface layer is low. The permeability is slow, the available water capacity is medium to high, and the shrink-swell potential is high. Reaction of the subsoil is strongly acid or medium acid. Depth to bedrock is more than 48 inches. The seasonal high water table is normally below a depth of 60 inches. Because of the slowly permeable subsoil, a perched water table is 12 to 18 inches below the surface in places during wet seasons.

Included with these soils in mapping are small areas of Enon and Vance soils. Also included are a few small areas of soils that have received sandy material from the surrounding uplands.

Infiltration is moderate, and surface runoff is slow. Tilth is easy to maintain, but tillage is delayed because of excess moisture. Subsurface drainage is difficult because of the slowly permeable subsoil. Ditches are the most effective means of removing excess water.

Most of this soil is in Virginia pine, sweetgum, blackgum, white oak, and red oak. Some areas are reverting to woodland, but most cleared areas are used for row crops. If adequate drainage is provided, most row crops produce moderate yields. Capability subclass IIw, woodland group 3w.

HrB—Herndon silt loam, 2 to 6 percent slopes. This well drained soil is on broad ridges on the uplands. Mapped areas are generally elliptical in shape and are 4 to 50 acres in size.

Typically, the surface layer is dark yellowish brown silt loam 4 inches thick. The subsurface layer is yellow silt loam 5 inches thick. The subsoil is 49 inches thick. The upper part is reddish yellow silty clay loam. The middle part is mottled yellowish red silty clay loam and mottled strong brown clay. The lower part is mottled reddish yellow silty clay loam. The underlying material, extending to a depth of 62 inches, is mottled yellowish red, light gray, and yellowish brown silt loam.

Included with this soil in mapping are small areas of soils that have a gravelly surface layer and a few small areas of eroded soils. Also included are a few small areas of Appling and Georgeville soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is low. Reaction of the subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is in crops. Some is used for pasture and as woodland. Slope, surface runoff, erosion, and moderate permeability are the main limitations to the use and management of this soil.

This soil has high potential for corn, soybeans, tobacco, and small grain. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture forage crops such as sericea lespedeza, red clover, white clover, fescue, and orchardgrass is high. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban uses such as dwellings and roads is high. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. This soil has high potential for all recreation uses.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, hickory, maple, ash, beech, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, sourwood, holly, redbud, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIe, woodland group 3o.

HrC—Herndon silt loam, 6 to 10 percent slopes. This well drained soil is on narrow side slopes on the uplands. Mapped areas are long, narrow, roughly rectangular bands and are 5 to 50 acres in size.

Typically, the surface layer is dark yellowish brown silt loam 4 inches thick. The subsurface layer is yellow silt loam 5 inches thick. The subsoil is 49 inches thick. The upper part is reddish yellow silty clay loam. The middle part is mottled yellowish red silty clay loam and mottled strong brown clay. The lower part is mottled reddish yellow silty clay loam. The underlying material, extending to a depth of 62 inches, is mottled yellowish red, light gray, and yellowish brown silt loam.

Included with this soil in mapping are some small areas of soils that have a gravelly surface layer and a few areas of eroded soils. Also included are small areas of Georgeville, Goldston, and Wilkes soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is low. The subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is used as cropland. Some is used for pasture and some as woodland. Slope, moderate permeability, surface runoff, and erosion are the main limitations to the use and management of this soil.

This soil has medium potential for corn, soybeans, tobacco, and small grain. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture forage crops such as sericea lespedeza, red clover, white clover, fescue, and orchardgrass is high. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban uses is medium because of slope and permeability. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. The limitation of slope can be reduced or modified by special planning, design, or maintenance. Erosion is a hazard if ground cover is removed. The potential for recreation uses is medium because of slope.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, hickory, maple, ash, beech, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, sourwood, holly, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIIe, woodland group 3o.

HwB—Hiwassee clay loam, 2 to 6 percent slopes. This well drained soil is on broad ridges on the uplands. The areas are generally elliptical in shape and are 2 to 15 acres in size.

Typically, the surface layer is dark reddish brown clay loam 6 inches thick. The subsoil is 73 inches thick. The upper part is dark red clay loam. The middle part is dark red clay. The lower part is dark red clay loam. The underlying material, extending to a depth of 85 inches, is dark red and red saprolite that crushes to loam.

Included with this soil in mapping are a few areas of soils that have a loam surface layer and a few small areas of soil that has a thicker subsoil than that of this mapping unit. Also included are a few small areas of Georgeville and Enon soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is low. Reaction of the subsoil is medium acid or slightly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is cropland. Some is in pasture, and some is used as woodland. Slope, surface runoff, erosion, and moderate permeability are the main limitations to the use and management of this soil.

This soil has high potential for corn, soybeans, and small grain. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

There is high potential for hay and pasture forage crops such as sericea lespedeza, red clover, white clover, fescue, and orchardgrass. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban uses such as dwellings and roads is high. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or increasing the size of the absorption area. The soil has high potential for most recreation uses.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, hickory, maple, ash, beech, and loblolly pine. The understory is mainly dogwood, sourwood, holly, redbud, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIe, woodland group 3o.

HwC—Hiwassee clay loam, 6 to 10 percent slopes. This well drained soil is on narrow side slopes on the uplands. Mapped areas are long, narrow, roughly rectangular bands and are 2 to 15 acres in size.

Typically, the surface layer is dark reddish brown clay loam 6 inches thick. The subsoil is 73 inches thick. The upper part is dark red clay loam. The middle part is dark red clay. The lower part is dark red clay loam. The underlying material, extending to a depth of 85 inches, is dark red and red saprolite that crushes to loam.

Included with this soil in mapping are a few areas of stony soils and a few areas in which the surface layer is silt loam or loam. Also included are small areas of Georgeville and Herndon soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is medium, and the shrink-swell potential is low. Reaction of the subsoil is medium acid or slightly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is cropland. Some is pasture and woodland. Slope, surface runoff, and moderate permeability are the main limitations to the use and management of this soil.

This soil has medium potential for corn, soybeans, and small grain. Slope and erosion are the main limitations. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential is moderately high for hay and pasture forage crops such as sericea lespedeza, red clover, white clover, fescue, and orchardgrass. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban and recreation uses is medium because of slope and permeability. Erosion is a hazard if ground cover is removed. The permeability affects the performance of septic tank absorption fields, but this limitation generally can be overcome by modifying the field or by increasing the size of the absorption area. The potential for recreation uses is medium because of slope.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, hickory, maple, ash, beech, and loblolly pine. The understory is mainly dogwood, sourwood, holly, redbud, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIIe, woodland group 3o.

IrB—Iredell gravelly loam, 1 to 4 percent slopes. This moderately well drained soil is on broad ridges on the uplands. Mapped areas are generally elliptical and are 2 to 75 acres in size.

Typically, the surface layer is dark grayish brown gravelly loam 5 inches thick. The subsurface layer is brown gravelly loam 3 inches thick. The subsoil is 2l inches thick. The upper part is dark yellowish brown and yellowish brown clay. The lower part is mottled light olive brown clay. The underlying material, extending to a depth of 40 inches, is mottled brown saprolite that crushes to loam.

Included with this soil in mapping are small areas of soils that have a fine sandy loam or silt loam surface layer, a few small areas of soils that have stones on the surface, and a few small areas of eroded soils. Also included are small areas of Enon soils.

The organic matter content of the surface layer is low. The permeability is slow, the available water capacity is low, and the shrink-swell potential is very high. The subsoil is slightly acid to neutral. Depth to bedrock is 20 to 40 inches. The seasonal high water table is normally below a depth of 72 inches.

Most of this soil is woodland. Some is pasture and cropland. Slow permeability and very high shrink-swell potential are the main limitations to the use and management of this soil.

This soil has low potential for row crops. The potential for pasture forage is medium. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban and recreation uses is low because of slow permeability and very high shrink-swell potential.

The potential for broad-leaved and needle-leaved trees is medium. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, hickory, blackjack oak, willow oak, cedar, maple, and loblolly pine. The understory is mainly redbud, dogwood, holly, and sassafras. The gravel content of this soil is the main limitation to its use as woodland. Capability subclass VIIs, woodland group 4c.

IuB—Iredell-Urban land complex, 1 to 8 percent slopes. This complex consists of areas of Iredell soils and Urban land that are too small and too intricately mixed to be mapped separately at the scale used. This complex is about 25 to 50 percent Iredell soils and 20 to 40 percent Urban land. In about 30 percent of each mapped area, the Iredell soils have been covered with as much as l8 inches of fill material or have as much as two-thirds of the original soil material removed.

The well drained Iredell soils are on broad ridges on the uplands. Typically, the surface layer is dark grayish brown gravelly loam 5 inches thick. The subsurface layer is brown gravelly loam 3 inches thick. The subsoil is 2l inches thick. The upper part is dark yellowish brown and yellowish brown clay. The lower part is mottled light olive brown clay. The underlying material, extending to a depth of 40 inches, is mottled brown saprolite that crushes to loam.

The Urban land consists of areas where the original soil has been cut, filled, graded, paved, or otherwise changed to the extent that a distinguishable soil is not apparent. These areas are used for shopping centers, factories, municipal buildings, apartment complexes, parking lots, and other such uses. The extent of site modification varies greatly. Many areas have been disturbed little, but slope is generally modified to fit the use.

Included in mapping are a few areas of Enon soils.

Use and management of this complex should be based on onsite investigations. No capability subclass; Iredell soil in woodland group 4c, Urban land not assigned.

Lg—Lignum silt loam, 0 to 3 percent slopes. This moderately well drained soil is on the uplands. Mapped areas are generally elliptical and are 3 to 40 acres in size.

Typically, the surface layer is grayish brown silt loam 1 inch thick. The subsurface layer is very pale brown silt loam 5 inches thick. The subsoil is 30 inches thick. The upper part is mottled brownish yellow silty clay loam. The middle part is mottled brownish yellow and strong brown silty clay and clay. The lower part is mottled light gray clay. The underlying material, extending to a depth of 48 inches, is mottled light gray saprolite that crushes to silt loam.

Included with this soil in mapping are small areas of Herndon soils and a few small areas of eroded soils.

The organic matter content of the surface layer is low. The permeability is slow, the available water capacity is medium, and the shrink-swell potential is moderate. The subsoil is very strongly acid or strongly acid. Depth to bedrock is 48 to 72 inches. The seasonal high water table is normally below a depth of 60 inches, but because of the slowly permeable subsoil, a perched water table is about 12 to 30 inches below the surface in places during wet seasons.

Most of this soil is cropland. Some is pasture and woodland. Wetness and slow permeability are the main limitations to the use and management of this soil.

This soil has high potential for corn, soybeans, tobacco, and small grain. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture forage from sericea lespedeza, red clover, white clover, fescue, and orchardgrass is high. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban uses is low. The slow permeability and wetness are the main limitations. This soil has medium potential for most forms of recreation.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, maple, hickory, cedar, willow oak, and blackjack oak. The understory is mainly dogwood, sourwood, redbud, holly, and sassafras. Wetness is the main limitation to the use and management of this soil as woodland. Capability subclass IIw, woodland group 3w.

LoC—Louisburg sandy loam, 6 to 15 percent slopes. This well drained to excessively drained soil is on side slopes adjacent to the major drainageways. The areas are elliptical in shape and are 4 to 25 acres in size.

Typically, the surface layer is yellowish brown sandy loam 8 inches thick. The subsoil is strong brown coarse sandy loam 12 inches thick. The underlying material, extending to a depth of 60 inches, is strong brown and yellowish red saprolite that crushes to gravelly sandy loam.

Included with this soil in mapping are a few places where rock crops out and large boulders are on the surface. Also included are small areas of Appling and Wedowee soils.

The organic matter content of the surface layer is low. The permeability is rapid, the available water capacity is very low, and the shrink-swell potential is very low. Reaction of the subsoil is medium acid. Depth to bedrock is more than 48 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is woodland. Some is pasture, and a small acreage is cropland. Slope, depth to rock, and erosion are the main limitations to the use and management of this soil.

This soil has low potential for crops and pasture forage. Slope and surface runoff are the main limitations.

The potential for urban and recreation uses is medium because of slope and depth to rock. Onsite investigation and planning are needed when this soil is used for septic tank filter fields, roads, or dwellings.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, maple, hickory, cedar, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, holly, and sassafras. There are no significant limitations for woodland use and management. Capability subclass VIe, woodland group 3o.

LoF—Louisburg sandy loam, 15 to 45 percent slopes. This well drained to excessively drained soil is on side slopes adjacent to the major drainageways. The areas are elliptical in shape and are 5 to 50 acres in size.

Typically, the surface layer is yellowish brown sandy loam 8 inches thick. The subsoil is strong brown coarse sandy loam 12 inches thick. The underlying material, extending to a depth of 60 inches, is strong brown and yellowish red saprolite that crushes to gravelly sandy loam.

Included with this soil in mapping are small areas of Wedowee soils.

The organic matter content of the surface layer is low. The permeability is rapid, the available water capacity is very low, and the shrink-swell potential is very low. Reaction of the subsoil is medium acid. Depth to bedrock is more than 48 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is woodland. Some is pasture, and a small acreage is cropland. Slope, depth to rock, erosion, and surface runoff are the main limitations to the use and management of this soil.

This soil has low potential for crops and pasture forage. Slope and surface runoff are the main limitations.

The potential for urban and recreation uses is low because of slope and depth to rock.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, sweetgum, maple, hickory, cedar, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, holly, and sassafras. Slope and depth to rock are the main limitations to woodland use and management. Capability subclass VIIe, woodland group 3r.

Or—Orange silt loam, 0 to 3 percent slopes. This moderately well drained soil is on broad ridges on the uplands. The areas are generally elliptical and are 2 to 10 acres in size.

Typically, the surface layer is grayish brown silt loam, 1 inch thick. The subsurface layer is pale yellow silt loam 4 inches thick. The subsoil is 19 inches thick. It is mottled yellowish brown clay in the upper part. The lower part is mottled light yellowish brown silty clay loam. The underlying material, extending to a depth of 42 inches, is mottled light gray saprolite that crushes to silt loam.

Included with this soil in mapping are a few small areas that have gravel and stones on the surface. Also included are small areas of Iredell and Lignum soils.

The organic matter content of the surface layer is low to medium. The permeability is slow, the available water capacity is low, and the shrink-swell potential is high. Reaction of the subsoil is slightly acid or neutral. Depth to bedrock is 40 to 60 inches. The seasonal high water table is normally below a depth of 60 inches, but because of a slowly permeable subsoil a perched water table is 12 to 36 inches below the surface in places during wet seasons.

Most of this soil is in pasture. Some is woodland, and a few small areas are cropland. Wetness, slow permeability, and high shrink-swell potential are the main limitations to use and management.

This soil has low potential for row crops. The potential for pasture forage is medium. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban and recreation uses is low because of wetness, slow permeability, and high shrink-swell potential.

This soil has medium potential for broad-leaved and needle-leaved trees. The dominant trees are blackjack oak, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, willow oak, cedar, and maple. The understory is mainly dogwood, redbud, holly, and sassafras. Wetness is the main limitation to the use and management of this soil as woodland. Capability subclass IVw, woodland group 4w.

Pt—Pits. This mapping unit consists of areas from which the underlying gravel or soil material has been removed or areas that have been excavated and are used as sanitary landfills.

Most of the pits are a result of quarrying operations for gravel. A few of the pits have resulted from the removal of material for use as fill in roads and other structures. The pits are 5 to 25 feet deep. Most lack vegetation; a few of the older pits have scattered patches of native herbaceous plants.

The few pits that are used as sanitary landfills are 5 to 8 feet deep and have been filled with refuse to within 18 to 36 inches of the surface. The areas that are completely filled have a plant cover of grass. Most other areas lack vegetation and are subject to accelerated runoff and erosion. No capability subclass or woodland group.

TaD—Tatum silt loam, 8 to 15 percent slopes. This well drained soil is on side slopes on the uplands. The areas are elliptical in shape and are 5 to 20 acres in size.

Typically, the surface layer is strong brown silt loam 5 inches thick. The subsoil is 29 inches thick. The upper part is red silty clay. The lower part is red silty clay loam. The underlying material, extending to a depth of 60 inches, is mottled red saprolite that crushes to loam.

Included with this soil in mapping are small areas that have a dark red clay loam surface layer and a few small areas of eroded soils. Also included are small areas of Goldston and Wilkes soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is low, and the shrink-swell potential is moderate. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is 40 to 60 inches. The seasonal high water table is at a depth of 48 to 72 inches.

Most of this soil is woodland and pasture. Some is cropland. Slope, surface runoff, erosion, and depth to rock are the main limitations to the use and management of this soil.

This soil has medium potential for corn, soybeans, oats, wheat, and barley. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, stripcropping, contour farming, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture forage is moderately high if plants such as ladino clover, red clover, and sericea lespedeza are used. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

This soil has medium potential for most urban uses because of slope and depth to rock. The limitation of slope can be reduced or modified by special planning, design, or maintenance. Erosion is a hazard if ground cover is removed. The potential for most recreation uses is medium. Slope is the main limitation.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, hickory, maple, beech, loblolly pine, shortleaf pine, Virginia pine, and chestnut oak. The understory is mainly dogwood, redbud, holly, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IIIe, woodland group 3o.

TaE—Tatum silt loam, 15 to 25 percent slopes. This well drained soil is on side slopes on the uplands. Mapped areas are long, narrow, roughly rectangular bands 2 to 25 acres in size.

Typically, the surface layer is strong brown silt loam 5 inches thick. The subsoil is 29 inches thick. The upper part is red silty clay. The lower part is red silty clay loam. The underlying material, extending to a depth of 60 inches, is mottled red saprolite that crushes to loam.

Included with this soil in mapping are small spots of eroded soils. Also included are a few small areas of Georgeville and Wilkes soils.

The organic matter content of the surface layer is low. The permeability is moderate, the available water capacity is low, and the shrink-swell potential is moderate. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is 40 to 60 inches. The seasonal high water table is at a depth of 48 to 72 inches.

Most of this soil is woodland and pasture. Slope, erosion, surface runoff, and depth to rock are the main limitations to the use and management of this soil.

This soil has low potential for row crops and for hay and pasture forage.

This soil has low potential for most urban and recreation uses because of slope. Erosion is a hazard if ground cover is removed.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are yellow-poplar, hickory, maple, beech, chestnut oaks, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, holly, and sassafras. Slope is the main limitation for woodland use and management. Capability subclass IVe, woodland group 3r.

Ur—Urban land. This mapping unit consists of areas in which more than 80 percent of the natural soil has been greatly altered by cutting, filling, grading, and shaping in the process of urbanization. The original landscape, topography, and commonly the drainage pattern have been changed. The surface and subsurface layers, and in many places the underlying weathered rock, have been mixed into a heterogenous mass of clay, silt, sand, and rock. Slope is commonly 2 to 10 percent.

These areas are used for roads, streets, parking lots, buildings of all kinds, cemeteries, playgrounds, and other such urban uses. Runoff from roofs, roads, and parking lots is excessive and increases the flooding hazard in lower lying areas. The hazard of waterway and reservoir siltation from areas that are graded and not immediately stabilized is very severe.

Use and management of these areas should be based on onsite investigation. No capability subclass or woodland group.

VaB—Vance sandy loam, 2 to 8 percent slopes. This well drained soil is on ridges on the uplands. The areas are generally elliptical and are 5 to 25 acres in size.

Typically, the surface layer is pale brown sandy loam 9 inches thick. The subsoil is 28 inches thick. The upper part is mottled yellowish brown clay. The lower part is mottled reddish yellow sandy clay. The underlying material, extending to a depth of 60 inches, is mottled reddish yellow saprolite that crushes to sandy clay loam.

Included with this soil in mapping are a few small areas of soils that have slopes greater than 8 percent and some small areas of eroded soils. Also included are a few small areas of Appling soils.

The organic matter content of the surface layer is low. The permeability is slow, the available water capacity is low, and the shrink-swell potential is moderate. Reaction of the subsoil is strongly acid or very strongly acid. Depth to bedrock is more than 60 inches. The seasonal high water table is below 72 inches.

Most of this soil is cropland. Some is pasture and woodland. Slope, surface runoff, erosion, and slow permeability are the main limitations to the use and management of this soil.

This soil has medium potential for tobacco, corn, milo, and small grain and high potential for horticultural crops such as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, stripcropping, field borders, contour farming, and crop rotations that include close-growing crops also help to conserve soil and water.

The potential for hay and pasture forage is moderately high if plants such as ladino clover, red clover, and sericea lespedeza are used. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for urban uses such as houses and streets is low because of slow permeability and low strength. The potential for recreation areas is medium because of slow permeability.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, blackjack oak, cedar, maple, hickory, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, holly, and sassafras. There are no significant limitations to the use and management of this soil as woodland. Capability subclass IIIe, woodland group 3o.

WmD—Wedowee sandy loam, 8 to 15 percent slopes. This well drained soil is on side slopes adjacent to the major drainageways. The areas are long, narrow, roughly rectangular bands 2 to 12 acres in size.

Typically, the surface layer is dark grayish brown sandy loam 3 inches thick. The subsurface layer is yellowish brown sandy loam 9 inches thick. The subsoil is 16 inches thick. The upper part is mottled strong brown sandy clay loam. The middle part is mottled yellowish brown sandy clay. The lower part is mottled yellowish red sandy clay loam. The underlying material, extending to a depth of 60 inches, is mottled yellowish red sandy loam.

Included with this soil in mapping are a few areas of soils that have stones on the surface. Also included are a few small areas of Tatum and Louisburg soils.

The organic matter content of the surface layer is low. The permeability is moderately slow, the available water capacity is low, and the shrink-swell potential is moderate. The subsoil is very strongly acid or strongly acid. Depth to bedrock is 48 to 60 inches. The seasonal high water table is below 72 inches.

Most of this soil is used as woodland and pasture and some as cropland. Slope, surface runoff, erosion, and moderate shrink-swell potential are the main limitations to the use and management of this soil.

This soil has low potential for row crops because of slope and erosion. The potential for hay and pasture forage is medium if plants such as ladino clover, red clover, and sericea lespedeza are used. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

This soil has medium potential for most urban uses. Slope and moderate shrink-swell potential are the main limitations. Erosion is a hazard if ground cover is removed. There is medium potential for most recreation uses because of slope.

This soil has moderately high potential for broad-leaved and needle-leaved trees. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, maple, ash, hickory, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, sourwood, redbud, holly, sumac, hophornbean, black cherry, and sassafras. There are no significant limitations for woodland use and management. Capability subclass IVe, woodland group 3o.

WmE—Wedowee sandy loam, 15 to 25 percent slopes. This well drained soil is on side slopes adjacent to the drainageways. Mapped areas are long, narrow, roughly rectangular bands 2 to 15 acres in size.

Typically, the surface layer is dark grayish brown sandy loam 3 inches thick. The subsurface layer is yellowish brown sandy loam 9 inches thick. The subsoil is 16 inches thick. The upper part is mottled strong brown sandy clay loam. The middle part is mottled yellowish brown sandy clay. The lower part is mottled yellowish red sandy clay loam. The underlying material, extending to a depth of 60 inches, is mottled yellowish red sandy loam.

Included with this soil in mapping are small areas of soils that have slopes steeper than 25 percent. Also included are small areas of Tatum and Louisburg soils.

The organic matter content of the surface layer is low. The permeability is moderately slow, the available water capacity is low, and the shrink-swell potential is moderate. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is 48 to 60 inches. The seasonal high water table is below a depth of 72 inches.

Most of this soil is used as woodland. A few areas are in pasture. Slope, surface runoff, erosion, and moderate shrink-swell potential are the main limitations.

This soil has low potential for row crops because of slope and erosion. The potential for hay and pasture forage is medium if plants such as ladino clover, red clover, and sericea lespedeza are used. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

This soil has low potential for most urban and recreation uses because of slope.

The potential for broad-leaved and needle-leaved trees is moderately high. The dominant trees are white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, yellow-poplar, maple, ash, hickory, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, sourwood, redbud, holly, sumac, hophornbean, black cherry, and sassafras. Slope is the main limitation to the use and management of this soil as woodland. Capability subclass VIe, woodland group 3r.

WsB—White Store loam, 2 to 6 percent slopes. This moderately well drained soil is on broad ridges on the uplands. The areas are generally elliptical in shape and are 2 to 10 acres in size.

Typically, the surface layer is yellowish brown loam 5 inches thick. The subsoil is 29 inches thick. The upper part is reddish brown clay loam. The middle part is mottled yellowish red clay, reddish brown clay, and mottled dark reddish brown silty clay. The lower part is reddish brown silty clay loam. The underlying layer, extending to a depth of 50 inches, is reddish brown saprolite that crushes to silt loam.

Included with this soil in mapping are a few small areas of soils that have a fine sandy loam or silt loam surface layer and a few small areas of eroded soils. Also included are a few small areas of Creedmoor soils.

The organic matter content of the surface layer is low. The permeability is very slow, the available water capacity is low, and the shrink-swell potential is very high. The subsoil is very strongly acid or strongly acid. Depth to bedrock is 48 to 72 inches. The seasonal high water table is below a depth of about 36 inches, but a perched water table is 6 to 18 inches below the surface in places during wet periods.

Most of this soil is used as woodland. Small areas are used for crops, hay, and pasture. Slope, erosion, surface runoff, slow permeability, wetness, and high shrink-swell potential are the main limitations to the use and management of this soil.

This soil has medium potential for corn, soybeans, tobacco, and small grain. Minimum tillage and crop residue management help to control runoff and erosion. Conservation practices such as maintaining drainageways in sod, terraces and diversions, field borders, stripcropping, and crop rotations that include close-growing crops also aid in conserving soil and water.

The potential for hay and pasture forage plants such as sericea lespedeza, red clover, white clover, fescue, and orchardgrass is medium. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for urban and recreation uses is low because of the soil's slow permeability, wetness, and high shrink-swell potential.

This soil has medium potential for broad-leaved and needle-leaved trees. The dominant trees are blackjack oak, cedar, maple, white oak, black oak, northern red oak, southern red oak, crimson oak, willow oak, hickory, sweetgum, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, sourwood, holly, black cherry, and sassafras. A clayey subsoil is the main limitation to the use and management of this soil as woodland. Capability subclass IIe, woodland group 4c.

WtC2—White Store clay loam, 6 to 15 percent slopes, eroded. This moderately well drained soil is on ridges and narrow side slopes on the uplands. The areas are roughly rectangular and are 2 to 25 acres in size.

Typically, the surface layer is yellowish brown clay loam 5 inches thick. The subsoil is 29 inches thick. The upper part is reddish brown clay loam. The middle part is mottled yellowish red clay, reddish brown clay, and mottled dark reddish brown silty clay. The lower part is reddish brown silty clay loam. The underlying layer, extending to a depth of 50 inches, is reddish brown saprolite that crushes to silt loam.

Included with this soil in mapping are a few small areas of soils that have a fine sandy loam surface layer and a few small areas of shallow gullies. Also included are small areas of Creedmoor and Wilkes soils.

The organic matter content of the surface layer is low. The permeability is very slow, the available water capacity is low, and the shrink-swell potential is very high. Reaction of the subsoil is very strongly acid or strongly acid. Depth to bedrock is 48 to 72 inches. The seasonal high water table is below a depth of about 36 inches, but a perched water table is 6 to 18 inches below the surface in places during wet periods.

Most of this soil is used as woodland. Small areas are used for hay and pasture. Slope, erosion, surface runoff, slow permeability, and high shrink-swell potential are the main limitations to the use and management.

This soil has low potential for row crops and medium potential for hay and pasture forage plants such as sericea lespedeza, red clover, white clover, fescue, and orchardgrass. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for urban and recreation uses is low because of the soil's slow permeability, wetness, slope, and high shrink-swell potential.

This soil has medium potential for broad-leaved and needle-leaved trees. The dominant trees are blackjack oak, cedar, maple, white oak, black oak, post oak, northern red oak, southern red oak, crimson oak, hickory, sweetgum, loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, sourwood, holly, black cherry, and sassafras. The clayey subsoil is the main limitation to the use and management of this soil as woodland. Capability subclass IVe, woodland group 4c.

WwC—White Store-Urban land complex, 2 to 8 percent slopes. This complex consists of areas of White Store soils and Urban land that are too small and too intricately mixed to be mapped separately at the scale used. This complex is about 25 to 50 percent White Store soils and 20 to 40 percent Urban land. In about 25 percent of each mapped area, the White Store soils have been covered with as much as 18 inches of fill material or have as much as two-thirds of the original soil material removed.

The moderately well drained White Store soils are on broad ridges on the uplands. Typically, the surface layer is yellowish brown clay loam 5 inches thick. The subsoil is 29 inches thick. The upper part is reddish brown clay loam. The middle part is mottled yellowish red clay, reddish brown clay, and mottled dark reddish brown silty clay. The lower part is reddish brown silty clay loam. The underlying layer, extending to a depth of 50 inches, is reddish brown saprolite that crushes to silt loam.

Urban land consists of areas where the original soil has been cut, filled, graded, paved, or otherwise changed to the extent that a distinguishable soil is not apparent. These areas are used for shopping centers, factories, municipal buildings, apartment complexes, parking lots, and other such uses. The extent of site modification varies greatly. Many areas have been disturbed little, but slope is generally modified to fit the use.

Included in the mapping are a few small areas of Creedmoor soils.

Use and management of this complex should be based on onsite investigation. No capability subclass; White Store soil in woodland group 4c, Urban land not assigned.

WxD—Wilkes gravelly loam, 8 to 15 percent slopes. This well drained soil is on narrow side slopes on the uplands. Mapped areas are elliptical and are 2 to 25 acres in size.

Typically, the surface layer is dark grayish brown gravelly loam 3 inches thick. The subsurface layer is light yellowish brown gravelly loam 5 inches thick. The subsoil is 10 inches thick. The upper part is brownish yellow clay loam. The lower part is strong brown clay loam. The underlying material, extending to a depth of 60 inches, is strong brown saprolite that crushes to loam in the upper part and greenish and brownish saprolite that crushes to loam in the lower part.

Included with this soil in mapping are a few areas of soils that have slopes of less than 8 percent and a few small areas of soils that have bedrock at a depth of less than 40 inches. Also included are small areas of Tatum soils.

The organic matter content of the surface layer is low. The permeability is moderately slow, the available water capacity is very low, and the shrink-swell potential is moderate. Reaction of the subsoil is medium acid to neutral. Depth to bedrock is 40 to 80 inches. The seasonal high water table is at a depth of more than 72 inches, but a perched water table is above the subsoil in places during prolonged wet periods.

Most of this soil is in trees and pasture. Slope, erosion, surface runoff, and depth to rock are the main limitations to use and management.

This soil has low potential for row crops and medium potential for hay and pasture forage plants such as ladino clover, red clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban uses is low because of slope and depth to rock. The potential for most recreation uses is medium.

This soil has medium potential for needle-leaved trees. The dominant trees are loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, holly, sourwood, black cherry, and sassafras. There are no significant limitations for woodland use and management. Capability subclass VIs, woodland group 4o.

WxF—Wilkes gravelly loam, 15 to 45 percent slopes. This well drained soil is on side slopes adjacent to the major drainageways. The areas are narrow, roughly rectangular bands 2 to 20 acres in size.

Typically, the surface layer is dark grayish brown gravelly loam 3 inches thick. The subsurface layer is light yellowish brown gravelly loam 5 inches thick. The subsoil is 10 inches thick. The upper part is brownish yellow clay loam. The lower part is strong brown clay loam. The underlying material, extending to a depth of 60 inches, is strong brown saprolite that crushes to loam in the upper part and greenish and brownish saprolite that crushes to loam in the lower part.

Included with this soil in mapping are small areas of Wedowee and Tatum soils. Also included are small areas of soils that have a few stones on the surface.

The organic matter content of the surface layer is low. The permeability is moderately slow, the available water capacity is very low, and the shrink-swell potential is moderate. The subsoil is medium acid to neutral. Depth to bedrock is 40 to 80 inches. The seasonal high water table is at a depth of more than 72 inches, but a perched water table is above the subsoil in places during prolonged wet periods.

Most of this soil is woodland and pasture. Slope, erosion, surface runoff, and depth to rock are the main limitations in the use and management of this soil.

This soil has low potential for row crops and medium potential for hay and pasture forage plants such as ladino clover, red clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover by reducing runoff and controlling erosion.

The potential for most urban and recreation areas is low because of slope and depth to rock.

This soil has medium potential for needle-leaved and broad-leaved trees. The dominant trees are loblolly pine, shortleaf pine, and Virginia pine. The understory is mainly dogwood, redbud, holly, sourwood, black cherry, and sassafras. Slope is the main limitation to use and management of this soil as woodland. Capability subclass VIIs, woodland group 4r.

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 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, and as sites for buildings, highways and other transportation systems, sanitary facilities, parks and other recreation facilities, and 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

EMMETT R. WELLER, conservation agronomist, and QUENTIN W. PATTERSON, district conservationist, Soil Conservation Service, helped plan and write this section.

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 needed management practices. 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.

More than 74,000 acres in the survey area were used for crops and pasture in 1967, according to the Conservation Needs Inventory. Of this total, 25,116 acres were used for permanent pasture; 19,530 acres for row crops; 7,571 acres for close-grown crops; and 6,497 acres for rotation hay and pasture. The rest was idle cropland.

Soil erosion is a management concern in Orange County. Where the slope is more than 2 percent, erosion is a hazard. Creedmoor, Enon, Helena, and White Store soils have slopes of 2 to 6 percent and are wet besides.

Loss of the surface layer through erosion reduces soil productivity and increases sedimentation in streams. Productivity is reduced as the surface layer is lost and the subsoil is incorporated into the plow layer. Loss of the surface layer is especially detrimental on soils that have a clayey subsoil and on soils that have a layer in or below the subsoil that limits the depth of the root zone. Controlling erosion can minimize sedimentation and help improve the quality of water for municipal and recreation use and for fish and wildlife.

In many fields on sloping soils that are clayey, preparing a seedbed and tilling are difficult because the original friable surface soil material has been lost through erosion.

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 loss to an amount that will not reduce the productive capacity of the soils. On livestock farms, the legume and grass forage crops in the cropping system reduce erosion on sloping land and also provide nitrogen and improve tilth for the crop that will follow.

On soils that have short slopes, cropping systems that provide substantial vegetative cover are required to control erosion unless minimum tillage is practiced. Minimum tillage and leaving crop residue on the surface help to increase infiltration and reduce runoff and erosion. These practices can be adapted to soils in the survey area, but they are difficult to use successfully on eroded soils and on soils that have a clayey surface layer. Zero tillage is effective in reducing erosion on sloping soils and on most other soils in the survey area. It is less effective on soils with a clayey surface layer.

Terraces and diversions reduce the length of a slope and thereby help control runoff and erosion. They are most practical on deep, well drained soils that have regular slopes.

Contouring and contour stripcropping are erosion control practices used extensively in the survey area. They are best adapted to soils with smooth, uniform slopes.

Soil drainage is the major management concern on about one-tenth of the acreage used for crops and pasture in the survey area. Some soils are naturally so wet that they are not suitable for crops common to the area.

The design of 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 poorly drained and very poorly drained soils that are used intensively for row crops. Drains have to be more closely spaced in slowly permeable soils than in permeable soils. Finding adequate outlets for a tile drainage system is difficult in some areas.

Soil fertility is naturally low to medium in most soils on uplands in the survey area. On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected yields.

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 those that are granular and porous.

Some of the soils used for crops in the survey area have a red or yellow silt loam or sandy loam surface layer that is low in content of organic matter. Generally the structure of such soils is weak, and intense rainfall causes the surface to crust. The crust is hard when dry and nearly impervious to water, and 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.

The Hiwassee soils are clayey and often stay wet until late in spring, so tilth is a problem. If plowed when wet, they tend to be very cloddy when they dry; thus good seedbeds are difficult to prepare. Fall plowing generally results in good tilth in the spring.

Field crops suited to the soils and the climate of the survey area include many that are not commonly grown. Corn, soybeans, and tobacco are the major row crops. Grain sorghum, sunflowers, potatoes, and similar crops can also be grown.

Wheat, oats, and barley are the common close-growing crops. Rye and buckwheat can also be grown. The common pasture and hayland crops grown for forage are ladino clover, red clover, tall fescue, orchardgrass, and sericea lespedeza.

Special crops grown commercially in the survey area are vegetables, small fruits, tree fruits, and nursery plants. A small acreage throughout the county is used for melons, strawberries, sweet corn, tomatoes, peppers, and other vegetables and small fruits.

Deep soils that have good natural drainage and that warm up early in spring are especially well suited to vegetables and small fruits. Crops can generally be planted and harvested earlier on deep soils than on other soils in the survey area.

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 4. 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 climatically suited to the area and the soil. A few farmers may be obtaining average yields higher than those shown in table 4.

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.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown; that good quality irrigation water is uniformly applied in proper amounts as needed; and that tillage is kept to a minimum.

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 4 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 horticultural crops or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forage, 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. 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.

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 capability unit is identified in the description of each soil mapping unit in the section "Soil Maps for Detailed Planning." Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIe-6.

The eight classes in the capability system and the subclasses in Orange County are described in the list that follows.

Class I. Soils that have few limitations that restrict their use. (None in Orange County)

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

Subclass IIe. Soils that, unless protected, have moderate limitations because of erosion: Well drained and moderately well drained, gently sloping and sloping soils that have a sandy loam, fine sandy loam, silt loam, clay loam, and loam surface layer and a sandy clay loam, clay, clay loam, silty clay, silty clay loam, and sandy clay subsoil.

Subclass IIw. Soils moderately limited because of excess water: Moderately well drained and well drained, nearly level and gently sloping soils that have a fine sandy loam and silt loam surface layer and a loam, sandy clay loam, sandy loam, silt loam, silty clay loam, silty clay, and clay subsoil.

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

Subclass IIIe. Soils that have severe limitations because of erosion, if they are cultivated and not protected: Well drained, gently sloping to strongly sloping soils that have a sandy loam, fine sandy loam, loam, silt loam, and clay loam surface layer and a sandy clay loam, clay, clay loam, silty clay, and silty clay loam subsoil.

Subclass IIIw. Soils that have severe limitations because of excess water: Somewhat poorly drained, nearly level soils that have a loam surface layer and a loam, sandy clay loam, and clay loam subsoil.

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

Subclass IVe. Soils that have very severe limitations because of erosion: Well drained and moderately well drained, sloping to moderately steep soils that have a loam, silt loam, and sandy loam surface layer and a clay loam, clay, silty clay, silty clay loam, sandy clay loam, and sandy clay subsoil.

Subclass IVw. Soils that have very severe limitations because of water: Moderately well drained, nearly level to gently sloping soils that have a silt loam surface layer and a clay and silty clay loam subsoil.

Class V. Soils that are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife habitat. (None in Orange County)

Class VI. Soils that have severe limitations that make them generally unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife habitat.

Subclass VIe. Soils severely limited by erosion: Well drained to excessively drained, sloping to moderately steep soils that have a sandy loam surface layer and a coarse sandy loam, sandy clay loam, and sandy clay subsoil.

Subclass VIs. Soils severely limited by very low available water capacity: Well drained, sloping to strongly sloping soils that have a slaty silt loam and gravelly loam surface layer and a slaty silt loam and clay loam subsoil.

Class VII. Soils that have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife habitat.

Subclass VIIe. Soils that have very severe limitations because of erosion: Well drained to excessively drained, strongly sloping to steep soils that have a coarse sandy loam surface layer and a coarse sandy loam subsoil.

Subclass VIIs. Soils that have very severe limitations because of very low available water capacity: Well drained and moderately well drained, nearly level to steep soils that have a slaty silt loam and gravelly loam surface layer and a slaty silt loam, clay, and clay loam subsoil.

Class VIII. Soils and landforms that have limitations that preclude their use for commercial plants and restrict them to recreation, wildlife habitat, water supply, and esthetic uses. (None in Orange County)

Woodland Management and Productivity

EDWIN L. YOUNG, woodland conservationist, Soil Conservation Service, helped plan and write this section.

Table 5 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 5 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 when plant competition is not a limiting factor. 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.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

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

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

Engineering

SIDNEY F. GRAY, geologist, Soil Conservation Service, helped plan and write 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 section 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 6 shows, for each kind of soil, the degree and kind of limitations for building site development; table 7, for sanitary facilities; and table 9, for water management. Table 8 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 6. A *slight* limitation indicates that soil properties 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 grave sites. 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 defined, 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 6 are built on undisturbed soil and have a foundation load 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 6 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 7 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 design, or intensive maintenance is required.

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 could be installed or the size of the absorption field could 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 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 soils 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 thin layers of soil. 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.

In the trench type of landfill, ease of excavation also affects the suitability of a soil for this purpose, so the soil must be deep to bedrock and free of large stones and boulders. Where the seasonal water table is high, water seeps into trenches and causes problems in filling.

Unless otherwise stated, the limitations in table 7 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 weather. 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 8 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 12 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 8 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.

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 plant life. 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, slopes, and amount of stones. The ability of the soil to support plant life 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 9 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

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

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

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

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 9 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

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 of the survey area are rated in table 10 according to limitations that affect their suitability for recreation uses (fig. 5). 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 10 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 7, and interpretations for dwellings without basements and for local roads and streets, given in table 6.

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

J. PHILLIP EDWARDS, biologist, Soil Conservation Service, helped plan and write this section.

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 (fig. 6). If any one of these elements is missing, inadequate, or 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 11, 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. Examples are corn, wheat, oats, and barley. 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.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are fescue, lovegrass, bromegrass, clover, and alfalfa. 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.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, goldenrod, beggarweed, wheatgrass, and grama. 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.

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. Examples of native plants are oak, 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. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

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. Examples are pine and cedar. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

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

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

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, grey 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 classification, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering Properties

Table 12 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 12 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 12 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 15. The estimated classification, without group index numbers, is given in table 12. Also in table 12 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. Range 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 13 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 14 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

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 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 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 soil mapping. 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 15.

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 North Carolina Department of Transportation and Highway Safety, Materials, and Tests Unit.

The methods used in obtaining the data are listed by code in the footnotes to table 15. Most of the codes 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.

Classification of the Soils

In this section, the soil series recognized in the survey area are described, the current system of classifying soils is defined, and the soils in the area are classified according to the current system.

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 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 (*3*). 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 moderately well drained, moderately permeable soils that formed in fluvial and marine sediments of mixed mineralogy. These soils are on stream terraces. Slope is 0 to 3 percent.

Typical pedon of Altavista fine sandy loam, 0 to 3 percent slopes, 0.5 mile east of intersection of U.S. 15-501 and N.C. 54, south 0.75 mile on State Road 1900 to the UNC Wildlife Research Center, 0.25 mile east and then south (across Morgan Creek), 0.5 mile on dirt road, 175 feet east of road, in a cultivated field:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) fine sandy loam; weak coarse granular structure; very friable; many fine and medium roots; strongly acid; abrupt wavy boundary.

B1—6 to 9 inches; yellowish brown (10YR 5/6) loam; weak fine and medium subangular blocky structure; friable; common medium roots; strongly acid; clear wavy boundary.

B2lt—9 to 22 inches; yellowish brown (10YR 5/6) sandy clay loam; common fine distinct strong brown and yellowish red mottles and few fine faint pale brown mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin patchy clay films on faces of peds and in root channels; medium acid; diffuse wavy boundary.

B22t—22 to 32 inches; brown (7.5YR 5/2) sandy clay loam; common medium distinct brownish yellow (10YR 6/8), light brownish gray (10YR 6/2), and yellowish red (5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; colors are banded in places and there are some vertical cracks in these bands; medium acid; diffuse wavy boundary.

B3—32 to 50 inches; strong brown (7.5YR 5/8) sandy loam; many common prominent grayish brown (10YR 5/2) and brownish yellow (10YR 6/6) mottles; weak, medium subangular blocky structure; slightly sticky; few silt pockets and small lenses of clay that are sticky and plastic; strongly acid; diffuse wavy boundary.

C—50 to 80 inches; strong brown (7.5YR 5/8) and light gray (10YR 7/1) sandy loam; few fine prominent brownish yellow mottles; massive; slightly sticky; few pebbles as much as 1 inch in diameter; few grains of feldspar; few lenses of clay that are sticky and plastic; strongly acid.

The solum is 30 to 60 inches thick. Depth to bedrock is more than 60 inches. Reaction of the subsoil is strongly acid or medium acid.

The Ap horizon is yellowish brown or light yellowish brown fine sandy loam or sandy loam.

The B1 horizon is yellowish brown or brownish yellow loam or sandy clay loam. The B2t horizon is yellowish brown, brown, or strong brown sandy clay loam or clay loam. There are gray mottles 10 to 20 inches below the top of the B2t horizon. The B3 horizon is brown or strong brown sandy loam or sandy clay loam.

The C horizon is light gray, strong brown, or yellowish brown sandy loam or loamy sand that has a few pebbles and lenses of clay.

Appling Series

The Appling series consists of well drained, moderately permeable soils that formed in residuum weathered from acid igneous and metamorphic rock. These soils are on broad ridges and sides of ridges. Slope is 2 to 10 percent.

Typical pedon of Appling sandy loam, 2 to 6 percent slopes, 8 miles north of Hillsborough on N.C. 86, east 0.2 mile to intersection of State Road 1506 and 1546 and 300 feet north of intersection on west side of State Road 1506, in a cultivated field:

Ap—0 to 9 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; very friable; many fine roots; medium acid; abrupt smooth boundary.

A2—9 to 11 inches; light yellowish brown (10YR 6/4) sandy loam; weak medium granular structure; very friable; many fine roots; medium acid; gradual smooth boundary.

B1—11 to 18 inches; reddish yellow (7.5YR 6/8) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; strongly acid; gradual smooth boundary.

B21t—18 to 26 inches; reddish yellow (7.5YR 6/8) clay; many medium distinct yellowish red (5YR 5/8) and brownish yellow (10YR 6/6) mottles; moderate fine and medium subangular blocky structure; friable, sticky and plastic; few fine roots; thin patchy clay films on faces of peds; strongly acid; gradual smooth boundary.

B22t—26 to 37 inches; strong brown (7.5YR 5/8) clay; many coarse prominent red (2.5YR 5/8) and few fine distinct yellowish brown mottles; moderate medium subangular blocky structure; firm, sticky and plastic; thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—37 to 48 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium prominent red (2.5YR 5/8) mottles and a few fine distinct white mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few coarse grains of sand; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—48 to 60 inches; yellowish red (5YR 5/8), reddish yellow (7.5YR 8/6) and light gray (10YR 7/2) saprolite that crushes to sandy clay loam; rock controlled structure; friable; common fine flakes of mica; very strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 60 inches. Reaction of the subsoil is very strongly acid or strongly acid.

The Ap horizon is brown, yellowish brown, grayish brown, or dark grayish brown. The A2 horizon is light yellowish brown or yellowish brown.

The B1 horizon, where present, is brownish yellow, reddish yellow, or yellowish brown sandy clay loam or clay loam. The B2t horizon is reddish yellow, strong brown, or yellowish red clay or clay loam. The B3 horizon, where present, is strong brown, brownish yellow, or red sandy clay loam or clay loam.

The C horizon is commonly variegated yellowish red, reddish yellow, light gray, dark red, yellowish brown, or gray saprolite that crushes to sandy clay loam or sandy loam.

Cecil Series

The Cecil series consists of well drained, moderately permeable soils that formed in weathered, acid igneous and metamorphic rocks. These soils are on broad ridges. Slope is 2 to 10 percent.

Typical pedon of Cecil fine sandy loam, 2 to 6 percent slopes, 8.5 miles west of Carrboro on State Road 1005 and 50 feet south of road, in a pine forest:

Ap—0 to 4 inches; yellowish red (5YR 4/6) fine sandy loam; weak fine granular structure; friable; many fine and medium roots; few small pebbles; very strongly acid; abrupt smooth boundary.

B1—4 to 8 inches; yellowish red (5YR 4/8) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; few small quartz pebbles; very strongly acid; clear smooth boundary.

B21t—8 to 25 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B22t—25 to 34 inches; red (2.5YR 4/8) clay; common fine distinct reddish yellow mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few thin patchy clay films on faces of peds; very strongly acid; gradual smooth boundary.

B3—34 to 46 inches; red (2.5YR 5/8) clay loam; many coarse prominent yellowish brown (10YR 5/8) and many medium prominent reddish yellow (7.5YR 7/8) mottles; weak medium subangular blocky structure; firm, slightly sticky, slightly plastic; few medium streaks of black and dark green minerals; very strongly acid; gradual wavy boundary.

C—46 to 61 inches; mottled red (2.5YR 5/8) and yellowish red (5YR 5/8) saprolite that crushes to loam; rock controlled structure; very friable; slightly sticky; very strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 60 inches. Reaction of the subsoil is very strongly acid or strongly acid.

The Ap horizon is reddish brown or yellowish red fine sandy loam or sandy loam.

The B1 horizon, where present, is yellowish red or red sandy clay loam or clay loam. The B2t horizon is clay or clay loam. The B3 horizon is clay loam or sandy clay loam.

The C horizon is red and yellowish red saprolite that crushes to loam or clay loam.

Chewacla Series

The Chewacla series consists of somewhat poorly drained, moderately permeable soils that formed in recent alluvium. These soils are in long flat areas parallel to the major streams. Slope is 0 to 2 percent.

Typical pedon of Chewacla loam 0.5 mile east of intersection of U.S. 15-501 and N.C. 54, from Chapel Hill, south 0.75 mile on State Road 1900 to the UNC Wildlife Research Center, 0.25 mile east and then south (across Morgan Creek) on dirt road 800 feet, east 660 feet on dirt lane, and 75 feet northeast, in a cultivated field:

Ap—0 to 6 inches; dark brown (10YR 4/3) loam; moderate medium granular structure; very friable; many fine and medium roots; few fine black grains; slightly acid; clear wavy boundary.

B1—6 to 15 inches; light yellowish brown (10YR 6/4) loam; common medium faint pale brown (10YR 6/3) and dark brown (10YR 4/3) mottles; weak fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine roots; many fine and medium pores; slightly acid; clear wavy boundary.

B21t—15 to 19 inches; light yellowish brown (10YR 6/4) sandy clay loam; common medium faint very pale brown (10YR 7/3) and brownish yellow (10YR 6/6) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium pores; few fine flakes of mica; few fine black grains; strongly acid; clear wavy boundary.

B22—19 to 25 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium light gray (10YR 7/2) and yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium pores; few fine flakes of mica; strongly acid; clear wavy boundary.

B23—25 to 30 inches; mottled light gray (10YR 6/1), yellowish brown (10YR 5/8), and very pale brown (10YR 7/4) sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine pores; few fine flakes of mica; strongly acid; clear wavy boundary.

B24—30 to 38 inches; mottled light gray (10YR 6/1), yellowish brown (10YR 5/8), and very pale brown (10YR 7/4) clay loam; weak medium subangular blocky structure; firm, sticky, plastic; few fine flakes of mica; strongly acid; clear wavy boundary.

B3g—38 to 52 inches; light gray (10YR 7/1) sandy clay loam; many coarse distinct yellowish brown (10YR 5/8) mottles; weak fine and medium subangular blocky structure; firm, sticky, plastic; few fine flakes of mica; strongly acid; clear wavy boundary.

C—52 to 60 inches; light gray (10YR 7/1) stratified sandy loam; many coarse distinct yellowish brown (10YR 5/8) mottles; massive; loose; few lenses of sandy clay loam and few pebbles 1/4 inch to 3 inches in size; strongly acid.

The solum is 36 to more than 72 inches thick. Depth to bedrock is more than 60 inches. Reaction of the subsoil is strongly acid to slightly acid.

The Ap horizon is dark brown or brown loam or fine sandy loam.

The B1 horizon is light yellowish brown or yellowish brown loam or silt loam. The B2 horizon is light gray, light yellowish brown, yellowish brown, or very pale brown sandy clay loam or clay loam.

The C horizon is stratified sandy loam, loam, or loamy sand.

Congaree Series

The Congaree series consists of well drained, moderately permeable soils that formed in loamy alluvium. These soils are on flood plains or at the base of slopes. Slope is 0 to 2 percent.

Typical pedon of Congaree fine sandy loam 0.5 mile east of intersection of U.S. 15-501 amd N.C. 54 from Chapel Hill, south 0.75 mile on State Road 1900 to the UNC Wildlife Research Center, 0.25 mile east and south (across Morgan Creek) on dirt road 800 feet, east 660 feet on dirt lane, and 500 feet north, in a cultivated field:

Ap—0 to 7 inches; brown (7.5YR 4/4) fine sandy loam; weak fine granular structure; very friable; common fine roots; few fine flakes of mica; strongly acid; clear wavy boundary.

C1—7 to 25 inches; dark yellowish brown (10YR 4/4) sandy loam; few fine faint pale brown and light yellowish brown mottles; massive; parting to weak fine granular structure; very friable; few fine roots; common fine and medium pores; few fine flakes of mica; few black specks; few small quartz pebbles; medium acid; gradual wavy boundary.

C2—25 to 38 inches; yellowish brown (10YR 5/4) sandy clay loam; thin stratified bands of brown (7.5YR 4/4) sandy loam and few fine faint pale brown mottles; weak fine granular structure; very friable; few fine roots; slightly acid; gradual wavy boundary.

C3—38 to 48 inches; brown (7.5YR 4/4) sandy loam; massive; friable; few small black concretions; few fine flakes of mica; slightly acid; gradual wavy boundary.

C4—48 to 52 inches; yellowish brown (10YR 5/4) sandy loam; massive; very friable; few small black concretions; few fine flakes of mica; slightly acid; clear wavy boundary.

C5—52 to 56 inches; yellowish brown (10YR 5/4) sandy loam; massive; friable; many black concretions as much as 1 1/2 inches in size; few fine flakes of mica; slightly acid; clear wavy boundary.

C6—56 to 63 inches; light gray (10YR 7/2) silt loam; many medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/4) mottles; massive; friable; common hard black concretions; few fine flakes of mica; slightly acid.

Depth to bedrock is more than 60 inches. The C horizon to a depth of about 63 inches is medium acid or slightly acid.

The Ap horizon is brown and reddish brown fine sandy loam or loam.

The C horizon to a depth of about 56 inches is yellowish brown, brown, strong brown, or dark yellowish brown sandy clay loam, sandy loam, or loam. The C horizon below a depth of about 56 inches is light gray or yellowish brown sandy loam or silt loam. In places, some thinly bedded planes of contrasting texture are present.

Creedmoor Series

The Creedmoor series consists of moderately well drained, very slowly permeable soils that formed in materials weathered from fine sandstone, mudstone, siltstone, and shale. Slope is 2 to 8 percent.

Typical pedon of Creedmoor fine sandy loam, 2 to 8 percent slopes, in Chapel Hill, 3/4 mile south of U.S. 15-501 bypass intersection with N.C. 54 along service road parallel to U.S. 15-501 bypass and 300 feet north of Old Mason Farm Road, in a hardwood forest:

O1—1 inch to 1/2; undecomposed hardwood leaves and grasses.

O2—1/2 inch to 0; black decomposed organic matter.

A1—0 to 5 inches; grayish brown (2.5Y 5/2) fine sandy loam; weak medium granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

A2—5 to 8 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak medium granular structure; friable, slightly sticky; many fine and medium roots; many fine pores; strongly acid; clear smooth boundary.

B1—8 to 15 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct pink (5YR 7/4) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; very strongly acid; clear wavy boundary.

B21t—15 to 28 inches; strong brown (7.5YR 5/8) clay; few fine faint light gray mottles; moderate medium angular blocky structure; very firm, very sticky, very plastic; few fine and medium roots; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—28 to 32 inches; yellowish brown (10YR 5/8) silty clay; common fine faint light gray mottles; moderate medium angular blocky structure; very firm, very sticky, very plastic; few fine roots; few thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B3—32 to 43 inches; variegated brownish yellow (10YR 6/8), strong brown (7.5YR 5/8), light gray (10YR 7/2), and pinkish gray (7.5YR 7/2) silty clay loam; massive; firm, sticky, slightly plastic; few fine roots; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—43 to 60 inches; reddish yellow (7.5YR 6/8) and light brownish gray (10YR 6/2) saprolite that crushes to silt loam; rock controlled structure; friable; strongly acid.

R—60 to 64 inches; moderately hard weak red sandstone and siltstone.

The solum is 40 to more than 60 inches thick. Depth to bedrock is more than 60 inches. Reaction of the subsoil is strongly acid or very strongly acid.

The A1 horizon is grayish brown or very dark gray. The A2 horizon is light yellowish brown or light brownish gray.

The B1 horizon is strong brown or yellowish brown. The B2t horizon is yellowish brown to strong brown silty clay or clay. The B3 horizon is brownish yellow, strong brown, light gray, pinkish gray, and gray.

The C horizon is reddish yellow and light brownish gray saprolite that crushes to silt loam or sandy loam.

Enon Series

The Enon series consists of well drained, slowly permeabie soils that formed in clayey residuum weathered from dark-colored rocks such as diorite, gabbro, hornblende schist, or mixed acidic and basic rocks. These soils are on the top and sides of ridges between intermittent and perennial streams. Slope is 2 to 12 percent.

Typical pedon of Enon loam, 2 to 6 percent slopes, 4.7 miles from Hillsborough on U.S. 70, south 1.4 miles to intersection of State Road 1712 and State Road 1710, and 50 feet northwest of intersection, in a cultivated field:

Ap—0 to 5 inches; brown (10YR 5/3) loam; weak fine granular structure; friable; many fine and medium roots; common small pebbles; strongly acid; clear wavy boundary.

B1—5 to 10 inches; reddish yellow (7.5YR 6/8) clay loam; common medium faint strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) mottles; weak fine angular blocky structure; friable, sticky, plastic; common fine and medium roots; few fine and medium pores; common small manganese concretions; medium acid; clear wavy boundary.

B2t—10 to 24 inches; strong brown (7.5YR 5/6) clay; common medium faint brownish yellow (10YR 6/6) mottles; moderate medium angular blocky structure; firm, very sticky, plastic; few fine roots; few fine and medium pores; thin patchy clay films on faces of peds; few black concretions; slightly acid; gradual wavy boundary.

B3—24 to 30 inches; strong brown (7.5YR 5/6) clay loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak medium angular blocky structure; friable, sticky, plastic; few pockets of clay; neutral; gradual wavy boundary.

C—30 to 68 inches; strong brown (7.5YR 5/8), yellowish brown (10YR 5/8), and very pale brown (10YR 7/3) saprolite that crushes to loam; very friable; few black fragments of rock; neutral.

R—68 to 69 inches; hard basic rock.

The solum is 20 to 44 inches thick. Depth to bedrock is more than 60 inches. Reaction of the subsoil is medium acid to neutral.

The Ap horizon is brown or yellowish brown loam or sandy loam.

The B1 horizon is brownish yellow or reddish yellow clay loam or loam. The B2t horizon is strong brown or yellowish brown clay or clay loam.

The C horizon is strong brown, yellowish brown, or very pale brown saprolite that crushes to loam or sandy loam.

Georgeville Series

The Georgeville series consists of well drained, moderately permeable soils that formed in residuum weathered from fine textured rocks, generally phyllites or Carolina slates. These soils are on narrow side slopes. Slope is 2 to 10 percent.

Typical pedon of Georgeville silt loam, 2 to 6 percent slopes, approximately 6.7 miles north of Hillsborough on N.C. 86, 150 feet east of N.C. 86, and 100 feet south of farm road, in cultivated field:

Ap—0 to 7 inches; yellowish red (5YR 4/6) silt loam; weak fine granular structure; friable; many fine roots; neutral; clear wavy boundary.

B21t—7 to 13 inches; red (2.5YR 4/6) clay loam; moderate fine angular blocky structure; friable to firm, slightly sticky, slightly plastic; common fine roots; medium acid; gradual wavy boundary.

B22t—13 to 40 inches; red (2.5YR 4/6) silty clay; common medium distinct reddish yellow (5YR 6/8) mottles; moderate medium angular blocky structure; firm, sticky, slightly plastic; very strongly acid; gradual wavy boundary.

B31—40 to 59 inches; red (2.5YR 4/6) silty clay loam; common medium distinct reddish yellow (7.5YR 7/8) mottles; moderate medium angular blocky to moderate fine angular blocky structure; firm, sticky, slightly plastic; few fine saprolite particles on faces of peds; very strongly acid; gradual wavy boundary.

B32—59 to 65 inches; red (2.5YR 4/6) silty clay loam, few medium distinct reddish yellow (7.5YR 7/8) mottles; moderate fine angular blocky structure; firm, sticky, slightly plastic; few fine saprolite particles on faces of peds; few medium pebbles; very strongly acid.

The solum is 40 to 70 inches thick. Reaction of the subsoil is very strongly acid to medium acid. Depth to bedrock is more than 60 inches.

The Ap horizon is yellowish red or brown silt loam or loam.

The B2t horizon is clay loam or silty clay. The B3 horizon is red or yellowish red silty clay loam or silt loam.

The C horizon, where present, is light reddish brown and very pale brown silt loam or silty clay loam.

Goldston Series

The Goldston series consists of well drained, moderately rapidly permeable soils that formed in residuum weathered from fine grained felsic slates. These soils are on narrow interstream ridges and sides of ridges between intermittent and perennial streams. Slope is 6 to 45 percent.

Typical pedon of Goldston slaty silt loam, 15 to 45 percent slopes, 2.5 miles northwest of Cane Creek Church along State Road 1114, west of Orange Grove highway and 50 feet south:

O1—3 inches to 2; loose hardwood leaf litter.

O2—2 inches to 0; partially decomposed leaf litter.

A1—0 to 10 inches; pale brown (10YR 6/3) slaty silt loam; moderate medium granular structure; very friable; many coarse and medium roots; common fine and medium pores; 45 percent fragments of slate, two-thirds to three-fourths of which are less than 3 inches in diameter; strongly acid; gradual wavy boundary.

B—10 to 18 inches; light yellowish brown (10YR 6/4) slaty silt loam; 30 to 35 percent is Bt horizon material of strong brown (7.5YR 5/8) silt loam; common amounts of pale brown (10YR 6/3) slaty silt loam from A1 horizon; weak medium subangular blocky structure; friable; common fine and medium roots; common fine and medium pores; few patchy clay films on faces of peds; 35 percent fragments of slate less than 3 inches in diameter; strongly acid; gradual wavy boundary.

C—18 to 24 inches; mottled pale brown (10YR 6/3) and strong brown (7.5YR 5/6) saprolite that crushes to silt loam; rock controlled structure; 50 percent fragments of slate; strongly acid; gradual irregular boundary.

R—24 inches; olive gray and brown moderately hard bedrock.

The solum is less than 20 inches thick. Depth to bedrock is 20 to 40 inches. Reaction of the subsoil is strongly acid to medium acid.

The A1 horizon is pale brown or dark grayish brown.

The B horizon is light yellowish brown, yellowish brown, or brown.

The C horizon is yellowish brown, gray, pale brown, and strong brown saprolite that crushes to silt loam.

Helena Series

The Helena series consists of moderately well drained, slowly permeable soils that formed in a mixture of material weathered from such acidic or basic crystalline rocks as aplitic granite and granite gneiss that are cut by dikes of gabbro and diorite. These soils are on broad ridges. Slope is 2 to 8 percent.

Typical pedon of Helena sandy loam, 2 to 8 percent slopes, 6.3 miles east of Hillsborough, 0.4 mile south of the intersection of U.S. 70 and N.C. 751, and 100 feet east of road, in a pine forest:

O1—1/4 inch of pine needles.

O2—Thin layer of decomposed leaf litter.

A1—0 to 5 inches; grayish brown (10YR 5/2) sandy loam; weak medium granular structure; very friable; many fine and medium roots; few angular quartz pebbles; strongly acid; clear wavy boundary.

A2—5 to 14 inches; very pale brown (10YR 7/4) sandy loam; weak medium granular structure; very friable; many fine and medium roots; common pebbles 1 to 3 inches in size; strongly acid; clear wavy boundary.

B1—14 to 17 inches; pale yellow (2.5Y 7/4) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few patchy clay films on faces of peds; common quartz pebbles 2 to 3 inches in size; strongly acid; gradual wavy boundary.

B21t—17 to 22 inches; brownish yellow (10YR 6/6) sandy clay; weak medium subangular blocky structure; friable, sticky, slightly plastic; few thin patchy clay films on faces of peds; few quartz pebbles 2 inches in size; strongly acid; gradual wavy boundary.

B22t—22 to 28 inches; brownish yellow (10YR 6/6) sandy clay; common medium distinct light gray (10YR 7/1) mottles; weak medium subangular blocky structure; firm, sticky, plastic; few fine and medium roots; few fine and medium pores; few prominent clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—28 to 36 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium distinct light gray (10YR 7/1) and very pale brown (10YR 7/4) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few bodies of clay; few bodies of parent material; strongly acid; gradual irregular boundary.

C—36 to 60 inches; reddish yellow (7.5YR 6/6) saprolite that crushes to sandy loam; many medium distinct light gray (10YR 7/1) mottles; massive; friable; strongly acid.

The solum is 20 to 60 inches thick. Depth to bedrock is more than 48 inches. Reaction of the subsoil is very strongly acid or strongly acid.

The A1 horizon is grayish brown or dark grayish brown. The A2 horizon is very pale brown, pale brown, or light yellowish brown.

The B1 horizon is pale yellow or light yellowish brown sandy clay loam or clay loam. The B2t horizon is brownish yellow, yellowish brown, and light yellowish brown sandy clay or clay. The B3 horizon is light gray and brownish yellow or light yellowish brown clay loam or sandy clay loam.

The C horizon is reddish yellow, strong brown, and light gray saprolite that crushes to sandy loam or coarse sandy loam.

Herndon Series

The Herndon series consists of well drained, moderately permeable soils that formed in residuum weathered from fine textured rocks, generally phyllites and Carolina slates. Slope is 2 to 10 percent.

Typical pedon of Herndon silt loam, 2 to 6 percent slopes, 4.2 miles south from Hillsborough on State Road 1009, west 0.1 mile on State Road 1113, and north of road, in mixed hardwoods:

A1—0 to 4 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

A2—4 to 9 inches; yellow (10YR 7/6) silt loam; weak medium granular structure; friable; many fine roots; very strongly acid; abrupt smooth boundary.

B1—9 to 16 inches; reddish yellow (7.5YR 6/8) silty clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; common medium pores; very strongly acid; clear wavy boundary.

B21t—16 to 27 inches; yellowish red (5YR 5/8) silty clay loam; common medium prominent red (2.5YR 4/8) and few fine prominent reddish yellow mottles; moderate medium subangular blocky structure; firm, sticky, plastic; few fine and medium roots; common medium pores; thin patchy clay films on faces of peds; few white minerals; strongly acid; clear wavy boundary.

B22t—27 to 40 inches; strong brown (7.5YR 5/8) clay; many medium prominent red (2.5YR 4/8) and common medium prominent yellowish red (5YR 4/6) mottles; moderate, medium subangular blocky structure; firm, sticky, plastic; common fine and medium roots; few fine and medium pores; thin patchy clay films on faces of peds; few white minerals; strongly acid; gradual wavy boundary.

B3—40 to 58 inches; reddish yellow (7.5YR 6/8) silty clay loam; common medium distinct yellowish red (5YR 5/8) and common medium faint reddish yellow (7.5YR 8/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; very strongly acid; gradual wavy boundary.

C—58 to 62 inches; mottled yellowish red (5YR 5/8), light gray (10YR 7/1), and yellowish brown (10YR 5/8) saprolite that crushes to silt loam; rock controlled structure; friable; very strongly acid.

The solum is 40 to 70 inches thick. Depth to bedrock is more than 60 inches. The subsoil is strongly acid or very strongly acid.

The A1 horizon is dark yellowish brown, grayish brown, or yellowish brown silt loam or loam. The A2 horizon, where present, is yellow or pale olive.

The B1 horizon is strong brown or reddish yellow. The B2t horizon is yellowish red, strong brown, or reddish yellow silty clay loam or clay. The B3 horizon is yellowish red or reddish yellow silty clay loam or clay loam.

Hiwassee Series

The Hiwassee series consists of well drained, moderately permeable soils that formed in unconsolidated, fine textured old alluvium and in residuum of basic or mixed acidic and basic crystalline rocks. These soils are on broad ridges and narrow side slopes. Slopes are 2 to 10 percent.

Typical pedon of Hiwassee clay loam, 2 to 6 percent slopes, 4.5 miles east of Hillsborough on U.S. 70 and 15 feet south of road, in a cultivated field:

Ap—0 to 6 inches; dark reddish brown (5YR 3/4) clay loam; weak medium subangular blocky structure; friable, sticky; many fine roots; slightly acid; abrupt smooth boundary.

B1—6 to 14 inches; dark red (2.5YR 3/6) clay loam; moderate fine and medium subangular blocky structure; friable, sticky, slightly plastic;

many fine and medium roots; few small quartz pebbles; slightly acid; gradual wavy boundary.

B2t—14 to 40 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm, very sticky, plastic; common fine and medium roots; common fine and medium pores; continuous clay films on faces of peds; few small and medium quartz pebbles; slightly acid; gradual wavy boundary.

B3—40 to 79 inches; dark red (2.5YR 3/6) clay loam; moderate fine and medium subangular blocky structure; firm, sticky, slightly plastic; few patchy clay films on faces of peds; common fine black minerals; few fine bluish green minerals; few fine yellow specks; slightly acid; gradual wavy boundary.

C—79 to 85 inches; dark red (2.5YR 3/6) and red (2.5YR 4/8) saprolite that crushes to loam; common medium green, bluish green, bluish gray, and black soft minerals; few medium lenses of clay; very friable; slightly acid.

The solum is 40 to 60 inches or more thick. Depth to bedrock is more than 60 inches. Reaction of the subsoil is medium acid or slightly acid.

The Ap horizon is dark reddish brown or dusky red.

The B2t horizon is dark red or red clay, silty clay loam, or clay loam. The B3 horizon, where present, is dark red or red silty clay loam or clay loam.

The C horizon, where present, is commonly red, dark red, or yellowish red clay loam or loam that has fragments of weathered rock.

Iredell Series

The Iredell series consists of moderately well drained, slowly permeable soils that formed in diorite, gabbro schist, and other rocks high in content of ferromagnesian minerals. These soils are on broad ridges. Slopes range from 1 to 4 percent.

Typical pedon of Iredell gravelly loam, 1 to 4 percent slopes, 6.5 miles south from Hillsborough on State Road 1009, 0.4 mile east on State Road 1727, and 400 feet north of road, in mixed hardwoods:

A1—0 to 5 inches; dark grayish brown (10YR 4/2) gravelly loam; weak medium granular structure; very friable; many medium coarse roots; about 15 percent round and angular pebbles 1/2 inch to 3 inches in size; strongly acid; clear wavy boundary.

A2—5 to 8 inches; brown (10YR 5/3) gravelly loam; weak medium granular structure; very friable, slightly plastic; common fine and medium roots; about 20 percent small angular pebbles 1/4 to 1 inch in size; slightly acid; clear wavy boundary.

B21t—8 to 18 inches; dark yellowish brown (10YR 4/4) clay; moderate medium and coarse angular blocky structure; very firm, very sticky, very plastic; common fine and medium roots; few small dark black concretions; few patchy clay films on faces of peds; slightly acid; gradual wavy boundary.

B22t—18 to 22 inches; yellowish brown (10YR 5/4) clay; strong coarse angular blocky structure; very firm, very sticky, very plastic; few fine roots; continuous clay films on faces of peds; slightly acid; gradual wavy boundary.

B3—22 to 29 inches; light olive brown (2.5Y 5/4) clay; many medium prominent olive (5Y 5/3) and olive gray (5Y 5/2) mottles; weak medium angular blocky structure; very firm, very sticky, very plastic; few fine roots; few patchy clay films on faces of peds; few bodies of C material in lower part of horizon; neutral; gradual wavy boundary.

C—29 to 40 inches; brown (7.5YR 4/4) saprolite that crushes to loam; many medium prominent white (10YR 8/2) and very pale brown (10YR 7/4) mottles; massive; friable; many black primary minerals; neutral.

R—40 to 41 inches; hard basic rock.

The solum is 20 to 36 inches thick. Depth to bedrock is more than 40 inches. Reaction of the subsoil is slightly acid to neutral. Coarse fragments cover 5 to 25 percent of the surface.

The A1 horizon is dark grayish brown or grayish brown.

The B2t horizon is dark yellowish brown, light olive brown, or yellowish brown clay or clay loam. The B3 horizon is light olive brown or light olive gray clay or clay loam.

The C horizon is mottled brown, green, strong brown, black, and gray saprolite that crushes to loam or clay loam.

Lignum Series

The Lignum series consists of moderately well drained, slowly permeable soils that formed in weathered slates; hard, fine grained schist; or slate rock. These soils are on interstream divides and around the head of drainageways. Slopes are 0 to 3 percent.

Typical pedon of Lignum silt loam, 0 to 3 percent slopes, 4.2 miles south from Hillsborough on State Road 1009, 2 miles west on State Road 1113, 0.6 mile west on State Road 1115, and 25 feet north of road, in a mixed hardwood and pine forest:

A1—0 to 1 inch; grayish brown (10YR 5/2) silt loam; weak fine granular structure; very friable; few medium and large roots; few quartz pebbles as much as 2 1/2 inches in diameter; strongly acid; abrupt smooth boundary.

A2—1 to 6 inches; very pale brown (10YR 7/4) silt loam, weak fine granular structure; very friable; few medium and large roots; strongly acid; clear wavy boundary.

B1—6 to 9 inches; brownish yellow (10YR 6/6) silty clay loam; few fine faint reddish yellow and very pale brown mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; many fine and medium pores; very strongly acid; clear smooth boundary.

B21t—9 to 16 inches; brownish yellow (10YR 6/6) silty clay; common fine faint reddish yellow and very pale brown mottles; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; few fine roots; many fine and medium pores; continuous very pale brown (10YR 7/3) silt coatings on faces of peds; very strongly acid; abrupt irregular boundary.

B22t—16 to 26 inches; strong brown (7.5YR 5/6) silty clay; common medium distinct yellowish red (5YR 4/8) and light gray (10YR 7/2) mottles; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; few fine roots; few fine and medium pores; continuous silt coatings and clay films on faces of peds; very strongly acid; gradual smooth boundary.

B23t—26 to 32 inches; strong brown (7.5YR 5/6) clay; many coarse prominent very pale brown (10YR 7/3) and light gray (10YR 7/1) mottles; moderate coarse angular blocky structure; very firm, very sticky, plastic; few fine roots; few fine pores; very strongly acid; gradual smooth boundary.

B3—32 to 36 inches; light gray (10YR 7/2) clay; many medium distinct strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm, plastic, sticky; very strongly acid; clear irregular boundary.

C—36 to 48 inches; light gray (10YR 7/2) saprolite that crushes to silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; rock controlled structure; firm; few bodies of clay; very strongly acid; clear irregular boundary.

R—48 inches; hard slate rock.

The solum is 20 to 40 inches thick. Depth to bedrock is 48 to 72 inches. The subsoil is very strongly acid or strongly acid.

The A1 horizon is grayish brown or dark gray. The A2 horizon, where present, is pale brown or very pale brown.

The B1 horizon is brownish yellow or light yellowish brown. The B2 horizon is brownish yellow, yellowish brown, or strong brown silty clay loam, silty clay, or clay. The B3 horizon, where present, is light gray or brownish yellow clay or silty clay.

The C horizon is commonly light gray and yellowish brown saprolite that crushes to silt or silt loam.

Louisburg Series

The Louisburg series consists of well drained to excessively drained, rapidly permeable soils that formed in weathered granite and gneiss. These soils are on side slopes adjacent to the major drainageways. Slope is 6 to 45 percent.

Typical pedon of Louisburg sandy loam, 6 to 15 percent slopes, 1.5 miles south of Carrboro on Smith Level Road, 0.25 mile southwest on State Road 1939, and 100 feet north of road, in a cultivated field:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) sandy loam; weak coarse granular structure; friable; many fine roots; 10 percent fine gravel, by volume, 2 to 5 millimeters in size; neutral; abrupt smooth boundary.

B—8 to 20 inches; strong brown (7.5YR 5/6) coarse sandy loam; 30 to 40 percent Bt material of strong brown (7.5YR 5/8) sandy loam; weak medium subangular blocky structure; friable; 10 percent fine gravel, by volume, 2 to 5 millimeters in size; few thin lenses of sandy clay loam; common white minerals; medium acid; gradual irregular boundary.

C—20 to 60 inches; strong brown (7.5YR 5/8) and yellowish red (5YR 5/8) saprolite that crushes to gravelly sandy loam; rock controlled structure; friable; common black minerals; 40 percent quartz gravel 2 to 5 millimeters in diameter; clay coatings on sand and gravel; medium acid.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 48 inches.

The Ap horizon is sandy loam or loamy sand.

The B horizon is strong brown or brown sandy loam or coarse sandy loam.

Orange Series

The Orange series consists of moderately well drained, slowly permeable soils that formed in weathered, fine grained quartz monzonite, hornblende schist, dacite, diorites, and similar rock materials. These soils are on broad ridges. Slope is 0 to 3 percent.

Typical pedon of Orange silt loam, 0 to 3 percent slopes, 6 miles north from Efland on State Road 1338, 0.4 mile east on State Road 1306, and 50 feet north of road, in a mixed hardwood and pine forest:

O1—1 inch to 1/2; pine needles and hardwood leaves.

O2—1/2 inch to 0; forest moss and decomposed plant residue.

A1—0 to 1 inch; grayish brown (2.5YR 5/2) silt loam; weak fine granular structure; very friable; many fine and medium roots; few small pebbles; very strongly acid; abrupt wavy boundary.

A2—1 to 5 inches; pale yellow (2.5Y 7/4) silt loam; weak fine granular structure; very friable; many medium and large roots; many fine and medium pores; few quartz pebbles 2 inches in size; very strongly acid; abrupt wavy boundary.

B2t—5 to 21 inches; yellowish brown (10YR 5/4) clay; few fine faint streaks of very pale brown (10YR 7/3) and brown (10YR 4/3); moderate coarse angular blocky structure; very firm, very sticky, very plastic; common medium roots; some old root channels filled with light gray (2.5Y 7/2) material from A horizon; thin patchy clay films on faces of peds; slightly acid; gradual wavy boundary.

B3—21 to 24 inches; light yellowish brown (2.5Y 6/4) silty clay loam; many medium distinct white (2.5Y 8/2) mottles; moderate fine and medium platy structure; firm, sticky, plastic; common bodies of C horizon material; neutral; gradual wavy boundary.

C—24 to 42 inches; light gray (2.5Y 7/2) saprolite that crushes to silt loam; common medium faint pale yellow (2.5Y 7/4) mottles; massive; firm; neutral.

R—42 to 45 inches; hard basic slate rock.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 40 inches. Reaction of the subsoil is slightly acid or neutral.

The A1 horizon is grayish brown or dark grayish brown. The A2 horizon is pale yellow or olive yellow.

The B2t horizon is yellowish brown or dark yellowish brown clay or clay loam. The B3 horizon is light yellowish brown or light olive brown silty clay loam or silt loam.

Sedgefield Series

The Sedgefield series consists of moderately well drained and somewhat poorly drained, slowly permeable soils that formed in residuum weathered from mixed acidic and basic rocks. These soils are on the lower part of slopes and in broad, flat areas.

Typical pedon of Sedgefield sandy loam, in an area of Helena-Sedgefield sandy loams, 0 to 2 percent slopes, 1.5 miles north of Walnut Grove Church on State Road 1001, 1 mile west of State Road 1001 on State Road 1510, and 100 feet south of State Road 1510, in woods:

O1—1 inch to 1/2; undecomposed mixed hardwood and pine leaf litter.

O2—1/2 inch to 0; partially decomposed mixed hardwood and pine leaf litter.

A1—0 to 3 inches; gray (10YR 6/1) sandy loam; weak medium granular structure; very friable; many fine and medium roots; few large roots; strongly acid; abrupt smooth boundary.

A2—3 to 7 inches; very pale brown (10YR 7/3) sandy loam; few fine faint yellowish brown mottles; weak fine and medium granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

B1—7 to 13 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; very pale brown (10YR 7/3) material from A2 horizon in pores; root channels and tongues make up 10 percent of the horizon; few quartz pebbles less than 1 inch in diameter; strongly acid; gradual wavy boundary.

B21t—13 to 23 inches; brownish yellow (10YR 6/6) clay; common medium distinct gray (10YR 6/1) mottles; moderate medium subangular and angular blocky structure; firm, sticky, plastic; few medium roots; few fine pores; thick prominent clay films on faces of primary peds; strongly acid; gradual wavy boundary.

B22t—23 to 33 inches; strong brown (7.5YR 5/6) clay; common medium distinct gray (10YR 6/1) mottles; moderate medium angular blocky structure; very firm, sticky, plastic; few fine roots; thick prominent clay films on faces of primary peds; strongly acid; gradual wavy boundary.

B3—33 to 37 inches; gray (10YR 6/1) sandy clay loam; common coarse strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; 10 percent brownish yellow (10YR 6/6) saprolite; medium acid; gradual wavy boundary.

C—37 to 65 inches; light gray (10YR 7/1), yellow (10YR 7/6), and brownish yellow (10YR 6/6) saprolite that crushes to sandy loam; massive; friable; medium acid; clear smooth boundary.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 48 inches. The subsoil is strongly acid or medium acid.

The A1 horizon is gray, grayish brown, or dark grayish brown. The A2 horizon, where present, is light yellowish brown, pale brown, or very pale brown.

The B2t horizon is brownish yellow, yellowish brown, strong brown, light olive brown, and light yellowish brown clay or clay loam. The B3 horizon is gray, light yellowish brown, or brownish yellow sandy clay loam or clay loam.

The C horizon is light gray, yellow, brownish yellow, olive, and pale olive saprolite that crushes to sandy loam, sandy clay loam, silt loam, or loam.

Tatum Series

The Tatum series consists of well drained, moderately permeable soils that formed in residuum weathered from relatively hard sericite schist. These soils are on side slopes. Slope is 8 to 25 percent.

Typical pedon of Tatum silt loam, 8 to 15 percent slopes, 6.4 miles northeast from Hillsborough on State Road 1002, 1 mile north on State Road 1548, and 50 feet northeast of road, in a cultivated field:

Ap—0 to 5 inches; strong brown (7.5YR 5/6) silt loam; moderate medium granular structure; very friable; less than 10 percent, by volume, fragments of slate; strongly acid; abrupt wavy boundary.

B2t—5 to 20 inches; red (2.5YR 4/8) silty clay; moderate medium angular blocky structure; firm, slightly sticky, slightly plastic; common fine and medium roots; common fine and medium pores; thin patchy clay films on faces of peds; less than 10 percent yellow and white small and medium fragments of slate; strongly acid; gradual wavy boundary.

B3—20 to 34 inches; red (2.5YR 4/8) silty clay loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common bodies of material from C horizon in lower part; strongly acid; gradual wavy boundary.

C—34 to 60 inches; red (2.5YR 4/8) saprolite that crushes to loam; many medium and coarse prominent yellowish red (5YR 5/6), strong brown (7.5YR 5/6), and light gray (10YR 7/l) mottles; rock controlled structure; friable, slightly sticky; strongly acid.

The solum is 25 to 50 inches thick. Depth to bedrock is 40 to 60 inches. Reaction of the subsoil ranges from very strongly acid to strongly acid.

The Ap horizon is strong brown or brown.

The B2t horizon is silty clay or silty clay loam. The B3 horizon is loam, silt loam, or silty clay loam.

The C horizon is commonly variegated red and yellowish red saprolite that crushes to loam.

Vance Series

The Vance series consists of well drained, slowly permeable soils that formed in residuum weathered from acid crystalline rock, primarily aplitic granite. These soils are on ridges. Slope is 2 to 8 percent.

Typical pedon of Vance sandy loam, 2 to 8 percent slopes, 0.1 mile northeast from Carr on N.C. 49, 0.2 mile north on private road, and 100 feet west of road, in cultivated field:

Ap—0 to 9 inches; pale brown (10YR 6/3) sandy loam; weak coarse granular structure; very friable; many fine roots; few pieces of angular quartz gravel; medium acid; abrupt smooth boundary.

B21t—9 to 15 inches; yellowish brown (10YR 5/8) clay; few fine distinct yellowish red (5YR 4/8) mottles; moderate coarse angular blocky structure; firm, sticky, plastic; common fine roots; thin patchy clay films on faces of peds; common angular quartz grains; strongly acid; clear wavy boundary.

B22t—15 to 21 inches; yellowish brown (10YR 5/8) clay; common medium distinct yellowish red (5YR 4/8) mottles; moderate medium angular blocky structure; firm, sticky, plastic; common fine roots; thin patchy clay films on faces of peds; few medium flakes of mica; common angular quartz grains; strongly acid; clear wavy boundary.

B3—21 to 37 inches; reddish yellow (7.5YR 6/8) sandy clay; common medium prominent red (2.5YR 4/8) mottles and few fine and medium distinct yellowish brown (10YR 5/8) and very pale brown (10YR 8/3) mottles; weak fine subangular blocky structure; firm, sticky, slightly plastic; few medium flakes of mica; common angular quartz grains; strongly acid; gradual wavy boundary.

C—37 to 60 inches; reddish yellow (7.5YR 6/8) saprolite that crushes to sandy clay loam; common medium prominent red (2.5YR 4/8) mottles and few medium distinct yellowish brown (10YR 5/8) and white (10YR 8/2) mottles; rock controlled structure; friable; strongly acid.

The solum is 24 to 48 inches thick. Depth to bedrock is more than 60 inches. Reaction of the subsoil is strongly acid or very strongly acid.

The Ap horizon is pale brown, grayish brown, or yellowish brown sandy loam or fine sandy loam.

The B2t horizon is reddish yellow or yellowish brown clay or clay loam. The B3 horizon is reddish yellow or yellowish red sandy clay, sandy clay loam, or clay loam.

The C horizon is reddish yellow, yellow, red, and light gray sandy clay loam, clay loam, or sandy loam.

Wedowee Series

The Wedowee series consists of well drained, moderately slowly permeable soils that formed in a regolith from weathered acid crystalline rocks. These soils are on side slopes adjacent to the major drainageways. Slope is 8 to 25 percent.

Typical pedon of Wedowee sandy loam, 15 to 25 percent slopes, 7.3 miles east from Hillsborough to State Road 1716 and 1719, south 0.7 mile on State Road 1719, and 150 feet west of road, in a hardwood forest:

A1—0 to 3 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; common medium and large roots; common small quartz pebbles; strongly acid; clear wavy boundary.

A2—3 to 12 inches; yellowish brown (10YR 5/4) sandy loam; weak fine granular structure; very friable; common medium and large roots; common small quartz pebbles; strongly acid; clear wavy boundary.

B1—12 to 15 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct yellowish red (5YR 5/8) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common medium roots; common small quartz pebbles; strongly acid; clear wavy boundary.

B2t—15 to 25 inches; yellowish brown (10YR 5/8) sandy clay; many medium prominent reddish yellow (5YR 6/8) mottles; moderate medium subangular blocky structure; firm, slightly sticky, slightly plastic; common medium roots; common small quartz pebbles; strongly acid; clear wavy boundary.

B3—25 to 28 inches; yellowish red (5YR 5/8) sandy clay loam; few medium prominent very pale brown (10YR 7/4) mottles; weak medium subangular blocky structure; friable, slightly plastic, slightly sticky; common medium roots; common small quartz pebbles; strongly acid; clear wavy boundary.

C—28 to 60 inches; yellowish red (5YR 5/8) saprolite that crushes to sandy loam; few medium distinct light brown (7.5YR 6/4) and red (2.5YR 4/8) mottles; rock controlled structure; friable; small bodies of clay; common medium roots; common small pebbles; strongly acid.

The solum is 20 to 40 inches thick. Depth to bedrock is 48 to 60 inches. Reaction of the subsoil ranges from very strongly acid to strongly acid.

The A1 horizon is dark grayish brown or very dark grayish brown. The A2 horizon is yellowish brown or yellow.

The B1 horizon is strong brown or brownish yellow sandy clay loam or loam. The B2t horizon is strong brown or yellowish brown sandy clay, clay, or clay loam. The B3 horizon is yellowish red or yellowish brown clay loam or sandy clay loam.

The C horizon is yellowish red, strong brown, very pale brown, and white saprolite that crushes to sandy loam or loam.

White Store Series

The White Store series consists of moderately well drained, very slowly permeable soils that formed in weathered shale, mudstone, and sandstone. These soils are on broad ridges. Slope is 2 to 15 percent.

Typical pedon of White Store loam, 2 to 6 percent slopes, 0.5 mile east from U.S. 15-501 bypass in Chapel Hill on Ephesus Church Road and 600 feet north on dirt lane, in cultivated field:

Ap—0 to 5 inches; yellowish brown (10YR 5/4) loam; weak medium granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

B1—5 to 8 inches; reddish brown (5YR 4/4) clay loam; moderate and strong medium angular blocky structure; friable, sticky, plastic; few fine roots; few patchy clay films on faces of peds; strongly acid; abrupt smooth boundary.

B21t—8 to 20 inches; yellowish red (5YR 4/6) clay; many medium prominent light gray (10YR 7/2) and very pale brown (10YR 7/3) mottles; massive parting to medium angular blocky structure; very firm, very sticky, very plastic; few fine roots; thin patchy clay films on faces of peds; very strongly acid; gradual irregular boundary.

B22t—20 to 27 inches; reddish brown (5YR 5/4) clay; massive parting to strong medium angular blocky structure; very firm, very sticky, very plastic; few fine roots; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23t—27 to 30 inches; dark reddish brown (5YR 3/4) silty clay; few fine prominent light gray mottles; weak medium angular blocky structure; firm, sticky, plastic; few fine roots; thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B3—30 to 34 inches; reddish brown (5YR 4/3) silty clay loam; massive parting to medium and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; very strongly acid; gradual wavy boundary.

C—34 to 50 inches; reddish brown (5YR 4/3) saprolite that crushes to silt loam; rock controlled structure; very friable; medium acid.

R—50 inches; hard reddish brown siltstone and sandstone.

The solum is 24 to 40 inches thick. Depth to bedrock is 48 to 72 inches. Reaction of the subsoil is very strongly acid to strongly acid.

The A horizon is brown or yellowish brown and is commonly loam, sandy loam, or fine sandy loam.

The B1 horizon, where present, is strong brown or reddish brown clay loam or sandy clay loam. The B2t horizon is yellowish red, reddish brown, dark reddish brown, or dark red clay to silty clay. The B3 horizon, where present, is reddish yellow, reddish brown, dark reddish brown, or dark red clay to silty clay loam.

The C horizon is reddish brown or dark reddish brown saprolite that crushes to silt loam.

Wilkes Series

The Wilkes series consists of well drained, moderately slowly permeable soils that formed in residuum weathered from diorite, hornblende schist, and related rocks that are moderately high in content of ferromagnesian minerals or from a mixture of acidic or basic rocks. These soils are on narrow side slopes. Slope is 8 to 45 percent.

Typical pedon of Wilkes gravelly loam, 8 to 15 percent slopes, approximately 0.1 mile north of Carrboro on State Road 1580 and 120 feet west of State Road 1580, in wooded area:

O1—2 inches to 1 inch; undecomposed mixed hardwood and pine forest litter.

O2—1 inch to 0; partially undecomposed and decomposed mixed hardwood leaves and pine needles.

A1—0 to 3 inches; dark grayish brown (2.5YR 4/2) gravelly loam; moderate medium granular structure; friable; many fine and coarse roots; about 5 percent of surface is stones (10 inches in diameter) and 12 to 15 percent is gravel and cobbles; slightly acid; clear wavy boundary.

A2—3 to 8 inches; light yellowish brown (2.5Y 6/5) gravelly loam; moderate medium granular structure; friable; many fine and coarse roots; about 10 percent of this horizon is gravel; slightly acid; clear wavy boundary.

B2t—8 to 13 inches; brownish yellow (10YR 6/6) clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine pores; few patchy clay films on faces of peds; slightly acid; clear wavy boundary.

B3—13 to 18 inches; strong brown (7.5YR 5/6) clay loam; weak coarse angular blocky structure; friable; common fine roots; few fine pores; light yellowish brown silt coatings on faces of peds; about 25 percent of the horizon is saprolite from basic rock; few flakes of mica; neutral; gradual wavy boundary.

C1—18 to 36 inches; strong brown (7.5YR 5/6) saprolite that crushes to loam; streaked with black and green; rock controlled structure; friable; neutral; abrupt smooth boundary.

C2—36 to 60 inches; greenish and brownish saprolite that crushes to loam; rock controlled structure; friable; neutral.

The solum is 10 to 20 inches thick. Depth to bedrock is 40 to 80 inches. Reaction of the subsoil ranges from medium acid to neutral.

The A1 horizon is dark grayish brown or grayish brown. The A2 horizon is light brownish gray or light yellowish brown.

The B2t horizon is brownish yellow or strong brown clay or clay loam. The B3 horizon, where present, is strong brown or yellowish brown.

The C horizon is commonly variegated yellowish brown, strong brown, green, black, and gray saprolite that crushes to loam or silt loam.

Classification

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 the latest literature available (*4, 5*).

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 16, 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 for 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

In this section, the processes of soil formation are discussed and related to the soils in the survey area.

Soils are the product of soil-forming processes acting upon materials altered or deposited by geologic forces. The factors that contribute to the differences among soils are climate, plant and animal life, parent material, topography, and time. Climate and plant and animal life, particularly vegetation, are the active forces in soil formation. Their effect on parent material is modified by topography and by the length of time the parent material has been in place. The relative importance of each factor differs from place to place. In some places one factor dominates in the formation of a soil and determines most of its properties, but normally the interaction of all factors determines the kinds of soil that form in any given place.

Climate

Climate is important in the formation of soils because it influences the weathering of minerals. Weathering is more rapid under a warm, humid climate than it is under a cold or a dry climate. The type and abundance of vegetation are influenced by the amount of precipitation and the length of the growing season. Precipitation also affects the translocation and leaching of some products of weathering. Hard rains and frequent showers may cause excessive erosion.

Orange County has the warm, humid climate that is typical of the southeastern United States. Specific climatic data are given in tables 1 and 2.

The climate is nearly the same throughout the county, and precipitation is rather uniformly distributed during the year. In winter the precipitation is usually light snow and showers, and in other seasons it is either light, prolonged rain or quick, hard showers. Winter is moderately cold and sometimes wet; summer is usually hot and humid.

As a result of the warm, humid climate, most of the soils of the county are strongly weathered, leached, and acid in the upper part, and comparatively low in the supply of plant nutrients.

Plant and Animal Life

Before the county was settled, the native vegetation consisted mainly of hardwoods, but there also were some coniferous trees. These plants had a major influence on the development of the soils. In addition, the activities of micro-organisms, earthworms, larvae, and other forms of animal life were important in the cycle of decay and regeneration of plants.

Hardwood trees and other plants absorb minerals from the soil and store them in their roots, stems, and leaves. When these plants or parts of them decay, the minerals re-enter the soil and are again used by the plants. Unless disturbed, this cycle continues through the years.

Soil development is also affected by plant roots, which penetrate soil material to various depths. The roots generally increase soil porosity and can break or split coarse soil fragments and particles. Organic acids produced by plants react on basic minerals in the parent material. Minerals taken into solution or suspension may be leached from a soil or translocated within it.

As agriculture developed in Orange County, man influenced soil formation by clearing forests and introducing new kinds of plants. Cultivation and artificial drainage changed some characteristics of soils in the county.

Man's influence has caused an accelerated loss of soil through erosion. Because of this loss, the soil in some areas is thin and has been changed in other ways. Some of the material that washed from sloping areas has been deposited in depressions and on flood plains. Young or immature soils form in this type of material.

Parent Material

Parent material is the unconsolidated rock from which a soil forms. It is primarily responsible for the chemical and mineral composition of the soil. It is the most important factor that has caused differences among the soils of Orange County. Some of the differences, such as texture, color, or depth, are easily determined by observation. Minor differences in mineral composition are determined by laboratory analysis.

Most of the soils of Orange County formed in residual material, that is, the material that weathered from the underlying rocks.

The soils of the county formed in parent materal that ranges from Precambrian to Mesozoic in geological age. According to the geology map of North Carolina, Triassic sandstone, siltstone, and shale with injected intrusions of diabasic rocks underlie the southeastern parts of the county. Soils that formed in these Triassic parent materials include the Creedmoor and White Store soils.

Soils that formed in the residuum of diabasic intrusions include Iredell, Enon, and Wilkes soils. Most of the central part of the county is underlain by volcanic rocks. Soils that formed in parent material from felsic volcanic slates and mafic volcanic slates include the Georgeville, Goldston, Herndon, Lignum, Orange, and Tatum soils.

In several widely scattered areas in the northern, central, and southern parts of the county and south of the Triassic Basin, the parent materials are felsic crystalline rocks that are mostly granite, schist, and gneiss. Soils that formed in these parent materials are the Appling, Cecil, Helena, Louisburg, Vance, and Wedowee soils.

Soils that formed in old alluvium on stream terraces include the Altavista soils, and those that formed on the flood plains include the Chewacla and Congaree soils.

Topography

Topography, or relief, controls surface drainage and affects percolation of water through the soil and into the underlying material. It affects the depth of soil, soil development, and the dominant kinds of vegetation.

Soils that formed on steep slopes normally have weakly expressed horizons, and their solum commonly is thin because much of it is eroded away almost as rapidly as it forms. Soils in low depressions and on flood plains generally have impeded drainage to some degree. Root distribution, as a factor in soil formation, is limited in shallow, steep, and imperfectly drained soils.

The topography of Orange County varies from gently sloping to steep.

The steepest slopes are adjacent to the major drainageways. In some places, broad, nearly level flood plains parallel the major streams and rivers of the county.

Differences in topography can account for some differences between soils that formed in the same or similar material. Georgeville and Tatum soils, for example, formed in smooth, fine grained material. But the gently sloping to sloping Georgeville soils have a thick solum and a strongly expressed argillic horizon, and the sloping to moderately steep Tatum soils have a much thinner solum and a definite but somewhat weaker argillic horizon. The differences between soils of these two series are caused mainly by topography and its effect on the rate of geologic and accelerated erosion.

Time

Time is important in the formation of soils. If the factors of soil formation have operated long enough to form well-defined, genetically related horizons and the soil material is in equilibrium with its environment, the soil is considered mature. But if the soil shows little or no horizonation and the soil-forming processes are still active, the soil is considered immature. Many soils range in maturity between these extremes.

Soils that formed in the same kind of parent material but in areas of different topography do not necessarily mature in the same length of time. On steep slopes, for example, no definite horizons have had time to develop, because the soil material has been removed by erosion almost as rapidly as it has formed. In less strongly sloping areas, soil development is more rapid.

Soils that form in material that is resistant to weathering require more time to mature than soils that form in easily weathered material. On flood plains the development of genetically related horizons may be slowed or prevented if alluvium is deposited frequently.

The Appling soils are mature soils in which the horizons are well defined and genetically related and the rate of weathering has exceeded that of geologic erosion; the soils generally are in equilibrium with their environment. The Goldston soils are only partly mature because they are in sloping areas where the rate of erosion is nearly equal to the rate of weathering. The Congaree soils are immature because the material in which they formed is recently deposited and is constantly being renewed.

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Glossary

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

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

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the exchange capacity.

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.

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.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

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.

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.

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

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

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

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

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.

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.

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.

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.

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.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

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.

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 characterisitc that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in 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

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Saprolite (geology). Soft, earthy, clay-rich, thoroughly decomposed rock formed in place by chemical weathering of igneous and metamorphic rock. In soil survey, the term saprolite is applied to any unconsolidated residual material underlying the soil and grading to hard bedrock below.

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.

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.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

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.

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."

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 borehold 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.

Illustrations

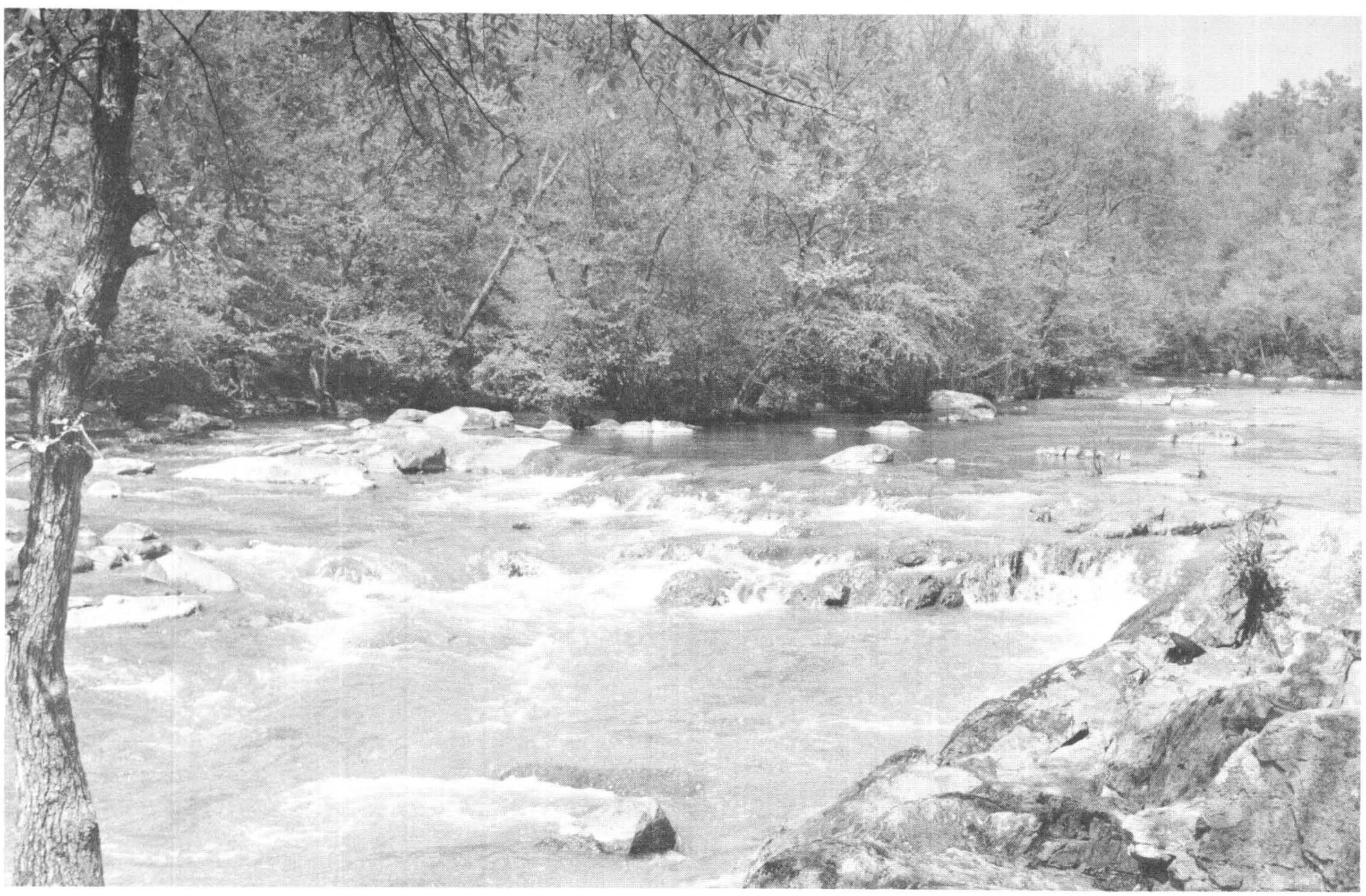

Figure 1.—The well drained Tatum and Goldston soils along the Eno River are suitable for woodland.

Figure 2.—Georgeville silt loam, 2 to 6 percent slopes has high potential for pasture plants including orchardgrass and ladino clover.

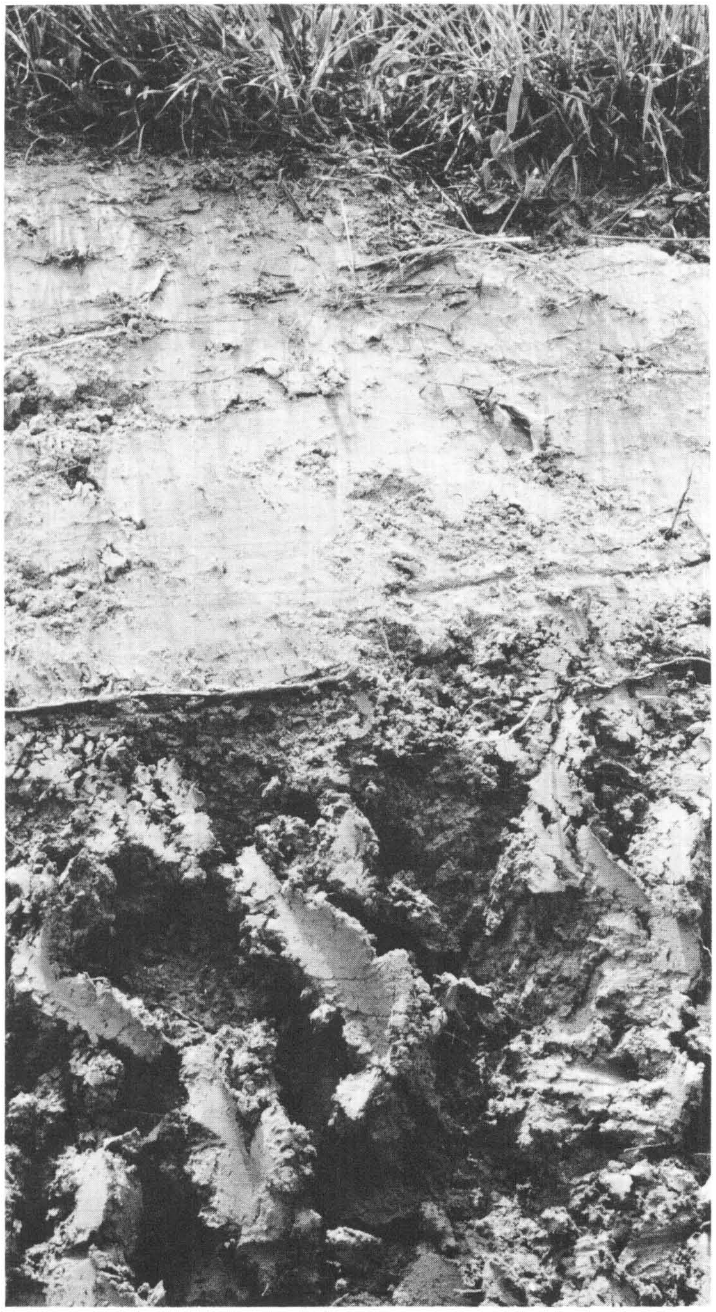

Figure 3.—Profile of Helena sandy loam, 2 to 8 percent slopes. This soil has slow permeability.

Figure 4.—Tobacco irrigated on Helena sandy loam, 2 to 8 percent slopes.

Figure 5.—This lake adjoins Lignum silt loam, 0 to 3 percent slopes, which has a moderate potential for most forms of recreation.

Figure 6.—Corn, milo, and millet on Chewacla loam are used for wildlife food after flooding.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[All data recorded at Durham, or estimated as indicated.]

Month	Temperature					Precipitation				
	Average daily maximum	Average daily minimum	2 years in 10 will have at least 4 days with-- Maximum temperature equal to or higher than--	2 years in 10 will have at least 4 days with-- Minimum temperature equal to or lower than--	Soil temperature 4-inch depth, bare, level ground (estimated)	Average monthly total	1 year in 10 will have-- Less than--	1 year in 10 will have-- More than--	Days with snow cover of 1 inch or more	Average depth of snow on days with snow cover
	F	F	F	F	F	In	In	In		In
January--	53	31	69	13	40	3.3	1.5	5.8	3	2
February-	55	31	72	18	42	3.4	1.2	5.5	2	2
March----	63	37	76	23	48	3.6	1.6	5.6	2	3
April----	73	46	86	32	59	3.4	1.6	5.4	(1)	(1)
May------	81	55	91	42	67	3.2	.8	4.8	0	---
June-----	88	64	97	53	76	3.7	1.8	6.0	0	---
July-----	89	67	98	60	79	5.4	2.5	7.5	0	---
August---	88	66	97	58	79	4.7	1.7	7.8	0	---
September	83	60	92	45	73	3.4	.7	7.6	0	---
October--	74	48	86	32	63	2.7	.6	5.4	0	---
November-	62	37	77	24	52	2.9	.5	6.3	(1)	(1)
December-	53	31	67	13	43	3.0	1.2	4.9	1	1
Year--	72	48	[2]99	[3]10	60	42.7	27.8	51.3	8	2

[1]Less than one-half.
[2]Average annual highest temperature.
[3]Average annual lowest temperature.

TABLE 2.--PROBABILITIES OF LAST FREEZING TEMPERATURE IN SPRING AND FIRST IN FALL

[From data recorded at Durham, modified for a rural environment.]

Probability	Dates for given probability and temperature				
	16 degrees F	20 degrees F	24 degrees F	28 degrees F	32 degrees F
Spring:					
1 year in 10 later than	March 10	March 24	April 4	April 18	April 26
2 years in 10 later than	February 28	March 15	March 28	April 12	April 20
5 years in 10 later than	February 10	February 25	March 10	March 30	April 11
Fall:					
1 year in 10 earlier than	November 25	November 15	November 5	October 26	October 14
2 years in 10 earlier than	December 3	November 21	November 10	October 30	October 19
5 years in 10 earlier than	December 12	December 2	November 20	November 11	October 28

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Aa	Altavista fine sandy loam, 0 to 3 percent slopes	300	0.1
ApB	Appling sandy loam, 2 to 6 percent slopes	13,350	5.2
ApC	Appling sandy loam, 6 to 10 percent slopes	7,700	3.0
AuC	Appling-Urban land complex, 2 to 10 percent slopes	950	0.4
CfB	Cecil fine sandy loam, 2 to 6 percent slopes	850	0.3
CfC	Cecil fine sandy loam, 6 to 10 percent slopes	750	0.3
Ch	Chewacla loam	9,800	3.8
Cp	Congaree fine sandy loam	2,400	0.9
CrB	Creedmoor fine sandy loam, 2 to 8 percent slopes	800	0.3
EnB	Enon loam, 2 to 6 percent slopes	10,500	4.1
EnC	Enon loam, 6 to 12 percent slopes	6,150	2.4
GeB	Georgeville silt loam, 2 to 6 percent slopes	50,200	19.7
GeC	Georgeville silt loam, 6 to 10 percent slopes	19,250	7.6
GhC	Georgeville-Urban land complex, 2 to 10 percent slopes	1,650	0.7
GlD	Goldston slaty silt loam, 6 to 15 percent slopes	1,000	0.4
GlF	Goldston slaty silt loam, 15 to 45 percent slopes	1,950	0.8
HeB	Helena sandy loam, 2 to 8 percent slopes	13,250	5.2
HhA	Helena-Sedgefield sandy loams, 0 to 2 percent slopes	2,500	1.0
HrB	Herndon silt loam, 2 to 6 percent slopes	29,850	11.7
HrC	Herndon silt loam, 6 to 10 percent slopes	19,500	7.7
HwB	Hiwassee clay loam, 2 to 6 percent slopes	1,460	0.6
HwC	Hiwassee clay loam, 6 to 10 percent slopes	600	0.2
IrB	Iredell gravelly loam, 1 to 4 percent slopes	3,500	1.4
IuB	Iredell-Urban land complex, 1 to 8 percent slopes	500	0.2
Lg	Lignum silt loam, 0 to 3 percent slopes	10,000	3.9
LoC	Louisburg sandy loam, 6 to 15 percent slopes	1,900	0.7
LoF	Louisburg sandy loam, 15 to 45 percent slopes	2,700	1.1
Or	Orange silt loam, 0 to 3 percent slopes	3,950	1.6
Pt	Pits	110	([1])
TaD	Tatum silt loam, 8 to 15 percent slopes	15,650	6.1
TaE	Tatum silt loam, 15 to 25 percent slopes	8,600	3.4
Ur	Urban land	1,700	0.7
VaB	Vance sandy loam, 2 to 8 percent slopes	670	0.3
WmD	Wedowee sandy loam, 8 to 15 percent slopes	2,100	0.8
WmE	Wedowee sandy loam, 15 to 25 percent slopes	2,500	1.0
WsB	White Store loam, 2 to 6 percent slopes	1,600	0.6
WtC2	White Store clay loam, 6 to 15 percent slopes, eroded	1,500	0.6
WwC	White Store-Urban land complex, 2 to 8 percent slopes	700	0.3
WxD	Wilkes gravelly loam, 8 to 15 percent slopes	450	0.2
WxF	Wilkes gravelly loam, 15 to 45 percent slopes	850	0.3
	Water	980	0.4
	Total	254,720	100.0

[1]Less than 0.1 percent.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated in 1975 for a high level of management. Absence of a yield indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Tobacco	Soybeans	Oats	Pasture	Grass-legume hay
	Bu	Lb	Bu	Bu	AUM[1]	Ton
Altavista:						
Aa	120	2,600	45	90	9.0	5.4
Appling:						
ApB	95	2,400	35	85	8.0	4.8
ApC	80	2,200	30	75	7.5	4.5
[2]AuC	---	---	---	---	---	---
Cecil:						
CfB	95	2,100	35	90	8.0	4.8
CfC	90	2,000	30	85	7.5	4.5
Chewacla:						
Ch	100	---	35	70	10.0	6.0
Congaree:						
Cp	125	---	45	80	10.0	6.0
Creedmoor:						
CrB	75	2,200	---	75	6.0	3.6
Enon:						
EnB	75	1,900	30	65	5.8	4.0
EnC	65	1,700	25	60	5.3	3.8
Georgeville:						
GeB	90	2,000	30	80	6.5	3.9
GeC, [2]GhC	80	1,800	25	70	6.0	3.6
Goldston:						
GlD	---	---	---	---	3.5	2.1
GlF	---	---	---	---	3.0	1.8
Helena:						
HeB	75	2,100	25	65	5.8	3.5
[2]HhA	73	2,000	25	60	5.6	3.3
Herndon:						
HrB	90	2,000	30	80	6.0	5.0
HrC	80	1,800	25	70	5.5	4.8
Hiwassee:						
HwB	95	---	---	90	6.5	3.9
HwC	85	---	---	80	6.0	3.6
Iredell:						
IrB	65	1,800	25	65	5.5	3.3
[2]IuB	---	---	---	---	---	---
Lignum:						
Lg	75	1,800	25	60	5.5	3.3

See footnotes at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Tobacco	Soybeans	Oats	Pasture	Grass-legume hay
	Bu	Lb	Bu	Bu	AUM	Ton
Louisburg:						
LoC	---	---	---	---	3.0	2.0
LoF	---	---	---	---	---	---
Orange:						
Or	80	---	25	50	5.2	2.5
Pits:						
Pt.						
Tatum:						
TaD	85	---	30	65	6.0	3.6
TaE	65	---	---	60	5.8	---
Urban land:						
Ur.						
Vance:						
VaB	80	2,000	35	70	5.6	3.3
Wedowee:						
WmD	60	---	---	50	4.5	---
WmE	---	---	---	---	---	---
White Store:						
WsB	80	1,800	---	70	5.0	3.0
WtC2	---	---	---	---	4.0	2.5
[2]WwC	---	---	---	---	---	---
Wilkes:						
WxD	---	---	---	---	6.0	3.6
WxF	---	---	---	---	5.5	3.9

[1]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.

[2]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 5.--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					Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Important trees	Site index	
Altavista:									
Aa	2w	Slight	Moderate	Slight	---	---	Loblolly pine	91	Loblolly pine, sweetgum, American sycamore, cherrybark oak.
							Longleaf pine	84	
							Shortleaf pine	77	
							Sweetgum	84	
							White oak	---	
Appling:									
ApB, ApC	3o	Slight	Slight	Slight	---	---	Loblolly pine	81	Eastern redcedar, eastern white pine, loblolly pine, slash pine, yellow-poplar.
							Shortleaf pine	65	
							Scarlet oak	68	
							Southern red oak	76	
							Virginia pine	74	
							White oak	71	
							Yellow-poplar	90	
[1]AuC:									
Appling part	3o	Slight	Slight	Slight	---	---	Loblolly pine	81	Eastern redcedar, loblolly pine, slash pine.
							Shortleaf pine	65	
							Scarlet oak	68	
							Southern red oak	76	
							Virginia pine	74	
							White oak	71	
							Yellow-poplar	90	
Urban land part.									
Cecil:									
CfB, CfC	3o	Slight	Slight	Slight	Slight	Slight	Eastern white pine	80	Loblolly pine, yellow-poplar.
							Loblolly pine	80	
							Shortleaf pine	69	
							Virginia pine	73	
							Black oak	66	
							Northern red oak	82	
							Post oak	65	
							Scarlet oak	80	
Chewacla:									
Ch	1w	Slight	Moderate	Moderate	---	---	Loblolly pine	96	Loblolly pine, slash pine, American sycamore, yellow-poplar, sweetgum, eastern white pine, green ash.
							Yellow-poplar	104	
							American sycamore	90	
							Sweetgum	97	
							Water oak	86	
							Eastern cottonwood	100	
							Green ash	97	
							Southern red oak	90	
Congaree:									
Cp	1o	Slight	Slight	Slight	---	---	Sweetgum	100	Loblolly pine, slash pine, yellow-poplar, American sycamore, black walnut, cherrybark oak, eastern cottonwood, sweetgum.
							Yellow-poplar	107	
							Cherrybark oak	107	
							Loblolly pine	90	
							Eastern cottonwood	107	
							American sycamore	89	
							Black walnut	100	
							Scarlet oak	100	
							Willow oak	95	

See footnote at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Important trees	Site index	Trees to plant
Creedmoor:									
CrB	3w	Slight	Moderate	Slight	---------	---------	Loblolly pine	84	Loblolly pine,
							Shortleaf pine	55	sweetgum.
							Sweetgum	---	
							Water oak	---	
Enon:									
EnB, EnC	4c	Moderate	Moderate	Moderate	---------	---------	Loblolly pine	71	Eastern redcedar,
							Shortleaf pine	60	loblolly pine,
							Virginia pine	65	Virginia pine.
Georgeville:									
GeB, GeC, [1]GhC	3o	Slight	Slight	Slight	---------	---------	Loblolly pine	81	Loblolly pine,
							Longleaf pine	67	Virginia pine,
							Shortleaf pine	63	eastern redcedar.
							White oak	69	
							Scarlet oak	70	
							Southern red oak	67	
Goldston:									
GlD	4o	Slight	Slight	Slight	---------	---------	Loblolly pine	73	Eastern redcedar,
							Longleaf pine	68	loblolly pine,
							Shortleaf pine	63	Virginia pine.
							Southern red oak	66	
							White oak	69	
GlF	4r	Moderate	Moderate	Slight	---------	---------	Loblolly pine	73	Eastern redcedar,
							Longleaf pine	68	loblolly pine,
							Shortleaf pine	63	Virginia pine.
							Southern red oak	66	
							White oak	69	
Helena:									
HeB	3w	Slight	Moderate	Slight	---------	---------	Loblolly pine	80	Loblolly pine,
							Shortleaf pine	63	Virginia pine,
							White oak	64	yellow-poplar.
							Yellow-poplar	87	
[1]HhA:									
Helena part	3w	Slight	Moderate	Slight	---------	---------	Loblolly pine	80	Loblolly pine,
							Shortleaf pine	63	Virginia pine,
							White oak	64	yellow-poplar.
							Yellow-poplar	87	
Sedgefield part	3w	Slight	Moderate	Slight	---------	---------	Loblolly pine	80	Loblolly pine,
							Shortleaf pine	70	yellow-poplar,
							Virginia pine	70	sweetgum.
							Southern red oak	70	
							Sweetgum	80	
							Yellow-poplar	90	
							White oak	70	
Herndon:									
HrB, HrC	3o	Slight	Slight	Slight	---------	---------	Loblolly pine	80	Loblolly pine,
							Shortleaf pine	61	Virginia pine,
							White oak	65	eastern redcedar,
							Southern red oak	72	yellow-poplar.
							Yellow-poplar	91	
Hiwassee:									
HwB, HwC	3o	Slight	Slight	Slight	---------	---------	Loblolly pine	75	Loblolly pine,
							Northern red oak	70	yellow-poplar.
							Shortleaf pine	70	
							White oak	70	
							Yellow-poplar	85	

See footnote at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant
Iredell:									
IrB	4c	Slight	Moderate	Moderate	---	---	Loblolly pine	67	Loblolly pine, eastern redcedar.
							Shortleaf pine	58	
							Post oak	44	
							White oak	47	
[1]IuB:									
Iredell part	4c	Slight	Moderate	Moderate	---	---	Loblolly pine	67	Loblolly pine, eastern redcedar.
							Shortleaf pine	58	
							Post oak	44	
							White oak	47	
Urban land part.									
Lignum:									
Lg	3w	Slight	Moderate	Moderate	Moderate	---	Virginia pine	74	Loblolly pine, Virginia pine.
							Shortleaf pine	66	
							Northern red oak	68	
Louisburg:									
LoC	3o	Slight	Slight	Slight	---	---	Loblolly pine	80	Loblolly pine, Virginia pine, yellow-poplar.
							Shortleaf pine	70	
							Southern red oak	72	
							Yellow-poplar	84	
							Virgina pine	70	
							White pine	70	
LoF	3r	Moderate	Moderate	Slight	---	---	Loblolly pine	80	Loblolly pine, Virginia pine, yellow-poplar.
							Shortleaf pine	70	
							Southern red oak	72	
							Yellow-poplar	84	
							Virginia pine	70	
							White pine	70	
Orange:									
Or	4w	Slight	Moderate	Moderate	Moderate	---	Northern red oak	60	Loblolly pine, Virginia pine.
							Virginia pine	60	
							Shortleaf pine	60	
							Loblolly pine	70	
Tatum:									
TaD	3o	Slight	Slight	Slight	Slight	---	Northern red oak	72	Loblolly pine, Virginia pine.
							Virginia pine	68	
							Shortleaf pine	65	
							Loblolly pine	89	
							Yellow-poplar	89	
TaE	3r	Moderate	Moderate	Slight	Slight	---	Northern red oak	72	Loblolly pine, Virginia pine.
							Virginia pine	68	
							Shortleaf pine	65	
							Loblolly pine	89	
							Yellow-poplar	89	
Vance:									
VaB	3o	Slight	Slight	Slight	---	---	Loblolly pine	76	Loblolly pine, Virginia pine, yellow-poplar.
							Northern red oak	---	
							Shortleaf pine	---	
							White oak	---	
Wedowee:									
WmD	3o	Slight	Slight	Slight	Slight	Moderate	Loblolly pine	80	Loblolly pine, Virginia pine, eastern redcedar, yellow-poplar.
							Virginia pine	70	
							Shortleaf pine	70	
							Southern red oak	70	
							Northern red oak	70	
							White oak	65	

See footnote at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Important trees	Site index	Trees to plant
Wedowee:									
WmE	3r	Moderate	Moderate	Slight	Slight	Moderate	Loblolly pine	80	Loblolly pine,
							Virginia pine	70	Virginia pine,
							Shortleaf pine	70	eastern redcedar,
							Southern red oak	70	yellow-poplar.
							Northern red oak	70	
							White oak	65	
White Store: WsB, WtC2	4c	Moderate	Moderate	Moderate	---------	---------	Loblolly pine	75	Loblolly pine,
							Virginia pine	65	Virginia pine,
									eastern redcedar.
[1]WwC: White Store part	4c	Moderate	Moderate	Moderate	---------	---------	Loblolly pine	75	Loblolly pine,
							Virginia pine	65	Virginia pine,
									eastern redcedar.
Urban land part.									
Wilkes: WxD	4o	Slight	Slight	Slight	---------	---------	Loblolly pine	75	Eastern redcedar,
							Post oak	79	loblolly pine,
							Shortleaf pine	63	Virginia pine.
							Southern red oak	76	
							Sweetgum	82	
WxF	4r	Moderate	Moderate	Slight	---------	---------	Loblolly pine	75	Eastern redcedar,
							Post oak	79	loblolly pine,
							Shortleaf pine	63	Virginia pine.
							Southern red oak	76	
							Sweetgum	82	

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 6.--BUILDING SITE DEVELOPMENT

["Shrink-swell" and some of the other terms that 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
Altavista:					
Aa	Severe: wetness, floods.	Severe: floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods, low strength.
Appling:					
ApB	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Slight.
ApC	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
[1]AuC:					
Appling part	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Slight.
Urban land part.					
Cecil:					
CfB	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
CfC	Moderate: too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
Chewacla:					
Ch	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Congaree:					
Cp	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Creedmoor:					
CrB	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell, wetness.	Severe: shrink-swell.	Severe: shrink-swell.
Enon:					
EnB, EnC	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
Georgeville:					
GeB, [1]GhC	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
GeC	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
Goldston:					
GlD	Severe: depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock.
GlF	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: slope.	Severe: depth to rock, slope.
Helena:					
HeB	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Helena:					
[1]HhA:					
Helena part	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
Sedgefield part	Severe: too clayey, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell, wetness.	Severe: shrink-swell.
Herndon:					
HrB	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
HrC	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
Hiwassee:					
HwB	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.
HwC	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.
Iredell:					
IrB	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
[1]IuB:					
Iredell part	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
Urban land part.					
Lignum:					
Lg	Severe: too clayey, wetness.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: low strength.
Louisburg:					
LoC	Moderate: depth to rock.	Moderate: slope.	Moderate: depth to rock.	Severe: slope.	Moderate: slope.
LoF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Orange:					
Or	Severe: too clayey, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.
Pits:					
Pt.					
Tatum:					
TaD	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength, depth to rock.	Severe: slope.	Severe: low strength.
TaE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land:					
Ur.					
Vance:					
VaB	Severe: too clayey.	Severe: low strength.	Severe: low strength.	Severe: low strength.	Severe: low strength.

See footnote at end of table.

TABLE 6.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
Wedowee:					
WmD	Moderate: slope.	Moderate: slope, low strength, shrink-swell.	Moderate: slope, low strength, shrink-swell.	Severe: slope.	Moderate: slope, low strength, shrink-swell.
WmE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
White Store:					
WsB	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
WtC2	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell.
[1]WwC:					
White Store part	Severe: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.
Urban land part.					
Wilkes:					
WxD	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.
WxF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 7.--SANITARY FACILITIES

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "severe" 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
Altavista:					
Aa	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Good.
Appling:					
ApB	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
ApC	Moderate: slope, percs slowly.	Severe: slope, seepage.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
[1]AuC:					
Appling part	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
Urban land part.					
Cecil:					
CfB	Moderate: percs slowly.	Moderate: seepage.	Severe: too clayey.	Slight	Fair: too clayey.
CfC	Moderate: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey.
Chewacla:					
Ch	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Good.
Congaree:					
Cp	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Creedmoor:					
CrB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
Enon:					
EnB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
EnC	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
Georgeville:					
GeB, [1]GhC	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Poor: too clayey.
GeC	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Poor: too clayey.
Goldston:					
GlD, GlF	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: seepage.	Poor: small stones, thin layer.
Helena:					
HeB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.

See footnote at end of table.

TABLE 7.--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
Helena:					
[1]HhA:					
Helena part	Severe: percs slowly.	Slight	Severe: too clayey.	Slight	Poor: too clayey.
Sedgefield part	Severe: percs slowly, wetness.	Slight	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
Herndon:					
HrB	Moderate: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight	Poor: too clayey.
HrC	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Poor: too clayey.
Hiwassee:					
HwB	Moderate: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Fair: too clayey.
HwC	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Fair: too clayey.
Iredell:					
IrB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey.
[1]IuB:					
Iredell part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey, depth to rock.	Slight	Poor: too clayey.
Urban land part.					
Lignum:					
Lg	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Poor: too clayey.
Louisburg:					
LoC	Moderate: depth to rock.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
LoF	Severe: slope.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: slope.
Orange:					
Or	Severe: percs slowly, wetness.	Moderate: depth to rock.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey.
Pits:					
Pt.					
Tatum:					
TaD	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Poor: too clayey.
TaE	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Urban land:					
Ur.					
Vance:					
VaB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.

See footnote at end of table.

TABLE 7.--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
Wedowee:					
WmD	Moderate: percs slowly, slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, area reclaim, slope.
WmE	Severe: slope.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
White Store:					
WsB	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
WtC2	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
[1]WwC:					
White Store part	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
Urban land part.					
Wilkes:					
WxD	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer.
WxF	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: thin layer.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 8.--CONSTRUCTION MATERIALS

["Shrink-swell" and some of the other terms that 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
Altavista:				
Aa	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Appling:				
ApB, ApC	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
[1]AuC:				
Appling part	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer, area reclaim.
Urban land part.				
Cecil:				
CfB, CfC	Fair: low strength.	Unsuited	Unsuited	Fair: too clayey.
Chewacla:				
Ch	Poor: wetness, low strength.	Unsuited	Unsuited	Good.
Congaree:				
Cp	Fair: low strength.	Unsuited	Unsuited	Good.
Creedmoor:				
CrB	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Enon:				
EnB, EnC	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Georgeville:				
GeB, GeC, [1]GhC	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Goldston:				
GlD, GlF	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, area reclaim.
Helena:				
HeB	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
[1]HhA:				
Helena part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Sedgefield part	Poor: shrink-swell.	Unsuited	Unsuited	Fair: thin layer.
Herndon:				
HrB, HrC	Fair: low strength.	Unsuited	Unsuited	Fair: thin layer.

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Hiwassee:				
HwB, HwC	Fair: low strength.	Unsuited	Unsuited	Poor: thin layer, too clayey.
Iredell:				
IrB	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: thin layer.
[1]IuB:				
Iredell part	Poor: low strength, shrink-swell.	Unsuited	Unsuited	Poor: thin layer.
Urban land part.				
Lignum:				
Lg	Poor: low strength.	Unsuited	Unsuited	Poor: too clayey.
Louisburg:				
LoC	Good	Poor: excess fines.	Poor: excess fines.	Fair: thin surface.
LoF	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope.
Orange:				
Or	Poor: low strength, shrink-swell, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: area reclaim, thin layer.
Pits:				
Pt.				
Tatum:				
TaD	Poor: low strength.	Unsuited	Unsuited	Poor: too clayey.
TaE	Poor: low strength.	Unsuited	Unsuited	Poor: slope.
Urban land:				
Ur.				
Vance:				
VaB	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
Wedowee:				
WmD	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, area reclaim.
WmE	Fair: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
White Store:				
WsB, WtC2	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
[1]WwC:				
White Store part	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
Urban land part.				

See footnote at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Wilkes:				
WxD	Fair: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
WxF	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 9.--WATER MANAGEMENT

["Seepage" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not evaluated]

Soil name and map symbol	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
Altavista:							
Aa	Moderate: seepage.	Moderate: piping.	Moderate: deep to water.	Favorable	Wetness, floods.	Not needed	Favorable.
Appling:							
ApB	Moderate: seepage.	Moderate: low strength.	Severe: no water.	Not needed	Favorable	Favorable	Favorable.
ApC	Moderate: seepage.	Moderate: low strength.	Severe: no water.	Not needed	Slope	Slope	Favorable.
[1]AuC:							
Appling part	Moderate: seepage.	Moderate: low strength.	Severe: no water.	Not needed	Favorable	Favorable	Favorable.
Urban land part.							
Cecil:							
CfB, CfC	Moderate: seepage.	Severe: compressible.	Severe: no water.	Not needed	Complex slope	Complex slope	Complex slope.
Chewacla:							
Ch	Moderate: seepage.	Moderate: piping.	Moderate: deep to water.	Poor outlets, floods.	Wetness, floods.	Not needed	Not needed.
Congaree:							
Cp	Moderate: seepage.	Moderate: compressible, piping, low strength.	Severe: deep to water.	Not needed	Floods	Not needed	Not needed.
Creedmoor:							
CrB	Slight	Moderate: shrink-swell.	Severe: no water.	Not needed	Slow intake	Favorable	Favorable.
Enon:							
EnB, EnC	Moderate: depth to rock.	Severe: shrink-swell, hard to pack.	Severe: deep to water.	Not needed	Percs slowly	Erodes easily, slope, percs slowly.	Percs slowly, erodes easily.
Georgeville:							
GeB	Moderate: slope, seepage.	Moderate: compressible, low strength, erodes easily.	Severe: no water.	Not needed	Complex slope, erodes easily.	Favorable	Favorable.
GeC, [1]GhC	Moderate: slope, seepage.	Moderate: compressible, low strength, erodes easily.	Severe: no water.	Not needed	Complex slope, erodes easily.	Complex slope, erodes easily.	Slope, erodes easily.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Goldston:							
GlD, GlF	Severe: seepage.	Severe: thin layer.	Severe: deep to water.	Not needed	Fast intake, slope.	Depth to rock, complex slope.	Slope.
Helena:							
HeB	Moderate: depth to rock.	Moderate: shrink-swell, erodes easily.	Severe: no water.	Not needed	Erodes easily	Favorable	Favorable.
[1]HhA:							
Helena part	Moderate: depth to rock.	Moderate: shrink-swell, erodes easily.	Severe: no water.	Percs slowly	Erodes easily	Favorable	Favorable.
Sedgefield part	Slight	Moderate: low strength, erodes easily.	Severe: deep to water.	Percs slowly	Percs slowly	Percs slowly	Percs slowly, erodes easily.
Herndon:							
HrB	Moderate: seepage.	Severe: compressible, low strength, erodes easily.	Severe: no water.	Not needed	Complex slope, erodes easily.	Favorable	Favorable.
HrC	Moderate: seepage.	Severe: compressible, low strength, erodes easily.	Severe: no water.	Not needed	Complex slope, erodes easily.	Complex slope	Erodes easily, slope.
Hiwassee:							
HwB	Moderate: seepage.	Moderate: compressible.	Severe: no water.	Not needed	Favorable	Favorable	Favorable.
HwC	Moderate: seepage.	Moderate: compressible.	Severe: no water.	Not needed	Slope	Favorable	Favorable.
Iredell:							
IrB	Slight	Severe: compressible, shrink-swell.	Severe: deep to water.	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
[1]IuB:							
Iredell part	Slight	Severe: compressible, shrink-swell.	Severe: deep to water.	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.	Percs slowly, slope.
Urban land part.							
Lignum:							
Lg	Moderate: depth to rock.	Severe: compressible, low strength.	Severe: deep to water, slow refill.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.	Percs slowly, wetness.

See footnote at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
Louisburg: LoC, LoF	Severe: seepage.	Moderate: piping, erodes easily.	Severe: no water.	Not needed	Slope, seepage.	Slope	Slope.
Orange: Or	Moderate: depth to rock.	Moderate: compressible, low strength, shrink-swell.	Severe: no water.	Wetness, percs slowly.	Slow intake, percs slowly, wetness.	Slope, percs slowly, wetness.	Percs slowly, wetness.
Pits: Pt.							
Tatum: TaD, TaE	Moderate: depth to rock, seepage.	Severe: compressible. low strength.	Severe: no water.	Not needed	Erodes easily, slope.	Slope	Erodes easily, slope.
Urban land: Ur.							
Vance: VaB	Slight	Moderate: hard to pack.	Severe: no water.	Not needed	Percs slowly	Percs slowly, erodes easily.	Percs slowly.
Wedowee: WmD, WmE	Moderate: depth to rock, seepage.	Moderate: low strength, thin layer.	Severe: no water.	Not needed	Slope	Slope	Slope.
White Store: WsB	Slight	Moderate: shrink-swell, compressible.	Severe: no water.	Not needed	Erodes easily, slow intake.	Percs slowly, erodes easily.	Percs slowly.
WtC2	Slight	Moderate: shrink-swell, compressible.	Severe: no water.	Not needed	Slope, erodes easily, slow intake.	Slope, percs slowly.	Slope, percs slowly.
[1]WwC: White Store part	Slight	Moderate: shrink-swell, compressible.	Severe: no water.	Not needed	Erodes easily, slow intake.	Percs slowly, erodes easily.	Percs slowly.
Urban land part.							
Wilkes: WxD, WxF	Severe: depth to rock.	Severe: thin layer.	Severe: deep to water.	Not needed	Complex slope	Depth to rock, complex slope.	Slope.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 10.--RECREATIONAL DEVELOPMENT

["Percs slowly" and some of the other terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe". Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Altavista:				
Aa	Severe: wetness.	Moderate: wetness, floods.	Moderate: wetness, floods.	Slight.
Appling:				
ApB	Slight	Slight	Moderate: slope.	Slight.
ApC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
[1]AuC:				
Appling part	Slight	Slight	Severe: slope.	Slight.
Urban land part.				
Cecil:				
CfB	Slight	Slight	Moderate: slope.	Slight.
CfC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Chewacla:				
Ch	Severe: wetness, floods.	Severe: floods.	Severe: wetness, floods.	Moderate: wetness, floods.
Congaree:				
Cp	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: floods.
Creedmoor:				
CrB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.
Enon:				
EnB	Moderate: percs slowly.	Slight	Moderate: percs slowly, slope.	Slight.
EnC	Moderate: percs slowly.	Moderate: slope.	Severe: slope.	Slight.
Georgeville:				
GeB	Slight	Slight	Moderate: slope.	Slight.
GeC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
[1]GhC	Slight	Slight	Severe: slope.	Slight.
Goldston:				
GlD	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: depth to rock, slope.	Moderate: small stones.
GlF	Severe: slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: small stones, slope.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Helena:				
HeB	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly.	Moderate: wetness.
[1]HhA:				
Helena part	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly.	Moderate: wetness.
Sedgefield part	Moderate: percs slowly.	Moderate: wetness.	Moderate: percs slowly, wetness.	Moderate: wetness.
Herndon:				
HrB	Slight	Slight	Moderate: slope.	Slight.
HrC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Hiwassee:				
HwB	Slight	Slight	Moderate: slope.	Slight.
HwC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Iredell:				
IrB	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: percs slowly, slope.	Moderate: too clayey, slope.
[1]IuB:				
Iredell part	Moderate: percs slowly, too clayey.	Moderate: too clayey.	Moderate: percs slowly, slope.	Moderate: too clayey, slope.
Urban land part.				
Lignum:				
Lg	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: wetness.
Louisburg:				
LoC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
LoF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Orange:				
Or	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: percs slowly, wetness.	Moderate: wetness.
Pits:				
Pt.				
Tatum:				
TaD	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
TaE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Urban land:				
Ur.				
Vance:				
VaB	Moderate: percs slowly.	Slight	Moderate: percs slowly.	Slight.

See footnote at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Wedowee:				
WmD	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
WmE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
White Store:				
WsB	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
WtC2	Severe: percs slowly.	Moderate: slope.	Severe: percs slowly, slope.	Slight.
[1]WwC:				
White Store part	Severe: percs slowly.	Slight	Severe: percs slowly.	Slight.
Urban land part.				
Wilkes:				
WxD	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
WxF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 11.--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Altavista:												
Aa	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
Appling:												
ApB	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
ApC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
[1]AuC:												
Appling part	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Urban land part.												
Cecil:												
CfB	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
CfC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Chewacla:												
[2]Ch	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Congaree:												
[2]Cp	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Creedmoor:												
CrB	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Enon:												
EnB	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
EnC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Georgeville:												
GeB, GeC, [1]GhC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Goldston:												
GlD, GlF	Poor	Fair	Good	Fair	Fair	---	Very poor.	Very poor.	Fair	Fair	Very poor.	---
Helena:												
HeB	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
[1]HhA:												
Helena part	Fair	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
Sedgefield part	Fair	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
Herndon:												
HrB	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
HrC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---

See footnotes at end of table.

TABLE 11.--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	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Hiwassee:												
HwB	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
HwC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
Iredell:												
IrB	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
[1]IuB:												
Iredell part	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Urban land part.												
Lignum:												
Lg	Fair	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor	---
Louisburg:												
LoC	Very poor.	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.	Poor	Very poor.	Very poor.	---
LoF	Very poor.	Poor	Poor	Very poor.	Very poor.	---	Very poor.	Very poor.	Poor	Very poor.	Very poor.	---
Orange:												
Or	Fair	Good	Good	Good	Good	---	Fair	Fair	Good	Good	Fair	---
Pits:												
Pt.												
Tatum:												
TaD	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
TaE	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.	---
Urban land:												
Ur.												
Vance:												
VaB	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.	---
Wedowee:												
WmD	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.	---
WmE	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.	---
White Store:												
WsB	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Very poor.	---
WtC2	Fair	Good	Good	Fair	Fair	---	Very poor.	Very poor.	Good	Fair	Very poor.	---
[1]WwC:												
White Store part	Fair	Good	Good	Fair	Fair	---	Poor	Very poor.	Good	Fair	Very poor.	---
Urban land part.												

See footnotes at end of table.

TABLE 11.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
Wilkes:												
WxD	Poor	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.	---
WxF	Poor	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Fair	Very poor.	---

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

[2]Drained and unflooded phase.

TABLE 12.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means more 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	
Altavista:											
Aa	0-6	Fine sandy loam	ML, CL, CL-ML, SM, SM-SC	A-4, A-6	0	95-100	90-100	65-95	35-60	<23	NP-7
	6-50	Sandy loam, sandy clay loam, loam.	ML, CL, CL-ML, SC	A-4, A-6, A-7	0	95-100	95-100	60-97	45-75	20-45	3-26
	50-80	Variable	---	---	0	---	---	---	---	---	---
Appling:											
ApB, ApC	0-11	Sandy loam	SM, SM-SC	A-2	0-5	86-100	80-100	55-75	15-35	<27	NP-5
	11-48	Sandy clay loam, clay.	MH, CL, ML, SC	A-7	0-5	95-100	95-100	70-92	50-75	41-74	15-30
	48-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]AuC:											
Appling part	0-11	Sandy loam	SM, SM-SC	A-2	0-5	86-100	80-100	55-75	15-35	<27	NP-5
	11-48	Sandy clay loam, clay.	MH, CL, ML, SC	A-7	0-5	95-100	95-100	70-92	50-75	41-74	15-30
	48-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land part.											
Cecil:											
CfB, CfC	0-4	Fine sandy loam	SM, SM-SC	A-2, A-4	0	84-100	80-100	67-90	26-42	<30	NP-6
	4-46	Clay, clay loam, sandy clay loam	MH, ML	A-7	0	97-100	92-100	72-99	55-95	41-80	9-37
	46-61	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Chewacla:											
Ch	0-6	Loam	ML, CL	A-4, A-5, A-6, A-7	0	98-100	95-100	70-100	55-90	25-50	4-20
	6-52	Sandy clay loam, loam, clay loam.	SM, CL, CL-ML, SM-SC, ML	A-4, A-6	0	96-100	95-100	60-95	36-70	<35	NP-20
	52-60	Variable	---	---	0	---	---	---	---	---	---
Congaree:											
Cp	0-7	Fine sandy loam	SM, SM-SC	A-2, A-4	0	95-100	95-100	70-100	20-50	<30	NP-7
	7-56	Sandy clay loam, sandy loam.	SM, SC, ML, CL	A-4, A-5, A-6, A-7	0	95-100	95-100	70-100	40-90	25-50	4-22
	56-63	Variable	---	---	---	---	---	---	---	---	---
Creedmoor:											
CrB	0-8	Fine sandy loam	SM	A-4, A-2	0	100	100	70-85	30-45	---	NP
	8-15	Sandy clay loam	MH, CH	A-7	0	100	100	85-95	70-80	60-70	30-40
	15-43	Clay, silty clay, silty clay loam.	MH, CH	A-7	0	100	100	94-97	75-88	61-79	32-49
	43-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Enon:											
EnB, EnC	0-5	Loam	ML, CL, CL-ML	A-4, A-6	0-5	80-100	80-100	70-90	50-80	20-40	4-20
	5-30	Clay loam, clay	CH	A-7-6	0-5	85-100	80-100	75-95	65-95	51-75	25-50
	30-68	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Georgeville:											
GeB, GeC	0-7	Silt loam	ML, CL, CL-ML	A-4	0-3	90-100	85-100	65-100	51-98	<40	NP-10
	7-59	Silty clay, silty clay loam, clay loam.	MH, ML	A-7-5	0	95-100	95-100	90-100	75-98	41-75	15-35
	59-65	Silty clay loam	MH	A-7-5	0	95-100	90-100	65-100	60-98	50-75	15-35
[1]GhC	0-7	Silt loam	ML, CL-ML	A-4	0-3	90-100	85-100	65-100	51-98	<40	NP-10
	7-59	Silty clay, silty clay loam, clay loam.	MH, ML	A-7-5	0	95-100	95-100	90-100	75-98	41-75	15-35
	59-65	Silty clay loam, silt loam, clay loam.	MH	A-7-5	0	95-100	90-100	65-100	60-98	50-75	15-35
Goldston:											
GlD, GlF	0-10	Slaty silt loam	GM, SM, ML, GM-GC	A-4	5-20	60-80	55-75	50-70	40-60	<35	NP-10
	10-18	Slaty silt loam	GM, SM, ML, GM-GC	A-2, A-4, A-5	10-30	55-100	50-92	45-90	25-80	<45	NP-10
	18-24	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Helena:											
HeB	0-14	Sandy loam	SM, SM-SC	A-2, A-4	0	95-100	90-100	51-86	27-46	<25	NP-7
	14-17	Sandy clay loam	CL	A-6, A-7	0	95-100	95-100	70-90	55-70	30-49	15-25
	17-36	Sandy clay loam, sandy clay.	CH, MH	A-7	0	95-100	95-100	73-93	56-80	50-85	24-50
	36-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]HhA:											
Helena part	0-14	Sandy loam	SM, SM-SC	A-2, A-4	0	95-100	90-100	51-86	27-46	<25	NP-7
	14-17	Sandy clay loam	CL	A-6, A-7	0	95-100	95-100	70-90	55-70	30-49	15-25
	17-36	Sandy clay loam, sandy clay.	CH, MH	A-7	0	95-100	95-100	73-93	56-80	50-85	24-50
	36-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Sedgefield part	0-13	Sandy loam	SM, SM-SC	A-2, A-4	0-5	85-100	85-100	51-86	27-46	<25	NP-7
	13-33	Clay	CL, CH	A-7	0-5	95-100	95-100	73-93	60-85	45-80	25-48
	33-37	Sandy clay loam	SC, CL, SM	A-6, A-7	0-5	95-100	90-100	60-90	36-65	20-45	11-25
	37-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Herndon:											
HrB, HrC	0-9	Silt loam	ML, CL, CL-ML	A-4	0	90-100	90-100	80-98	65-90	<35	NP-10
	9-58	Silty clay loam, clay.	MH, ML	A-7	0	98-100	95-100	95-99	80-98	41-70	13-30
	58-62	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 12.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Hiwassee:											
HwB, HwC----------	0-6	Clay loam--------	CL, ML, CL-ML	A-7-6, A-6, A-4	0-2	95-100	95-100	90-100	50-85	25-50	5-23
	6-79	Clay, clay loam	CL, ML, MH	A-7-5, A-7-6 A-6	0-2	95-100	95-100	80-100	70-95	36-52	12-20
	79-85	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Iredell:											
IrB----------------	0-8	Gravelly loam	SM, SM-SC, ML, CL-ML	A-2-4, A-4	1-5	65-85	65-80	60-75	30-60	20-40	2-10
	8-29	Clay-------------	CH	A-7-6	0	99-100	85-100	80-100	65-95	60-115	30-85
	29-40	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]IuB:											
Iredell part----	0-8	Gravelly loam	SM, SM-SC, ML, CL-ML	A-2-4, A-4	1-5	65-85	65-80	60-75	30-60	20-40	2-10
	8-29	Clay-------------	CH	A-7-6	0	99-100	85-100	80-100	65-95	60-115	30-85
	29-40	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land part.											
Lignum:											
Lg-----------------	0-6	Silt loam--------	ML, CL, MH	A-4, A-6, A-7	0	95-100	95-100	80-100	55-90	30-51	9-19
	6-36	Silty clay loam, silty clay, clay.	MH, CH	A-7	0-2	80-90	75-90	70-85	55-85	50-75	22-36
	36-48	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Louisburg:											
LoC, LoF----------	0-8	Sandy loam	SM	A-1, A-2	0-15	75-100	75-96	35-80	20-34	<18	NP-4
	8-20	Coarse sandy loam.	SM	A-2, A-4	0-15	85-100	75-98	53-80	25-40	<40	NP-10
	20-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Orange:											
Or-----------------	0-5	Silt loam--------	SM, ML, CL-ML	A-4	0	90-95	85-95	75-95	45-85	<24	NP-6
	5-24	Clay, silty clay loam.	CH	A-7	0	90-95	85-95	75-95	65-90	70-105	45-70
	24-42	Variable---------	---	---	0-10	70-100	60-100	50-100	40-90	---	---
	42-45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Pits:											
Pt.											
Tatum:											
TaD, TaE----------	0-5	Silt loam--------	ML, CL, SM	A-4	0	80-100	75-100	65-100	40-90	20-34	NP-10
	5-34	Silty clay loam, silty clay.	MH, CH	A-7	0	75-100	70-100	60-100	55-95	50-66	20-36
	34-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land:											
Ur.											

See footnote at end of table.

TABLE 12.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Vance:											
VaB----------------	0-9	Sandy loam-------	SM, SM-SC	A-2, A-4	0-5	90-100	80-100	55-80	15-40	<27	NP-5
	9-37	Sandy clay, clay	CH, MH	A-7	0-5	95-100	90-100	75-95	65-80	51-80	25-48
	37-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Wedowee:											
WmD, WmE-----------	0-12	Sandy loam-------	SM, SM-SC	A-4	0	95-100	90-100	80-99	36-50	<30	NP-6
	12-15	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0	90-100	90-100	80-97	40-75	<32	NP-15
	15-28	Sandy clay, sandy clay loam	SC, ML, CL	A-4, A-6, A-7	0	95-100	95-100	65-97	45-70	30-58	10-25
	28-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
White Store:											
WsB----------------	0-5	Loam-------------	ML, CL-ML	A-4	0-3	95-100	90-100	85-96	56-76	<25	NP-7
	5-34	Clay, clay loam, silty clay, silty clay loam	CH	A-7	0	100	100	95-99	80-98	70-92	65-90
	34-50	Weathered bedrock.	---	---	---	---	---	---	---	---	---
WtC2---------------	0-5	Clay loam--------	CH, CL	A-7	0-3	97-100	95-100	90-99	70-85	45-70	25-45
	5-34	Clay, clay loam, silty clay, silty clay loam	CH	A-7	0	100	100	95-99	80-98	70-92	65-90
	34-50	Weathered bedrock.	---	---	---	---	---	---	---	---	---
[1]WwC:											
White Store part	0-5	Clay loam--------	CH, CL	A-7	0-3	97-100	95-100	90-99	70-85	45-70	25-45
	5-34	Clay, clay loam, silty clay, silty clay loam	CH	A-7	0	100	100	95-99	80-98	70-92	65-90
	34-50	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land part.											
Wilkes:											
WxD, WxF-----------	0-8	Gravelly loam---	SM, SM-SC	A-2, A-4	10-25	70-80	60-75	45-75	20-49	<20	NP-7
	8-18	Clay loam--------	CL, CH, MH, ML	A-6, A-7	0-10	80-100	80-100	75-95	50-80	30-60	11-32
	18-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means more than. The erosion tolerance factor (T) is for the entire profile. Dashes indicate data were not available. Absence of an entry means data 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					
Altavista:									
Aa------------------	0-6	2.0-6.0	0.12-0.20	5.1-6.0	Low--------	Moderate	Moderate	0.32	4
	6-50	0.6-2.0	0.12-0.20	5.1-6.0	Low--------	Moderate	Moderate	0.32	
	50-80	---	---	---	-----------	-----------	-----------	---	
Appling:									
ApB, ApC-----------	0-11	2.0-6.0	0.10-0.15	4.5-6.0	Low--------	Moderate	Moderate	0.20	4
	11-48	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	Moderate	Moderate	0.24	
	48-60	---	---	---	-----------	-----------	-----------	---	
[1]AuC:									
Appling part-----	0-11	2.0-6.0	0.10-0.15	4.5-5.5	Low--------	Moderate	Moderate	0.20	4
	11-48	0.6-2.0	0.15-0.17	4.5-5.5	Moderate	Moderate	Moderate	0.24	
	48-60	---	---	---	-----------	-----------	-----------	---	
Urban land part.									
Cecil:									
CfB, CfC-----------	0-4	2.0-6.0	0.12-0.14	4.5-5.5	Low--------	Moderate	Moderate	0.32	4
	4-46	0.6-2.0	0.13-0.15	4.5-5.5	Moderate	Moderate	Moderate	0.28	
	46-61	---	---	---	-----------	-----------	-----------	---	
Chewacla:									
Ch------------------	0-6	0.6-2.0	0.15-0.24	5.1-6.5	Low--------	High-------	Moderate	---	---
	6-52	0.6-2.0	0.12-0.20	5.1-6.5	Low--------	High-------	Moderate	---	
	52-60	---	---	---	-----------	-----------	-----------	---	
Congaree:									
Cp------------------	0-7	0.6-6.0	0.12-0.18	5.1-6.5	Low--------	Moderate	Moderate	0.28	5
	7-56	0.6-2.0	0.12-0.20	5.6-6.5	Low--------	Moderate	Moderate	0.28	
	56-63	---	---	---	-----------	-----------	-----------	---	
Creedmoor:									
CrB-----------------	0-8	2.0-6.0	0.10-0.14	4.5-5.5	Low--------	High-------	High-------	0.37	3
	8-15	0.2-0.6	0.13-0.15	4.5-5.5	Moderate	High-------	High-------	0.32	
	15-43	<0.06	0.13-0.15	4.5-5.5	High-------	High-------	High-------	---	
	43-60	---	---	---	-----------	-----------	-----------	---	
Enon:									
EnB, EnC-----------	0-5	0.6-2.0	0.15-0.20	5.1-6.5	Low--------	High-------	Moderate	0.37	2
	5-30	0.06-0.2	0.15-0.20	5.6-7.8	High-------	High-------	Moderate	0.28	
	30-68	0.2-0.6	0.13-0.18	5.6-7.8	Moderate	High-------	Low--------	0.37	
Georgeville:									
GeB, GeC, [1]GhC-----	0-7	0.6-2.0	0.15-0.20	4.5-6.0	Low--------	High-------	High-------	0.43	3
	7-59	0.6-2.0	0.13-0.18	4.5-5.5	Low--------	High-------	High-------	0.43	
	59-65	0.6-2.0	0.13-0.18	4.5-5.5	Low--------	High-------	High-------	0.43	
Goldston:									
GlD, GlF-----------	0-10	2.0-6.0	0.10-0.15	4.0-6.0	Low--------	Moderate	High-------	0.20	2
	10-18	2.0-6.0	0.10-0.15	4.0-6.0	Low--------	Moderate	High-------	0.20	
	18-24	2.0-6.0	0.05-0.10	4.0-6.0	Low--------	Moderate	High-------	0.20	
Helena:									
HeB-----------------	0-14	2.0-6.0	0.10-0.12	4.5-5.5	Low--------	High-------	Moderate	0.37	3
	14-17	0.2-0.6	0.13-0.15	4.5-5.5	Moderate	High-------	High-------	0.32	
	17-36	0.06-0.2	0.13-0.15	4.5-5.5	High-------	High-------	High-------	0.32	
	36-60	---	---	---	-----------	-----------	-----------	---	

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Helena:									
[1]HhA:									
Helena part------	0-14	2.0-6.0	0.10-0.12	4.5-6.0	Low--------	High-------	Moderate	0.37	3
	14-17	0.2-0.6	0.13-0.15	4.5-5.5	Moderate	High-------	High-------	0.32	
	17-36	0.06-0.2	0.13-0.15	4.5-5.5	High-------	High-------	High-------	0.32	
	36-60	---	---	---	-----------	-----------	-----------	---	
Sedgefield part-	0-13	2.0-6.0	0.10-0.14	4.5-6.5	Low--------	High-------	Moderate	0.37	3
	13-33	0.06-0.2	0.14-0.18	4.5-6.5	High-------	Low--------	Moderate	0.32	
	33-37	0.6-2.0	0.12-0.15	5.6-8.4	Moderate	Low--------	Low--------	0.32	
	37-65	---	---	---	-----------	-----------	-----------	---	
Herndon:									
HrB, HrC-----------	0-9	0.6-2.0	0.14-0.20	4.5-5.5	Low--------	High-------	High-------	0.43	3
	9-58	0.6-2.0	0.13-0.18	4.5-5.5	Low--------	High-------	High-------	0.37	
	58-62	0.6-6.0	0.05-0.08	4.5-5.5	Low--------	High-------	High-------	0.43	
Hiwassee:									
HwB, HwC-----------	0-6	0.6-2.0	0.12-0.15	4.5-6.5	Low--------	Moderate	Moderate	0.28	4
	6-79	0.6-2.0	0.12-0.15	4.5-6.5	Low--------	Moderate	Moderate	0.28	
	79-85	---	---	---	-----------	-----------	-----------	---	
Iredell:									
IrB-----------------	0-8	2.0-6.0	0.12-0.15	5.1-7.3	Low--------	Moderate	Low--------	0.32	3
	8-29	0.06-0.2	0.16-0.22	6.1-7.3	Very high	High-------	Low--------	0.20	
	29-40	---	---	---	-----------	-----------	-----------	---	
[1]IuB:									
Iredell part-----	0-8	2.0-6.0	0.12-0.15	5.6-7.3	Low--------	Moderate	Low--------	0.32	3
	8-29	0.06-0.2	0.16-0.22	6.1-7.3	Very high	High-------	Low--------	0.20	
	29-40	---	---	---	-----------	-----------	-----------	---	
Urban land part.									
Lignum:									
Lg------------------	0-6	0.6-2.0	0.14-0.20	4.5-5.5	Low--------	High-------	High-------	0.43	2
	6-36	0.06-0.6	0.10-0.18	4.5-5.5	Moderate	High-------	High-------	0.43	
	36-48	0.2-0.6	0.10-0.18	4.5-5.5	Low--------	High-------	High-------	0.43	
Louisburg:									
LoC, LoF-----------	0-8	6.0-20	0.10-0.12	5.6-6.0	Very low	Low--------	Moderate	0.24	2
	8-20	6.0-20	0.09-0.11	5.6-6.0	Very low	Low--------	Moderate	0.24	
	20-60	---	---	---	-----------	-----------	-----------	---	
Orange:									
Or------------------	0-5	0.6-2.0	0.14-0.20	6.1-7.3	Low--------	High-------	Moderate	0.49	2
	5-24	0.06-0.2	0.10-0.19	6.1-7.3	High-------	High-------	Moderate	0.28	
	24-42	0.2-0.6	0.13-0.20	6.1-7.3	Low--------	High-------	Moderate	0.43	
	42-45	---	---	---	-----------	-----------	-----------	---	
Pits:									
Pt.									
Tatum:									
TaD, TaE-----------	0-5	0.6-2.0	0.14-0.20	4.5-5.5	Low--------	High-------	High-------	0.37	4
	5-34	0.6-2.0	0.10-0.19	4.5-5.5	Moderate	High-------	High-------	0.28	
	34-60	---	---	---	-----------	-----------	-----------	0.47	
Urban land:									
Ur.									
Vance:									
VaB-----------------	0-9	2.0-6.0	0.10-0.14	4.5-6.0	Low--------	High-------	Moderate	0.28	3
	9-37	0.06-0.2	0.12-0.15	4.5-5.5	Moderate	High-------	High-------	0.37	
	37-60	---	---	---	-----------	-----------	-----------	---	

See footnote at end of table.

TABLE 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permea- bility	Available water capacity	Soil reaction	Shrink- swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
Wedowee:									
WmD, WmE----------	0-12	2.0-6.0	0.10-0.18	4.5-5.5	Low--------	Low--------	High-------	0.24	2
	12-15	0.6-2.0	0.12-0.18	4.5-5.5	Low--------	Moderate--	High-------	0.28	
	15-28	0.2-0.6	0.12-0.18	4.5-5.5	Moderate--	Moderate--	High-------	0.28	
	28-60	---	---	---	-----------	-----------	-----------	---	
White Store:									
WsB----------------	0-5	0.6-2.0	0.14-0.16	5.6-6.0	Low--------	High-------	High-------	0.43	3
	5-34	<0.06	0.15-0.17	4.5-5.5	Very high	High-------	High-------	0.37	
	34-50	---	---	---	-----------	-----------	-----------	---	
WtC2---------------	0-5	0.06-0.6	0.15-0.20	4.5-5.5	High-------	High-------	High-------	0.37	3
	5-34	<0.06	0.15-0.17	4.5-5.5	Very high	High-------	High-------	0.37	
	34-50	---	---	---	-----------	-----------	-----------	---	
[1]WwC:									
White Store part	0-5	0.06-0.6	0.15-0.20	4.5-5.5	High-------	High-------	High-------	0.37	3
	5-34	<0.06	0.15-0.17	4.5-5.5	Very high	High-------	High-------	0.37	
	34-50	---	---	---	-----------	-----------	-----------	---	
Urban land part.									
Wilkes:									
WxD, WxF----------	0-8	2.0-6.0	0.10-0.14	5.1-6.5	Low--------	Moderate	Moderate	0.24	2
	8-18	0.2-0.6	0.15-0.20	6.1-7.8	Moderate	Moderate	Moderate	0.32	
	18-60	0.6-2.0	0.08-0.13	6.1-7.8	Low--------	Moderate	Moderate	0.28	

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 14.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. The definitions of "flooding" and "water table" in the Glossary explain the terms "brief," "apparent," and "perched." The symbol < means less than; > means more than]

Soil name and map symbol	Flooding			High water table			Bedrock	
	Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness
				Ft			In	
Altavista:								
Aa	None to occasional.	Very brief	Mar-Jul	1.5-2.5	Apparent	Dec-Mar	>60	---
Appling:								
ApB, ApC	None	---	---	>6.0	---	---	>60	---
[1]AuC:								
Appling part	None	---	---	>6.0	---	---	>60	---
Urban land part.								
Cecil:								
CfB, CfC	None	---	---	>6.0	---	---	>60	---
Chewacla:								
Ch	Common	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---
Congaree:								
Cp	Frequent	Brief	Nov-Apr	2.5-4.0	Apparent	Nov-Apr	>60	---
Creedmoor:								
CrB	None	---	---	1.0-2.0	Perched	Jan-Mar	>60	---
Enon:								
EnB, EnC	None	---	---	1.0-2.0	Perched	Dec-Mar	>60	---
Georgeville:								
GeB, GeC, [1]GhC	None	---	---	>6.0	---	---	>60	---
Goldston:								
GlD, GlF	None	---	---	>6.0	---	---	20-40	Rippable
Helena:								
HeB	None	---	---	1.0-2.5	Perched	Jan-Mar	>48	Rippable
[1]HhA:								
Helena part	None	---	---	1.0-2.5	Perched	Jan-Mar	>48	Rippable
Sedgefield part	None	---	---	1.0-1.5	Perched	Jan-Mar	>48	Hard
Herndon:								
HrB, HrC	None	---	---	>6.0	---	---	>60	---
Hiwassee:								
HwB, HwC	None	---	---	>6.0	---	---	>60	---
Iredell:								
IrB	None	---	---	>6.0	---	---	20-40	Rippable
[1]IuB:								
Iredell part	None	---	---	>6.0	---	---	20-40	Rippable
Urban land part.								
Lignum:								
Lg	None	---	---	1.0-2.5	Apparent	Dec-May	48-72	Hard
Louisburg:								
LoC, LoF	None	---	---	>6.0	---	---	48-120	Hard
Orange:								
Or	None	---	---	1.0-3.0	Apparent	Dec-May	40-60	Hard

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Flooding			High water table			Bedrock	
	Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness
				Ft			In	
Pits: Pt.								
Tatum: TaD, TaE	None	---	---	4.0-6.0	Apparent	---	40-60	Rippable
Urban land: Ur.								
Vance: VaB	None	---	---	>6.0	---	---	>60	---
Wedowee: WmD, WmE	None	---	---	>6.0	---	---	48-60	Rippable
White Store: WsB, WtC2	None	---	---	0.5-1.5	Perched	Dec-Mar	48-72	Rippable
[1]WwC: White Store part	None	---	---	0.5-1.5	Perched	Dec-Mar	48-72	Rippable
Urban land part.								
Wilkes: WxD, WxF	None	---	---	>6.0	---	---	40-80	Hard

[1]This mapping unit is made up of two or more dominant kinds of soil. See mapping unit description for the composition and behavior of the whole mapping unit.

TABLE 15.--ENGINEERING TEST DATA

[Tests performed by North Carolina State Highway Commission according to standard procedures of the American Association of State Highway and Transportation Officials (AASHTO)]

Soil name and location	Parent material	Report No.	Depth	Horizon	Moisture-density data [1]: Maximum dry density	Moisture-density data [1]: Optimum moisture	Mechanical analysis [2]: Percentage passing sieve--No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	Percentage smaller than--0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO [3]	Unified [4]
			In		pcf	Pct												
Altavista fine sandy loam: 1/2 mile east of intersection of U.S. 15-501 and N.C. 54; south 3/4 mile on S.R. 1900 to the U.N.C. Wildlife Research Center; 1/4 mile east and then south (across Morgan Creek) 1/2 mile on dirt road, 175 feet east of road in a cultivated field.	Stratified fluvial sediments of Piedmont material	S73NC-68 1-1	0-6	Ap	123	11	95	92	82	52	45	35	17	10	17	2	A-4(3)	CL
		1-3	9-22	B21t	105	18	100	100	95	46	45	40	33	29	37	16	A-6(4)	SC
		1-5	32-50	B3	114	14	100	100	96	64	57	42	18	10	23	3	A-4(6)	ML
Chewacla loam: 1/2 mile east of intersection U.S. 15-501 and N.C. 54; south 3/4 mile on S.R. 1900 to the U.N.C. Wildlife Research Center; 1/4 mile east and then south (across Morgan Creek) on dirt road 800 feet; turn east 660 feet on dirt lane; 75 feet northeast in cultivated field.	Recent alluvial sediments	S73NC-68 2-1	0-6	Ap	111	15	100	99	87	65	62	50	20	10	28	4	A-4(6)	ML
		2-4	19-25	B22	114	15	100	100	95	58	54	47	35	28	34	16	A-6(7)	CL
		2-8	52-60	C	115	14	100	99	83	29	25	20	10	6	---	[5]NP	A-2-4(0)	SM
Louisburg sandy loam: 1 1/2 miles south of Carboro Smith Level Road; southwest on S.R. 1939 1/4 mile; north of road 100 feet in a cultivated field.	Acid crystalline rock	S73NC-68 3-1	0-8	Ap	113	13	98	96	68	31	26	20	10	5	---	NP	A-2-4(0)	SM
		3-2	8-20	B	116	14	100	98	59	29	26	21	12	7	---	NP	A-2-4(0)	SM
		3-3	20-60	C	115	14	100	98	63	28	26	20	12	9	---	NP	A-2-4(0)	SM

[1]Based on AASHTO Designation T99-57, Method A. (1).

[2]Mechanical analyses according to AASHTO Designation T 88-57. 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-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soil.

[3]Based on AASHTO Designation M 145-66.

[4]Based on the Unified Soil Classification System (D-2487-66T).

[5]Nonplastic.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Appling	Clayey, kaolinitic, thermic Typic Hapludults
Cecil	Clayey, kaolinitic, thermic Typic Hapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Congaree	Fine-loamy, mixed, nonacid, thermic Typic Udifluvents
Creedmoor	Clayey, mixed, thermic Aquic Hapludults
Enon	Fine, mixed, thermic Ultic Hapludalfs
Georgeville	Clayey, kaolinitic, thermic Typic Hapludults
Goldston	Loamy-skeletal, siliceous, thermic Ruptic-Ultic Dystrochrepts
Helena	Clayey, mixed, thermic Aquic Hapludults
Herndon	Clayey, kaolinitic, thermic Typic Hapludults
Hiwassee	Clayey, kaolinitic, thermic Typic Rhodudults
Iredell	Fine, montmorillonitic, thermic Typic Hapludalfs
Lignum	Clayey, mixed, thermic Aquic Hapludults
Louisburg	Coarse-loamy, mixed, thermic Ruptic-Ultic Dystrochrepts
Orange	Fine, montmorillonitic, thermic Albaquic Hapludalfs
Sedgefield	Clayey, mixed, thermic Aquultic Hapludalfs
Tatum	Clayey, mixed, thermic Typic Hapludults
Vance	Clayey, mixed, thermic Typic Hapludults
Wedowee	Clayey, kaolinitic, thermic Typic Hapludults
White Store	Fine, mixed, thermic Vertic Hapludalfs
Wilkes	Loamy, mixed, thermic, shallow Typic Hapludalfs

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