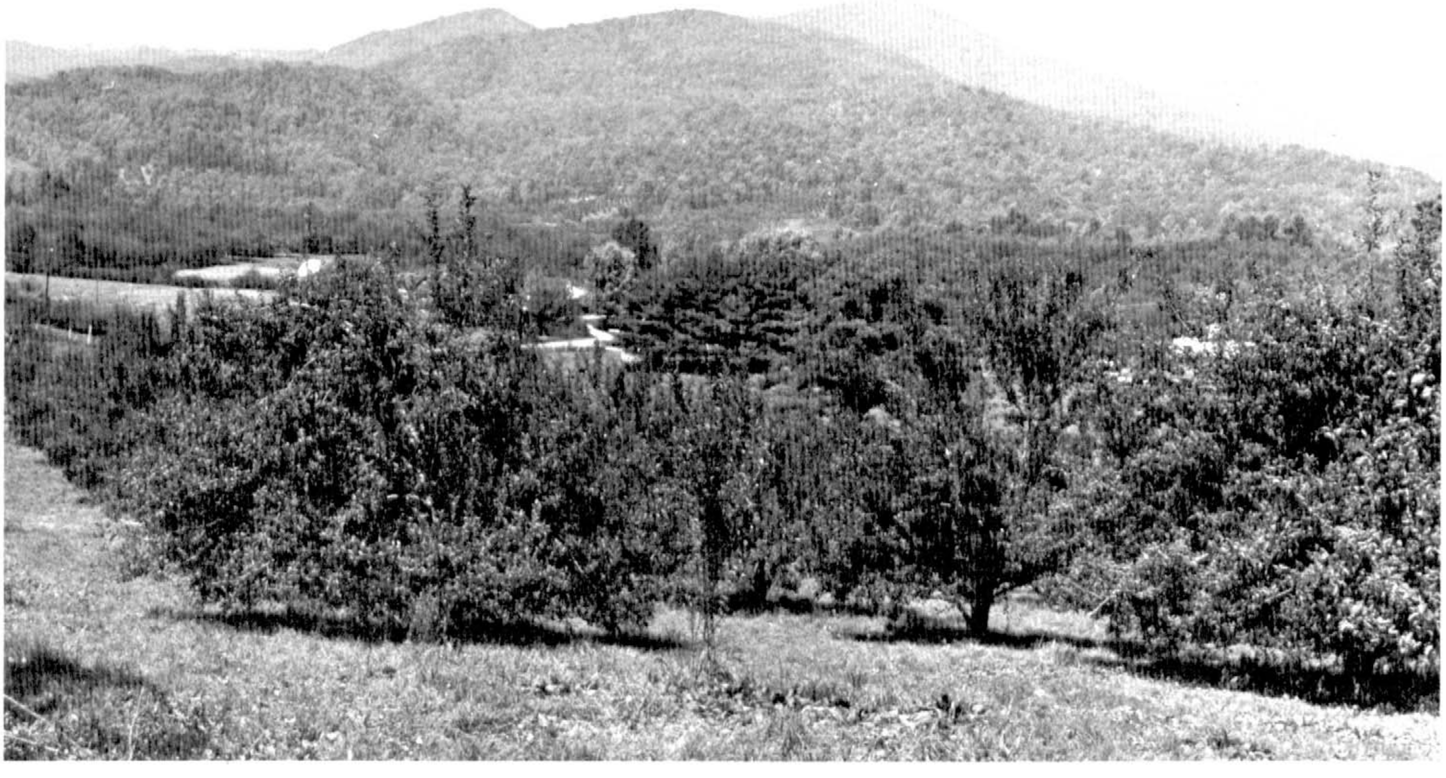
SOIL SURVEY OF

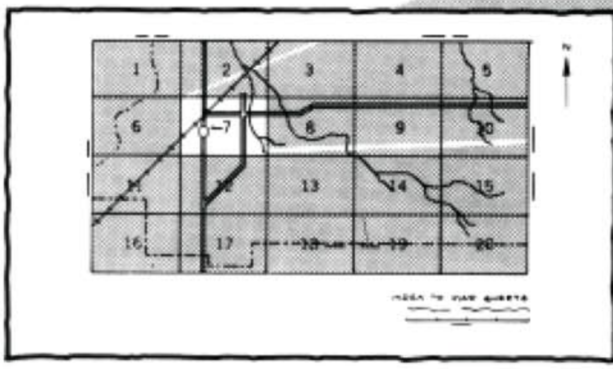
Henderson County, North Carolina

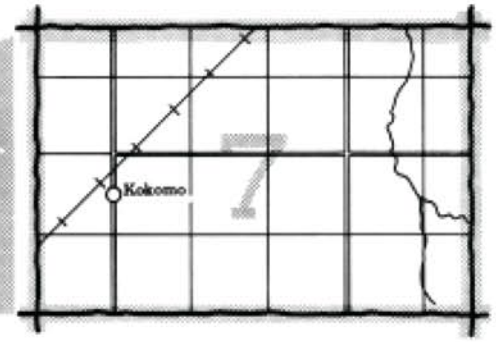


United States Department of Agriculture
Soil Conservation Service and Forest Service
In cooperation with
North Carolina Agricultural Experiment Station

HOW TO USE

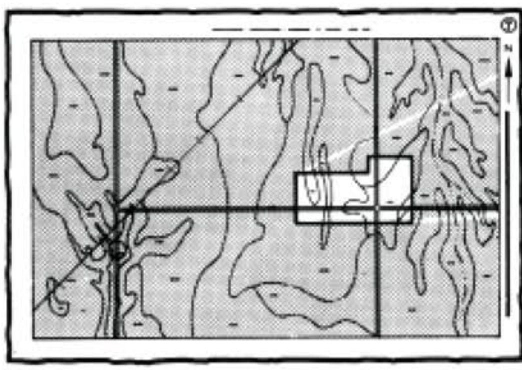
1. Locate your area of interest on the "Index to Map Sheets"

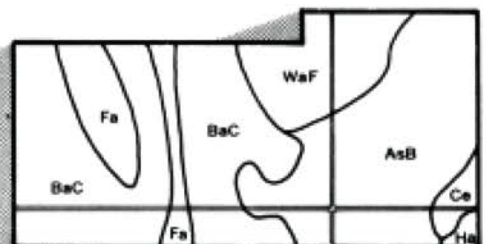




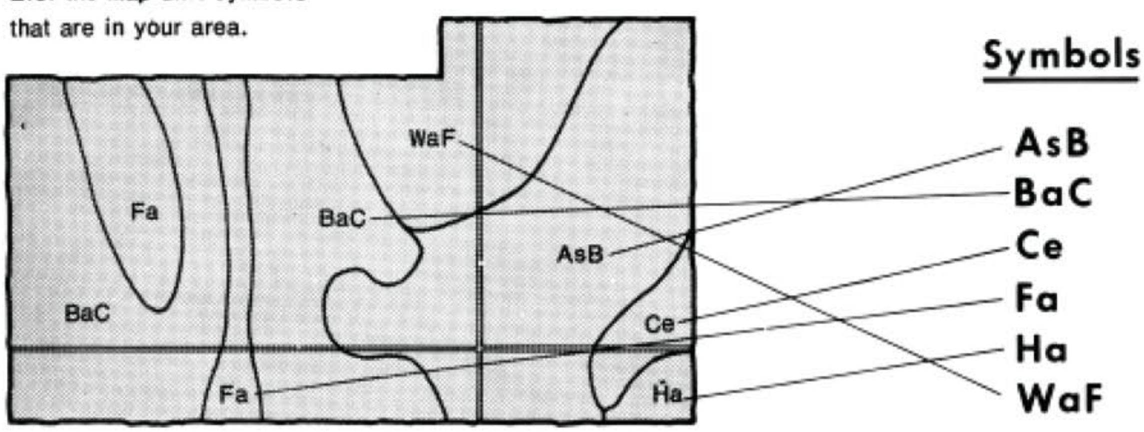
2. Note the number of the map sheet and turn to that sheet.

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



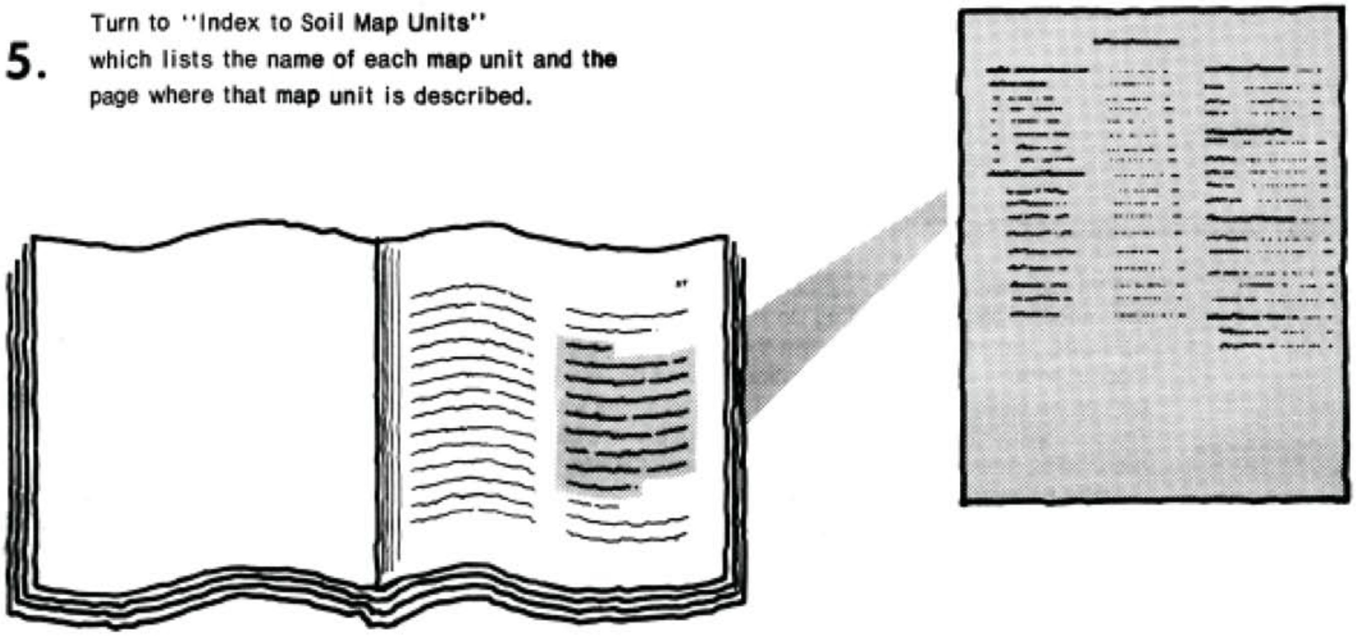


4. List the map unit symbols that are in your area.

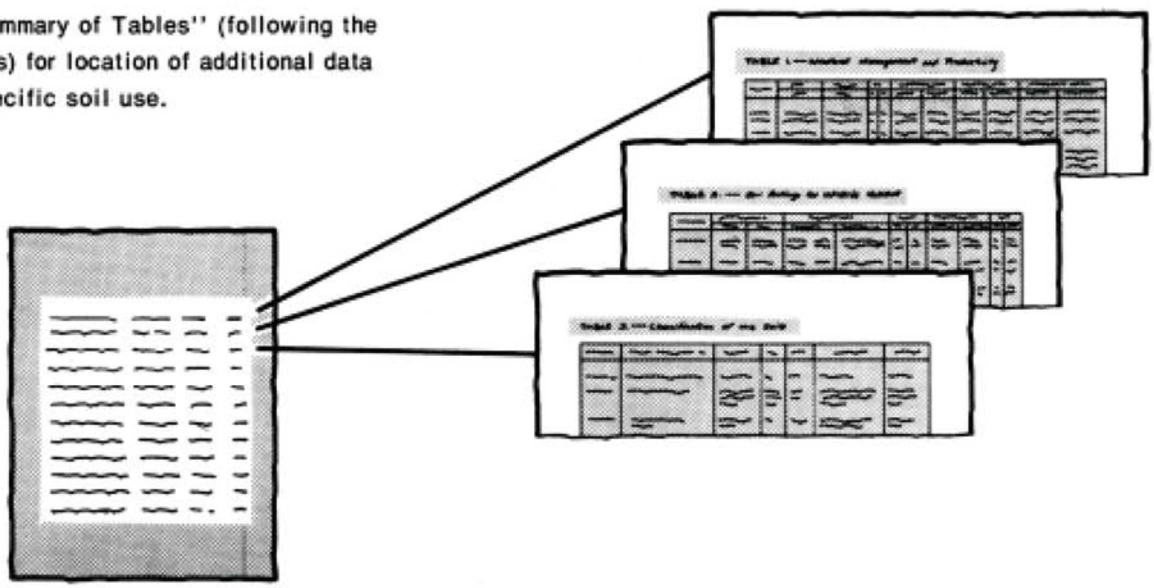


THIS SOIL SURVEY

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



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



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

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

Major fieldwork for this soil survey was completed in the period 1967-71. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1971. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, and the North Carolina Agricultural Experiment Station. It is part of the technical assistance furnished to the Henderson County Soil and Water Conservation District.

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

Cover: Apple orchard on Edneyville fine sandy loam, 7 to 15 percent slopes.

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Issued April 1980

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Foreword

The soil survey of Henderson County can help you and your community to plan and to use wisely one of our most precious natural resources—the soil.

This soil survey is intended for many different users. It can help a homebuyer or developer determine soil-related hazards or limitations that affect homesites. It can help land-use planners determine the suitability of areas for homes or onsite sewage disposal systems. This survey can help a farmer estimate the potential crop or forage production of his land. It can be used to determine the suitability and limitations of soils for pipelines, buildings, landfills, recreation areas, and many other uses.

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 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.

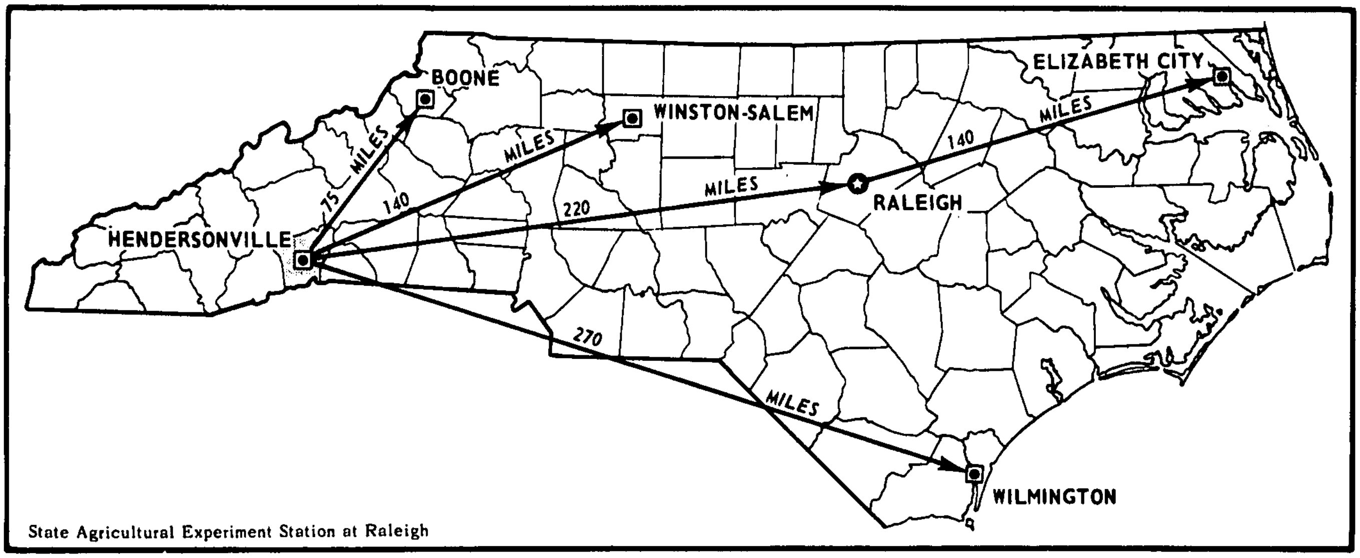
These and many other soil properties that affect land use are described in this soil survey. This publication also shows the location of broad areas of soils on the general soil map and the location of each kind of soil on detailed maps at the back. It provides descriptions of each kind of soil in the survey area, describes soil-related hazards and limitations, and gives much information on the suitability and potential of each soil for specified uses.

We cannot explain here all the ways this soil survey can help you. If you need additional information or assistance in using this survey, please call your local office of the Soil Conservation Service or the Cooperative Extension Service. The soil conservationist or soil scientist assigned to the Henderson County Conservation District or the county extension director can assist you.

We believe that this soil survey, along with other resource information, will enable you to have a better environment and a better life. The widespread use of this publication will greatly assist all of us in the conservation, development, and productive use of our soil, water, and related resources.

Jesse L. Hicks

State Conservationist
Soil Conservation Service



Location of Henderson County in North Carolina.

SOIL SURVEY OF HENDERSON COUNTY, NORTH CAROLINA

By John M. King, Jr., Soil Conservation Service

Soils Surveyed By John M. King, Jr., and John W. Turpin, Soil Conservation Service, and Charles H. Young, Forest Service

United States Department of Agriculture, Soil Conservation Service and Forest Service, in cooperation with the North Carolina Agricultural Experiment Station

Henderson County is in the southwestern part of North Carolina (see facing page). The county is 241,664 acres, or approximately 377 square miles, in size. According to the 1970 census, the population of the county was 42,804. Hendersonville, the county seat, had a population of 25,018.

Henderson County is in the Blue Ridge Mountains physiographic province. Elevation ranges from 1,400 feet above sea level near Bat Cave to 5,200 feet on Little Pisgah Ridge. The elevation at Hendersonville is 2,153 feet. The mean annual temperature at Hendersonville averages 56 degrees, and precipitation averages about 56 inches.

About 18,400 acres in the survey area is in the Pisgah National Forest, and about 11,383 acres is in urban and built-up areas. Land other than that used for crops and pasture makes up 13,000 acres. According to the Conservation Needs Inventory of North Carolina, in 1967 more than 140,000 acres was used for woodland.

Climate

By A. V. Hardy, climatologist for North Carolina, National Weather Service, U. S. Department of Commerce.

The climate of Henderson County is influenced strongly by elevation; irregular topography causes large differences in climate within the county. Latitude, location on the continent, and other lesser factors help to control the general climatic features. Temperature and precipitation data for Henderson County are shown in table 1. Weather data in this survey are from Hendersonville. Data are representative of the climate in the main farming areas of the French Broad River valley and tributary valleys and in similar areas that are level to moderately rolling and are between 2,000 and 2,300 feet above sea level. More mountainous parts of the county, which have peaks ranging to 3,000 feet or more, have lower average temperatures and in some places greater average precipitation.

The average length of the freeze-free growing season is about 180 days. Table 2 gives information on the probability of freezing temperatures in spring and fall. The time and intensity of freezes late in spring and early in fall vary considerably from year to year and from place to place within the county. The lowest temperature of record at Hendersonville is 9 degrees F below zero, but in most years winter passes without temperatures reaching zero. The highest temperature of record is 100 degrees, but this has occurred only once in 80 years. A temperature of 90 degrees or higher occurs on an average of about 15 days each summer, but in some years summer passes without the temperature reaching 90 degrees.

Henderson County is in the eastern part of the wettest area of North Carolina and of the eastern United States. Although observed data at Hendersonville and near Fletcher do not reflect the high precipitation recorded at stations in adjoining counties near the Georgia border, these data show an average of more than 3 inches for each month and more than 50 inches for the year. Much of the rainfall during the growing season comes from summer thunderstorms. Precipitation may vary considerably from week to week, from year to year, and even from place to place; however, there is rarely a month that has less than 1 or 2 inches except September and October. Rain early in summer is fairly dependable. Precipitation in winter usually results from low pressure storms which frequently pass through or near the area and is even less variable than that in summer.

Most winter months have snow cover on 1 to 15 days but usually on fewer than 5 days. The greatest accumulation in most winters is less than 1 foot, but there are some heavier accumulations of as much as 2 feet at higher elevations.

Cloudiness is variable; an average of about 1 day in 3 or 4 is essentially fair, 1 is cloudy, and 1 or 2 are partly cloudy. The area receives about half the total possible sunshine and slightly more than half late in spring and in summer. The average relative humidity is about 90 percent at sunrise and about 55 percent at midafternoon.

Westerly winds prevail in summer, and northwesterly winds prevail during the other seasons. Wind direction in the surrounding area is influenced to some extent by local topography. Windspeed averages 8 to 10 miles per hour, but it is somewhat higher early in the afternoon and is a little lower early in the morning, before sunrise. Tropical storms from the Atlantic Ocean or the Gulf of Mexico rarely cause destructive winds in Henderson County, but in places they cause an increase in rainfall. Tornadoes are very rare. Highest winds are most often caused by thunderstorms in summer. Such storms may also cause hail. These storms usually affect only a small area.

Physiography, Relief, and Drainage

Henderson County is dissected by many streams that form a dendritic drainage pattern. The general slope of the western, central, and northern parts of the county is toward the French Broad River, which leads into the drainage basin of the Tennessee Valley. This basin covers about three-fourths of the county. The northeastern corner of the county drains into the Broad River, and the southern and southeastern parts drain into the Green and Hungry Rivers. These rivers eventually flow into the Atlantic Ocean. The topography of the county is mountain ranges, isolated peaks, large rolling valleys, and stream flood plains. The most rugged topography is in the western and northeastern parts and along the Green and Hungry Rivers. Many of the mountains rise to an elevation of 4,000 feet or more. In most places these mountains have narrow ridgetops and steep sides. Several escarpments are near drainageways in the vicinity of Bat Cave, and almost perpendicular, bare rock walls are conspicuous on the northwestern side of Sugarloaf Mountain. One of the most noticeable features of the topography is the broad, rolling intermountain plateau or valley, covering 75 to 80 square miles. It covers from the vicinity of Hendersonville and Flat Rock to northeast of Edneyville, to Fletcher and Etowah. The most extensive flood plains are along the French Broad River, Mills River, and Cane, Mud, Clear, and Hooper Creeks. These flood plains are subject to frequent, brief flooding. The bottom land is as much as 1 mile wide in places.

Water Supply

The average yield of water from wells in Henderson County is about 18 gallons per minute, but the yield ranges from 1 gallon to 80 gallons per minute. The average depth of wells is 118 feet, and depth ranges from 25 feet to more than 200 feet. Almost all rural homes depend on domestic ground-water supplies. Springs are used where available, particularly in the hills.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are located, 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 that has been changed very little by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Soil series commonly are named for towns or other geographic features near the place where they were first observed and mapped. Edneyville and Brevard, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in characteristics.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Hayesville loam, 2 to 7 percent slopes, is one of several phases within the Hayesville series.

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

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

Some mapping units are made up of soils of different series, or of different phases within one series, and some have little or no soil. These kinds of 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. Existing ratings of suitabilities and limitations (interpretations) of the soils are field tested and modified as necessary during the course of the survey, and new interpretations are added to meet local needs. This is done mainly through field observations of behavior of different kinds of soil for different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and other information available from state and local specialists. For example, data on yields of crops 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 as to be readily useful to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation. Presenting the detailed information in an organized, understandable manner is the purpose of this publication.

Soil Map for General Planning

The general soil map at the back of this publication shows, in color, the soil associations described in this survey. Each soil association is a unique natural landscape unit that has a distinctive pattern of soils and relief and drainage features. It normally consists of one or more soils of major extent and some soils of minor extent, and it is named for the major soils. The kinds of soil in one association may 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 of the county for general kinds of land use. From the map, areas that are generally suitable for certain kinds of farming or other land uses can be identified. Likewise, areas with soil properties distinctly unfavorable for certain land uses can be located.

Because of the small scale of the map, it does not show the kind of soil at a specific site. Thus, this is not a suitable map for planning the management of a farm or field or for selecting the location of a road, building, or similar structure because 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.

Major land uses considered are for cultivated farm crops, specialty crops, woodland, urban uses, intensive recreation areas, and extensive recreation areas. Cultivated farm crops include those grown extensively by farmers in the survey area. Specialty crops include vegetables, fruits, and nursery crops grown on limited acreage and generally requiring intensive management. Woodland refers to land that is producing trees native to the area, or introduced species. Urban uses includes residential, commercial, and industrial developments. Intensive recreation areas are campsites, picnic areas, baseball diamonds, and similar areas that are subject to heavy foot traffic. Extensive recreation areas include those for nature study and wilderness uses.

1. Codorus-Toxaway-Rosman Association

Nearly level, well drained to very poorly drained soils that have a loamy and sandy subsoil and underlying layer; on flood plains

This association consists of soils that are in slightly depressional areas on flood plains and in slightly elevated areas generally adjacent to streams on wide flood plains.

This association makes up 8 percent of the county. It is about 40 percent Codorus soils, 15 percent Toxaway soils, and 10 percent Rosman soils. Comus, Delanco, Edneyville, Hatboro, and Kinkora soils make up most of the remaining 35 percent.

Codorus soils are moderately well drained and somewhat poorly drained. The surface layer is brown loam. The subsoil is dark brown loam and grayish brown fine sandy clay loam. The underlying layer is dark gray loamy sand.

Toxaway soils are very poorly drained and poorly drained. The surface layer is very dark gray to black silt loam in the upper part and very dark gray loam in the lower part. The underlying layer is very dark gray sandy loam in the upper part, grayish brown sand in the middle part, and gray sandy clay loam and loamy sand in the lower part.

Rosman soils are well drained and moderately well drained. The surface layer is dark brown loam. The subsoil is yellowish brown loam and fine sandy loam. The underlying layer is dark yellowish brown and dark grayish brown sandy loam.

Most areas of this association are cleared and used for crops and pasture. A few areas remain wooded.

Flooding and a seasonal high water table are the main limitations for the use and management of the major soils in this association.

2. Evard-Edneyville-Ashe Association

Sloping to very steep, well drained and somewhat excessively drained soils that have a loamy subsoil; on mountain ridgetops and side slopes

This association consists of soils on mountain ridgetops and side slopes. The side slopes are dissected by many drainageways that are in a dendritic pattern.

This association makes up 62 percent of the county. It is 30 percent Evard soils, 22 percent Edneyville soils, and 22 percent Ashe soils. Brevard, Chandler, Clifton, Fannin, Hayesville, Porters, Spivey, Tate, and Tusquitee soils and some areas of rock outcrop make up the remaining 26 percent of this association.

The Evard soils are sloping to very steep and are well drained. The surface layer and subsurface layer are dark brown sandy loam. The subsoil is yellowish red sandy clay loam and sandy loam. The underlying layer is yellowish red saprolite that crushes to sandy loam.

The Edneyville soils are sloping to steep and are well drained. The surface layer is dark grayish brown fine sandy loam. The subsurface layer is brown fine sandy loam. The subsoil is yellowish brown and is fine sandy loam in the upper part, sandy clay loam in the middle part, and fine sandy loam in the lower part. The underlying layer is light yellowish brown and light brownish gray fine sandy loam.

The Ashe soils are moderately steep to very steep and are somewhat excessively drained. The surface layer is stony sandy loam that is dark brown in the upper part and yellowish brown in the lower part. The subsoil is yellowish brown sandy loam. The underlying layer is gray saprolite that crushes to sandy loam.

Some areas of this association have been cleared and are used for cultivation. The remaining areas are used for pasture, woodland, or homesites and farmsteads.

Slope, erosion, and stoniness are the main limitations to the use and management of the major soils in this association.

3. Hayesville-Bradson Association

Gently sloping to moderately steep, well drained soils that have a loamy and clayey subsoil; on ridges and stream terraces

This association consists of soils on broad, smooth ridges and smooth, high stream terraces. It is dissected by many streams that have flood plains that range from 200 feet to about one-half mile in width.

This association makes up 20 percent of the county. It is about 60 percent Hayesville soils and 10 percent Bradson soils. Brevard, Delanco, Edneyville, and Tate soils make up the remaining 30 percent.

The Hayesville soils are gently sloping to moderately steep and are well drained. The surface layer is dark brown loam. The subsurface layer is brown loam. The subsoil is yellowish red clay loam in the upper part, yellowish red and red clay loam in the middle part, and red sandy clay loam and sandy loam in the lower part. The upper part of the underlying layer is red saprolite that crushes to sandy loam, and the lower part is gray and light gray soft saprolite that crushes to sandy loam.

The Bradson soils are gently sloping to strongly sloping and are well drained. The surface layer is reddish brown gravelly loam. The subsoil is red clay in the upper part and red clay loam in the lower part. The underlying layer is reddish yellow saprolite that crushes to loam.

Most of the areas of this association have been cleared and are used for crops. The remaining areas are used for pasture or building sites and farmsteads.

Slope and erosion are the main limitations to the use and management of the major soils in this association.

4. Fannin-Talladega Association

Sloping to steep, well drained soils that have a loamy subsoil; on ridgetops and side slopes

This association consists of soils on ridgetops and side slopes. It is dissected by many narrow drainageways.

This association makes up 4 percent of the county. It is about 60 percent Fannin soils and 10 percent Talladega soils. Hayesville, Tate, and Brevard soils make up the remaining 30 percent.

The Fannin soils are sloping to steep and are well drained. The surface layer is dark brown silt loam. The subsoil is yellowish red silty clay loam and silt loam. The underlying layer is yellowish red to strong brown schist saprolite that crushes to loam. Fragmental schist rock is at a depth of 60 inches.

The Talladega soils are steep and are well drained. The surface layer is dark yellowish brown silt loam. The subsoil is yellowish red silty clay loam. The underlying layer is yellowish red saprolite that crushes to loam. Moderately hard schist is at a depth of 36 inches.

Some areas of this association have been cleared and are used for crops or pasture. The remaining areas are wooded or are used for summer cottages or vacation cabins.

Slope and erosion are the main limitations to the use and management of the major soils in this association.

5. Ashe-Porters Association

Moderately steep to very steep, somewhat excessively drained and well drained soils that have a loamy subsoil; on ridgetops and side slopes

This association consists of soils on narrow ridgetops and uneven side slopes.

This association makes up 6 percent of the county. It is about 40 percent Ashe soils and 30 percent Porters soils. Evard, Edneyville, and Tusquitee soils make up the remaining 30 percent.

The Ashe soils are somewhat excessively drained. The surface layer is stony sandy loam that is dark brown in the upper part and yellowish brown in the lower part. The subsoil is yellowish brown sandy loam. The underlying layer is gray saprolite that crushes to sandy loam. Moderately hard granite gneiss rock is at a depth of 30 inches.

The Porters soils are well drained. The surface layer is very dark grayish brown stony loam. The subsoil is dark brown loam in the upper part, yellowish brown clay loam in the middle part, and yellowish brown loam in the lower part. The underlying layer is brown saprolite that crushes to sandy loam. Hard gneiss is at a depth of 42 inches.

Most areas of this association are wooded or are reverting to woodland. A few areas are used as pasture or as sites for summer cottages or vacation cabins.

Slope and stoniness are the main limitations to the use and management of the major soils in this association.

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. These descriptions together with the soil maps can be useful in determining the potential of 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 detailed information for each soil is given in the section "Planning the 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. The potential of the soil for various major land uses is estimated. The principal hazards and limitations are indicated, and the management concerns and practices for the major uses are discussed.

A mapping unit represents an area on the landscape and consists of a dominant soil or soils for which the unit is named. Most mapping units have one dominant soil, but some have two or more dominant soils. A mapping unit commonly includes small, scattered areas of other soils. The properties of some included soils can differ substantially from those of the dominant soil or soils and thus greatly influence the use of the dominant soil. How the included soils may affect the use and management of the mapping unit is discussed.

In most areas surveyed there is land that has little or no identifiable soil and supports no vegetation. This land, called miscellaneous areas, is delineated on the map and given descriptive names. Arents, loamy, is an example. Areas too small to be delineated are identified by special symbols on the soil maps.

The acreage and proportionate extent of each mapping unit are given in table 3, and additional information on each unit is given in interpretive tables in other sections (see "Summary of Tables"). Many of the terms used in describing soils are defined in the Glossary.

Soil Descriptions and Potentials

Ae—Arents, loamy. Arents, loamy, consists of areas where the original soil has been cut, filled, graded, paved, or changed to the extent that a soil series is not recognized. The soil material is mainly loamy and well drained. These areas are used for schools, playgrounds, shopping centers, and airports.

Careful management of these soils is necessary to help reduce runoff and aid in controlling erosion. Erosion is a major concern when these areas are not protected by plant cover or impervious material. Runoff from paved areas needs to be disposed of in a manner that will prevent gully or excessive erosion.

Because of the variable characteristics of these soils, onsite evaluation is needed to predict soil behavior. Not assigned to capability subclass or woodland group.

AhE—Ashe stony sandy loam, 15 to 25 percent slopes. This somewhat excessively drained soil is on long, narrow, convex tops of mountains. Most areas are longer than they are wide and are 5 to 50 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is stony sandy loam 7 inches thick. It is dark brown in the upper part and yellowish brown in the lower part. The subsoil is yellowish brown sandy loam 14 inches thick. The underlying layer, to a depth of 30 inches, is gray saprolite that crushes to sandy loam. Moderately hard granite-gneiss rock is at a depth of 30 inches.

Included with this soil in mapping are some small areas of soils that have a surface layer of loam. Also included are small areas of Edneyville and Tusquitee soils and a few small areas of rock outcrop.

The organic-matter content of the surface layer is low to medium. Permeability is moderately rapid, available water capacity is low, and shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout unless the soil is limed. Depth to bedrock is 20 to 40 inches. The seasonal high water table is more than 6 feet deep.

Most areas of this soil are wooded or are reverting to woodland. A few summer cottages or vacation cabins have been built where sites are accessible or have esthetic value.

This soil has a low potential for cultivated crops and apples. It is limited by steep slopes, stoniness, and rapid runoff. This soil has a medium potential for growing pasture forages such as bluegrass or sericea lespedeza.

This soil has a low potential for most urban uses. It 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.

This soil has a medium potential for pines or other conifers. Slope and surface stones are the main limitations for woodland use and management. Capability subclass VIs; woodland group 3x.

AhF—Ashe stony sandy loam, 25 to 45 percent slopes. This somewhat excessively drained soil is on rough side slopes that are dissected by numerous small drainageways. Areas of this soil are irregularly shaped and are 15 to 75 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is stony sandy loam 7 inches thick. It is dark brown in the upper part and yellowish brown in the lower part. The subsoil is yellowish brown sandy loam 14 inches thick. The underlying layer, to a depth of 30 inches, is gray saprolite that crushes to sandy loam. Moderately hard granite-gneiss rock is at a depth of 30 inches.

Included with this soil in mapping are a few small areas of soils that have a surface layer of loam, small areas of soils that do not have stones on the surface, small areas of Edneyville soils, and a few very small areas of Tusquitee soils.

The organic-matter content of the surface layer is low to medium. Permeability is moderately rapid, and available water capacity is low. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is 20 to 40 inches. The seasonal high water table is at a depth of more than 6 feet.

Almost all areas of this soil are wooded. A few areas are used for pasture. A few summer cottages or vacation cabins have been built on sites that are accessible and have esthetic value.

This soil has a low potential for cultivated crops, pasture forages, and apples because of slope and stoniness.

This soil has low potential for most urban uses because of slope and depth to bedrock. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has medium potential for pines or other conifers. Slope and surface stones are the major limitations to woodland use or management. Capability subclass VIIs; woodland group 3x.

AhG—Ashe stony sandy loam, 45 to 70 percent slopes. This somewhat excessively drained soil is on rough sides of mountains. Areas are irregularly shaped and are 10 to 90 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is stony sandy loam 7 inches thick. It is dark brown in the upper part and yellowish brown in the lower part. The subsoil is yellowish brown sandy loam 14 inches thick. The underlying layer, to a depth of 30 inches, is gray saprolite that crushes to sandy loam. Moderately hard granite-gneiss rock is at a depth of 30 inches.

Included with this soil in mapping are a few small areas of Edneyville soils, a few small areas of Spivey soils in drainageways, and some small areas of rock outcrop.

The organic-matter content of the surface layer is low to medium. Permeability is moderately rapid, and available water capacity is low. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is 20 to 40 inches. The seasonal high water table is at a depth of more than 6 feet.

This soil is wooded. A few isolated areas are used as native pasture or as sites for vacation homes.

This soil has low potential for row crops, hay, pasture, and apples because of slope and surface stones.

This soil has low potential for most urban uses because of slope, stoniness, and depth to bedrock. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has medium potential for pines or other conifers. Slope and surface stones are the major limitations to woodland use or management. Capability unit VIIs; woodland group 3x.

ArG—Ashe-Rock outcrop complex, 15 to 70 percent slopes. This complex consists of areas of Ashe soils and Rock outcrop that are so intermingled that they could not be separated at the scale selected for mapping. Most areas are irregularly shaped and are 2 to 70 acres in size.

Ashe stony sandy loam makes up 65 to 80 percent of the area. Typically, the surface layer is stony sandy loam 7 inches thick. It is dark brown in the upper part and yellowish brown in the lower part. The subsoil is yellowish brown sandy loam 14 inches thick. The underlying layer, to a depth of 30 inches, is gray saprolite that crushes to sandy loam. Moderately hard granite-gneiss rock is at a depth of 30 inches.

The organic-matter content of the surface layer is low to medium. Permeability is moderately rapid, and available water capacity is low. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is 20 to 40 inches. The seasonal high water table is at a depth of more than 6 feet.

Rock outcrop (figure 1) makes up 5 to 15 percent of the area. Bedrock exposures are mainly granite-gneiss.

Included with this complex in mapping are some small areas of soils that have loose stones on the surface. Also included are a few areas of Edneyville soils.

This complex is wooded.

This complex has low potential for row crops, hay, pasture, and apples because of slope, rock outcrop, and surface stones.

This complex has low potential for most urban uses because of slope, stoniness, and depth to bedrock. Onsite evaluation and planning are needed when this soil is used for septic tank absorption field, roads, or dwellings.

This complex has medium potential for pines or other conifers. Slope, rock outcrops, and surface stones are the main limitations to woodland use or management. Capability subclass VIIs; woodland group 3x.

BaB—Bradson gravelly loam, 2 to 7 percent slopes. This well drained soil is on broad, smooth, high stream terraces. Areas are somewhat elongated and are 6 to 30 acres in size. Gravel covers 5 to 25 percent of the surface.

Typically, the surface layer is reddish brown gravelly loam 6 inches thick. The subsoil is red clay and clay loam 59 inches thick. The underlying layer, to a depth of 75 inches, is reddish yellow saprolite that crushes to loam.

Included with this soil in mapping are small areas of soils that have a surface layer of fine sandy loam, a few small areas of eroded soils, and some small areas of soils that do not have gravel on the surface. Small areas of a soil that has a strong brown or yellowish brown subsoil are also included.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium to high. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

This soil is cleared and used mainly for crops.

This soil has high potential for production of row crops such as corn, tobacco, cabbage, potatoes, beans, and squash and for production of pasture and hay plants such as Kentucky bluegrass, fescue, orchardgrass, sericea lespedeza, and alfalfa. The hazard of erosion is moderate if cultivated crops are grown. Minimum tillage, contour farming, using cover crops such as grasses and legumes in the cropping system, and grassing of waterways are practices that help to reduce runoff, control erosion, and maintain production potential. The potential for producing apples on this soil is high. Limitations to management are minor, but frost pockets are a hazard in places.

This soil has high potential for most urban uses, such as dwellings and roads. Good performance and low maintenance can be expected. Permeability is a limitation for septic tank absorption fields, but this limitation can be overcome by modifying the field or increasing the size of the absorption area.

This soil has high potential for hardwoods and pines or other conifers. There are no significant limitations to woodland use or management. Capability subclass IIe; woodland group 2o.

BaC—Bradson gravelly loam, 7 to 15 percent slopes. This well drained soil is on smooth, high stream terraces. Areas are irregularly shaped and are 6 to 20 acres in size.

Typically, the surface layer is reddish brown gravelly loam 6 inches thick. The subsoil is red clay and clay loam 59 inches thick. The underlying layer, to a depth of 75 inches, is reddish yellow saprolite that crushes to loam.

Included with this soil in mapping are some small areas of a soil that has a surface layer of fine sandy loam, small areas of eroded soils, and areas of soils that do not have gravel on the surface. In some places soils that have a strong brown or yellowish brown subsoil are also included.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium to high. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for crops. A few areas are used for pasture.

This soil has medium potential for row crops such as corn, tobacco, potatoes, squash, green beans, and cabbage. The hazard of erosion is severe where this soil is cultivated, but practices such as minimum tillage, using conservation cropping systems that include legumes and grasses, contour farming, grassing of waterways, stripcropping, and constructing terraces and diversions help to reduce runoff and erosion and maintain optimum production. The production potential is high for hay and pasture forages such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for apples is medium, but slope is a minor limitation.

This soil has moderate potential for most urban uses, such as dwellings, septic tank absorption fields, and roads. The limitation of slope can be reduced or modified by special planning, design, or maintenance. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. There are no significant limitations to woodland use or management. Capability subclass IIIe; woodland group 2o.

BrC—Brevard loam, 7 to 15 percent slopes. This well drained soil is on smooth foot slopes or benches at the base of high mountains. Areas are somewhat elongated and are 6 to 25 acres in size.

Typically, the surface layer is dark brown loam 4 inches thick. The subsurface layer is dark yellowish brown loam 3 inches thick. The subsoil is 63 inches thick. It is yellowish red loam in the upper part, yellowish red sandy loam and red clay loam in the middle part, and red sandy clay loam in the lower part. The underlying layer, to a depth of 90 inches, is strong brown, weathered mica gneiss that crushes to fine sandy loam.

Included with this soil in mapping are small areas of soils that have a surface layer of fine sandy loam and small areas of eroded soils. In places scattered stones and gravel are on the surface. Small areas of Tusquitee, Tate, and Bradson soils are also included.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is commonly more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for crops. A few areas are used for pasture.

This soil has medium potential for row crops such as corn, tobacco, potatoes, squash, green beans, and cabbage. The hazard of erosion is severe where this soil is cultivated, but practices such as minimum tillage, using conservation cropping systems that include legumes and grasses, contour farming, grassing of waterways, stripcropping, and constructing terraces and diversions help to reduce runoff and erosion and maintain optimum production. The potential production is high for hay and pasture forages such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for apples is medium, but slope is a minor limitation.

This soil has moderate potential for most urban uses, such as dwellings, septic tank absorption fields, and roads. The limitation of slope can be reduced or modified by special planning, design, or maintenance. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. There are no significant limitations to woodland use or management. Capability subclass IIIe; woodland group 2o.

BrE—Brevard loam, 15 to 25 percent slopes. This well drained soil is on smooth foot slopes and benches. Areas are somewhat elongated and are 10 to 40 acres in size.

Typically, the surface layer is dark brown loam 4 inches thick. The subsurface layer is dark yellowish brown loam 3 inches thick. The subsoil is 63 inches thick. It is yellowish red loam in the upper part, yellowish red sandy loam and red clay loam in the middle part, and red sandy clay loam in the lower part. The underlying layer, to a depth of 90 inches, is strong brown, weathered mica gneiss that crushes to fine sandy loam.

Included with this soil in mapping are small areas of soils that have a surface layer of fine sandy loam and small areas of Tusquitee and Tate soils. In some places scattered stones and gravel are on the surface.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is commonly more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Some areas of this soil are cleared and used for pasture or crops. Other areas are wooded.

This soil has medium potential for most locally grown crops such as corn, tobacco, beans, and cabbage, but the hazard of erosion is very severe where the soil is cultivated. Practices such as minimum tillage, using conservation cropping systems that include long-term sod crops, contour farming, grassing of waterways, and constructing diversions help to reduce soil losses, conserve moisture, and maintain production. The production potential is medium for hay and pasture plants such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for apples is medium, but slope limits the operation of spraying and harvesting equipment.

This soil has low potential for most urban uses, such as septic tank absorption fields and dwellings and roads, because of the limitation of slope. This limitation can be overcome by extensive modification or by major planning, designing, and intensive maintenance. Erosion is a hazard where ground cover is removed. Permeability and slope are limitations for septic tank absorption fields.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to the use and management of this soil for woodland. Capability subclass IVe; woodland group 2r.

BrF—Brevard loam, 25 to 45 percent slopes. This well drained soil is on smooth mountain foot slopes and in coves. Areas are irregularly shaped, are concave, and are 6 to 30 acres in size.

Typically, the surface layer is dark brown loam 4 inches thick. The subsurface layer is dark yellowish brown loam 3 inches thick. The subsoil is 63 inches thick. It is yellowish red loam in the upper part, yellowish red sandy loam and red clay loam in the middle part, and red sandy clay loam in the lower part. The underlying layer, to a depth of 90 inches, is strong brown, weathered mica gneiss that crushes to fine sandy loam.

Included with this soil in mapping are small areas of soils that have scattered stones and gravel on the surface and small areas of the Tusquitee soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is commonly more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for pasture. A few areas are used for crops or woodland.

This soil has medium potential for pasture plants such as tall fescue, orchardgrass, bluegrass, clover, and sericea lespedeza. Careful management is necessary to help reduce runoff and control erosion. Steep slopes and the hazard of erosion limit use of this soil for row crops. The production potential is low for apples because slope limits the safe operation of spraying and harvesting equipment.

This soil has low potential for most urban uses, such as sites for septic tank absorption fields, roads, and dwellings, because of slope. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to the use and management of this soil for woodland. Capability subclass VIe; woodland group 2r.

CaG—Chandler stony loam, 45 to 70 percent slopes. This somewhat excessively drained soil is on rough sides of mountains. Areas are irregularly shaped and are 15 to 75 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is dark brown stony loam 5 inches thick. The subsoil is strong brown loam 21 inches thick. The underlying layer, to a depth of 54 inches, is dark yellowish brown micaceous saprolite that crushes to sandy loam. Moderately hard schist rock is at a depth of 54 inches.

Included with this soil in mapping are a few areas of Ashe soils and some small areas of soils that have slopes of less than 45 percent.

The organic-matter content of the surface layer is low to medium. Permeability is moderately rapid, and available water capacity is low to medium. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is 40 to 60 inches. The seasonal high water table is at a depth of more than 6 feet.

This soil is wooded. A few isolated areas are used as native pasture or as sites for vacation homes.

This soil has low potential for row crops, hay, pasture forages, and apples. Slope and surface stones limit the potential of this soil for these uses.

This soil has low potential for most urban uses because of slope. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has medium potential for pines or other conifers. Slope and stoniness are the significant limitations to woodland use and management. Capability subclass VIIs; woodland group 3x.

CfE—Clifton stony loam, 15 to 25 percent slopes. This well drained soil is on ridgetops. Areas are somewhat elongated and are 6 to 35 acres in size. Stones cover 2 to 15 percent of the surface.

Typically, the surface layer is dark brown stony loam 4 inches thick. The subsurface layer is dark reddish brown loam 5 inches thick. The subsoil is 33 inches thick. The upper part is yellowish red clay loam, the middle part is red clay loam, and the lower part is red loam. Hard, dark-colored gneiss is at a depth of about 42 inches.

Included with this soil in mapping are small areas of Evard and Porters soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is slightly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is 40 to 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil are wooded or are reverting to woodland. A few summer cottages or vacation cabins have been built on sites that are accessible and have esthetic value.

This soil has low potential for cultivated crops and apples because of steep slopes, stoniness, and rapid runoff. This soil has medium potential for pasture plants such as bluegrass and sericea lespedeza.

This soil has low potential for most urban uses because of slope and stoniness. Onsite evaluation and planning are needed where this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the major limitations to the use and management of this soil for woodland. Capability subclass VIe; woodland group 2x.

CfF—Clifton stony loam, 25 to 45 percent slopes. This well drained soil is on sides of mountains. Areas are irregular in shape and are 10 to 40 acres in size. Stones cover 2 to 15 percent of the surface.

Typically, the surface layer is dark brown stony loam 4 inches thick. The subsurface layer is dark reddish brown loam 5 inches thick. The subsoil is 33 inches thick. The upper part is yellowish red clay loam, the middle part is red clay loam, and the lower part is red loam. Hard, dark-colored gneiss is at a depth of about 42 inches.

Included with this soil in mapping are small areas of Evard and Porters soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is slightly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is 40 to 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Almost all areas of this soil are wooded. A few areas are used for pasture. A few summer cottages or vacation cabins have been built on sites that are accessible and have esthetic value.

This soil has low potential for the production of cultivated crops, pasture forages, and apples because of slope and stoniness.

This soil has low potential for most urban uses because of slope. Onsite evaluation and planning are needed where this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the major limitations to the use and management of this soil for woodland. Capability subclass VIIs; woodland group 2x.

Co—Codorus loam. This moderately well drained to somewhat poorly drained, nearly level soil is in slightly depressional areas on wide flood plains and on narrow flood plains. In many places this soil makes up an entire flood plain. Areas are somewhat elongated and are 4 to 40 acres in size.

Typically, the surface layer is brown loam 12 inches thick. The subsoil is dark brown loam and mottled grayish brown fine sandy clay loam 33 inches thick. The underlying layer, to a depth of 60 inches, is dark gray loamy sand.

Included with this soil in mapping are small areas of soils that have a surface layer of fine sandy loam and a few small areas of Comus, Rosman, Toxaway, and Hatboro soils.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is medium acid or slightly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of 1 to 2 feet for 2 to 6 months in most years. This soil is subject to frequent flooding.

This soil has medium potential for the production of water-tolerant row crops and hay and pasture forages, but in places flooding damages these crops. Cabbage, green beans, squash, and corn can be grown continuously, but minimum tillage, cover crops, and a conservation cropping system that includes grasses and legumes will help to maintain tilth and production. Tillage can be delayed in spring because of the seasonally high water table. Drainage is required in places to remove excess water from the lower and wetter areas. The production potential for apples is low because of the hazard of flooding and a seasonal high water table.

This soil has low potential for most urban uses such as dwellings, roads, and septic tank absorption fields. The hazard of flooding is difficult and costly to overcome.

This soil has high potential for hardwoods and pines or other conifers. Wetness is the main limitation to woodland use and management. Capability subclass IIIw; woodland group 1w.

Cu—Comus fine sandy loam. This well drained, nearly level soil is in slightly elevated positions commonly adjacent to streams on wide flood plains (fig. 2). Areas are somewhat elongated and are 4 to 25 acres in size.

Typically, the surface layer is brown fine sandy loam 20 inches thick. The subsoil is yellowish brown loam 16 inches thick. The underlying layer, to a depth of 70 inches, is mottled brown loam in the upper part and mottled grayish brown sandy loam in the lower part.

Included with this soil in mapping are small areas of soils that have a surface layer of loam and a few small areas of Codorus and Rosman soils.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is strongly acid to medium acid throughout the profile unless the soil is limed. Depth to bedrock is more than 72 inches. The seasonal high water is at a depth of about 30 inches for 2 to 6 months in most years. This soil is subject to frequent, very brief flooding.

Most areas of this soil have been cleared and are used for crops. A few areas are used for pasture.

This soil has high potential for the production of row crops such as corn, cabbage, potatoes, squash, and green beans and for the production of hay and pasture plants such as clover, tall fescue, and orchardgrass. Flooding is a hazard during spring and summer. Row crops can be grown continuously, but minimum tillage and cover crops help to maintain tilth and production. The potential for apple orchards is low because of the hazard of flooding and a seasonal high water table.

This soil has low potential for most urban uses, such as dwellings, roads, and septic tank absorption fields, because of a seasonal high water table and the hazard of flooding. These limitations are difficult and costly to overcome.

This soil has high potential for hardwoods and pines or other conifers. There are no significant limitations to woodland use and management. Capability subclass IIw; woodland group 1o.

DeA—Delanco loam, 0 to 2 percent slopes. This moderately well drained soil is on low stream terraces. Areas are somewhat irregularly shaped and are 4 to 25 acres in size.

Typically, the surface layer is brown loam 10 inches thick. The subsoil is 30 inches thick. It is yellowish brown clay loam and mottled brown clay loam in the upper part and mottled light brownish gray sandy clay loam in the lower part. The underlying layer, to a depth of 60 inches, is mottled gray sandy clay loam.

Included with this soil in mapping are small areas of Kinkora and Codorus soils. Also included are a few small areas of soils that are more clayey than this Delanco soil.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is moderate. Reaction is strongly acid or very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 72 inches. The seasonal high water table is at a depth of about 30 inches for 2 to 3 months in most years. This soil is subject to occasional, very brief flooding in the low-lying areas.

Most areas of this soil have been cleared and are used for crops and pasture.

This soil has high potential for the production of row crops such as corn, cabbage, potatoes, squash, and green beans and for hay and pasture plants such as clover, tall fescue, and orchardgrass. Flooding for short periods is a hazard during spring and summer in the lower lying areas. Row crops can be grown continuously, but minimum tillage and cover crops help to maintain soil tilth and reduce erosion. The potential for apple orchards is low because of flooding and a seasonal high water table.

This soil has low potential for most urban uses, such as dwellings, roads, and septic tank absorption fields. The limitations—a seasonal high water table and a hazard of flooding—are difficult and costly to overcome.

This soil has high potential for hardwoods and conifers. Wetness is the main limitation to woodland use and management. Capability subclass IIw; woodland group 2w.

DeB—Delanco loam, 2 to 7 percent slopes. This moderately well drained soil is on somewhat elevated stream terraces and at the head of small drainageways. Areas are irregularly shaped and are 4 to 30 acres in size.

Typically, the surface layer is brown loam 10 inches thick. The subsoil is 30 inches thick. It is yellowish brown clay loam and mottled brown clay loam in the upper part and mottled light brownish gray sandy clay loam in the lower part. The underlying layer, to a depth of 60 inches, is mottled gray sandy clay loam.

Included with this soil in mapping are small areas of wetter soils; small areas of soils that are more clayey than this Delanco soil; and a few areas of eroded soils. Also included are a few small areas of soils that are as much as 10 percent gravel.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is moderate. Reaction is strongly acid or very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 72 inches. The seasonal high water table is at a depth of about 30 inches for 2 to 3 months in most years. This soil is subject to occasional, very brief flooding in the low-lying areas.

Most areas of this soil are cleared and used for crops.

This soil has high potential for production of row crops such as corn, tobacco, cabbage, potatoes, beans, and squash and pasture and hay plants such as Kentucky bluegrass, fescue, orchardgrass, sericea lespedeza, and alfalfa. Erosion is a hazard if cultivated crops are grown. Minimum tillage, contour farming, using cover crops, using a cropping system that includes grasses and legumes, and grassing waterways are practices that help to reduce runoff and erosion and maintain high production potential. The potential for producing apples on this soil is high, and limitations to management are minor.

This soil has low potential for most urban uses, such as dwellings, septic tank absorption fields, and roads. A seasonal high water table is the major limitation to most uses.

This soil has high potential for hardwoods and conifers. Wetness is the main limitation to woodland use and management. Capability subclass IIe; woodland group 2w.

EdC—Edneyville fine sandy loam, 7 to 15 percent slopes. This well drained soil is on fairly smooth ridgetops. Areas are fairly narrow to broad and are 6 to 40 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 1 inch thick. The subsurface layer is brown fine sandy loam 4 inches thick. The subsoil is 25 inches thick. It is yellowish brown fine sandy loam in the upper part, yellowish brown sandy clay loam in the middle part, and yellowish brown fine sandy loam in the lower part. The underlying layer, to a depth of 60 inches, is light yellowish brown and light brownish gray fine sandy loam.

Included with this soil in mapping are a few small areas of Evard and Ashe soils. Also included are some areas of soils that are stony and gravelly.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 40 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for cultivated crops. A few areas are used for pasture or for homesites and farmsteads.

This soil has medium potential for row crops such as corn, tobacco, potatoes, squash, green beans, and cabbage. Erosion is a hazard where this soil is cultivated, but practices such as minimum tillage, using a conservation cropping system that includes legumes and grasses, contour farming, grassing of waterways, stripcropping, and establishing terraces and diversions help to reduce soil and water losses. The production potential is high for such hay and pasture plants as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for growing apples is high, but slope is a minor limitation to this use.

This soil has moderate potential for most urban uses, such as dwellings, septic tank absorption fields, and roads. The limitation of slope can be reduced or modified in places by special planning, design, or maintenance. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. There are no major limitations to woodland use and management. Capability subclass IIIe; woodland group 2o.

EdE—Edneyville fine sandy loam, 15 to 25 percent slopes. This well drained soil is on the sides of ridges. Areas are irregularly shaped and are 10 to 125 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 1 inch thick. The subsurface layer is brown fine sandy loam 4 inches thick. The subsoil is 25 inches thick. It is yellowish brown fine sandy loam in the upper part, yellowish brown sandy clay loam in the middle part, and yellowish brown fine sandy loam in the lower part. The underlying layer, to a depth of 60 inches, is light yellowish brown and light brownish gray fine sandy loam.

Included with this soil in mapping are a few small areas of Evard and Ashe soils. Also included in places are areas of soils that are stony and gravelly.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 40 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for crops or pasture.

This soil has medium potential for most locally grown crops such as corn, tobacco, beans, and cabbage, but the hazard of erosion is very severe where the soil is cultivated. Practices such as minimum tillage, using a conservation cropping system that has long-term sod crops, contour farming, grassing of waterways, and constructing diversions help to reduce soil losses, conserve moisture, and maintain production. The production potential is medium for hay and pasture plants such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for growing apples is medium, but slope is a limitation to the operation of spraying and harvesting equipment.

This soil has low potential for most urban uses, such as septic tank absorption fields and dwellings and roads, because of slope. Extensive modification of the soils or major planning, design, and intensive maintenance are generally required to overcome this limitation. Erosion is a hazard where ground cover is removed. Permeability and slope are limitations for septic tank absorption fields.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass IVe; woodland group 2r.

EdF—Edneyville fine sandy loam, 25 to 45 percent slopes. This well drained soil is on the sides of mountains. Areas are irregularly shaped and are 20 to 150 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 1 inch thick. The subsurface layer is brown fine sandy loam 4 inches thick. The subsoil is 25 inches thick. It is yellowish brown fine sandy loam in the upper part, yellowish brown sandy clay loam in the middle part, and yellowish brown fine sandy loam in the lower part. The underlying layer, to a depth of 60 inches, is light yellowish brown and light brownish gray fine sandy loam.

Included with this soil in mapping are areas of Ashe soils. Also included are a few areas of soils that are stony.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 40 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil are cleared and are used for pasture and crops. Some areas are wooded. A few areas have been used for cabins or summer homes.

This soil has medium potential for pasture plants such as tall fescue, orchardgrass, bluegrass, clover, and sericea lespedeza. Careful management is necessary to help reduce runoff and control erosion. Steep slopes and the hazard of erosion limit the potential of this soil for row crops. The production potential is low for apples because slope limits the operation of spraying and harvesting equipment.

This soil has low potential for most urban uses, such as septic tank absorption fields, roads, and dwellings. Slope is a limitation for these uses. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass IVe; woodland group 2r.

EnB—Elsinboro loam, 0 to 3 percent slopes. This well drained soil is on low stream terraces. Areas are somewhat elongated and are 4 to 12 acres in size.

Typically, the surface layer is brown loam 9 inches thick. The subsoil is 29 inches thick. It is yellowish brown and brownish yellow clay loam in the upper part and yellowish brown sandy clay loam in the lower part. The underlying layer, to a depth of 55 inches, is brown gravelly loamy sand.

Included with this soil in mapping are small areas of Delanco and Tate soils.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium to high. Shrink-swell potential is moderate. Reaction is strongly acid or very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 72 inches. The seasonal high water table is at a depth of more than 5 feet.

Almost all areas of this soil are cleared and used for crops.

This soil has high potential for production of row crops such as tobacco, corn, cabbage, green beans, squash, and potatoes. Row crops can be grown continuously, but minimum tillage and cover crops help to maintain soil tilth and protect the soil from erosion. The production potential is high for tall fescue, orchardgrass, clover, alfalfa, and most other locally adapted hay and pasture plants. Only a small acreage of this soil is used for apple orchards, because most areas are affected by frost pockets.

This soil has high potential for most urban uses, such as dwellings, septic tank absorption fields, and roads. Good performance and low maintenance can be expected.

This soil has high potential for hardwoods and pines or other conifers. There are no major limitations to woodland use and management. Capability subclass I; woodland group 2o.

EvC—Evard fine sandy loam, 7 to 15 percent slopes. This well drained soil is on smooth ridgetops. Areas are somewhat elongated and are 10 to 75 acres in size.

Typically, the surface layer is dark brown fine sandy loam 2 inches thick. The subsurface layer is dark brown sandy loam 4 inches thick. The subsoil is yellowish red sandy clay loam and sandy loam 24 inches thick. The underlying layer, to a depth of 53 inches, is yellowish red saprolite that crushes to sandy loam. Hard quartz mica gneiss is at a depth of 53 inches.

Included with this soil in mapping are small areas of Hayesville and Edneyville soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low to moderate. Reaction is strongly acid or very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 48 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for cultivated crops, but a few areas are used as pasture.

This soil has medium potential for row crops such as corn, tobacco, potatoes, squash, green beans, and cabbage. Erosion is a severe hazard where this soil is cultivated, but practices such as minimum tillage, using a conservation cropping system that includes legumes and grasses, contour farming, grassing of waterways, stripcropping, and constructing terraces and diversions help to reduce soil and water losses and maintain optimum production. The production potential is medium for hay and pasture plants such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Pasture management is needed to insure adequate protective cover. The production potential for apples is medium, but slope is a minor limitation when the soil is used for this purpose.

This soil has moderate potential for most urban uses such as dwellings and roads. The limitation of slope can be reduced or modified in places by special planning, design, or maintenance. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass IIIe; woodland group 2r.

EwE—Evard soils, 15 to 25 percent slopes. These well drained soils are on upland ridges. The surface layer is sandy loam, fine sandy loam, or loam. Areas are irregularly shaped and are 10 to 60 acres in size.

Typically, the surface layer is dark brown sandy loam 2 inches thick. The subsurface layer is dark brown sandy loam 4 inches thick. The subsoil is yellowish red sandy clay loam and sandy loam 24 inches thick. The underlying layer, to a depth of 53 inches, is yellowish red saprolite that crushes to sandy loam. Hard quartz mica gneiss is at a depth of 53 inches.

Included with these soils in mapping are a few small areas of soils that are moderately eroded and small areas of Edneyville soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low to moderate. Reaction is strongly acid or very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 48 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of these soils have been cleared and are used for pasture. A few areas are wooded or are reverting to woodland.

These soils have a medium potential for pasture plants such as tall fescue, orchardgrass, bluegrass, clover, and sericea lespedeza. Production potential for row crops is low because of steep slopes and the hazard of erosion. Careful management is necessary to help to reduce runoff and control erosion. The production potential for apples is low because slope limits the operation of spraying and harvesting equipment.

These soils have low potential for most urban uses, such as septic tank absorption fields, roads, and dwellings, because of slope. Onsite investigation and evaluation are needed prior to the use of these soils for urban development. Erosion is a hazard where ground cover is removed.

These soils have high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass VIe; woodland group 2r.

EwF—Evard soils, 25 to 45 percent slopes. These well drained soils are on sides of mountains. The surface layer is sandy loam, fine sandy loam, or loam. Areas are somewhat elongated and are 25 to 100 acres in size.

Typically, the surface layer is dark brown sandy loam 2 inches thick. The subsurface layer is dark brown sandy loam 4 inches thick. The subsoil is yellowish red sandy clay loam and sandy loam 24 inches thick. The underlying layer, to a depth of 53 inches, is yellowish red saprolite that crushes to sandy loam. Hard quartz mica gneiss is at a depth of 53 inches.

Included with these soils in mapping are small areas of Edneyville and Ashe soils. Also included are small areas of soils that have stones on the surface.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low to moderate. Reaction is strongly acid or very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 48 inches. The seasonal high water table is at a depth of more than 6 feet.

Some areas of these soils have been cleared and are used for native pasture, but most areas are wooded or are reverting to woodland. Summer homes or vacation cabins have been built in a few areas that have high esthetic value and are accessible.

These soils have low production potential for cultivated crops, pasture forages, and apples because of slope.

These soils have low potential for most urban uses because of slope. Onsite evaluation and planning are needed when these soils are used for septic tank absorption fields, roads, or dwellings.

These soils have high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass VIIe; woodland group 2r.

EwG—Evard soils, 45 to 70 percent slopes. These well drained soils are on rugged sides of mountains. The surface layer is sandy loam, fine sandy loam, or loam. Areas are irregularly shaped and are 25 to 60 acres in size.

Typically, the surface layer is dark brown sandy loam 2 inches thick. The subsurface layer is dark brown sandy loam 4 inches thick. The subsoil is yellowish red sandy clay loam and sandy loam 24 inches thick. The underlying layer, to a depth of 53 inches, is yellowish red saprolite that crushes to sandy loam. Hard quartz mica gneiss is at a depth of 53 inches.

Included with these soils in mapping are areas of Ashe and Edneyville soils. Also included are small areas of soils that have stones, cobbles, and gravel on the surface.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low to moderate. Reaction is strongly acid or very strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 48 inches. The seasonal high water table is at a depth of more than 6 feet.

Some areas of these soils have been cleared and are used for native pasture, but most areas are wooded or are reverting to woodland. Summer homes or vacation cabins have been built in a few areas that have esthetic value and are accessible.

These soils have low production potential for cultivated crops, pasture forages, and apples because of slope.

These soils have low potential for most urban uses because of slope. Onsite evaluation and planning are needed when these soils are used for septic tank absorption fields, roads, or dwellings.

These soils have high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass VIIe; woodland group 2r.

FaC—Fannin silt loam, 7 to 15 percent slopes. This well drained soil is on smooth ridgetops. Areas are irregularly shaped and are 6 to 30 acres in size.

Typically, the surface layer is dark brown silt loam 6 inches thick. The subsoil is yellowish red silty clay loam and silt loam 30 inches thick. The underlying layer, to a depth of 60 inches, is yellowish red to strong brown schist saprolite that crushes to loam. Fragmental schist rock is at a depth of 60 inches.

Included with this soil in mapping are a few areas of soils that have slopes of less than 7 percent and a few small areas of eroded soils. Also included are small areas of Hayesville soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for crops or pasture.

This soil has medium potential for the production of most locally grown crops such as corn, tobacco, beans, and cabbage. Slope limits the suitability of the soil for cultivation. The hazard of erosion is severe when the soil is cultivated. Practices such as minimum tillage, using a conservation cropping system that includes long-term sod crops, contour farming, grassing of waterways, and establishing diversions help to reduce soil losses, conserve moisture, and maintain production. The production potential is medium for such hay and pasture plants as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The production potential for apples is medium, but slope is a limitation to the operation of spraying and harvesting equipment.

This soil has moderate potential for most urban uses such as septic tank absorption fields and dwellings and roads. Extensive modification of the soil or major planning, design, and intensive maintenance are generally required to overcome the limitation of slope. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. There are no major limitations to woodland use and management. Capability subclass IVe; woodland group 2o.

FaE—Fannin silt loam, 15 to 25 percent slopes. This well drained soil is on smooth ridges. Areas are irregularly shaped and are 6 to 30 acres in size.

Typically, the surface layer is dark brown silt loam 6 inches thick. The subsoil is yellowish red silty clay loam and silt loam 30 inches thick. The underlying layer, to a depth of 60 inches, is yellowish red to strong brown schist saprolite that crushes to loam. Fragmental schist rock is at a depth of 60 inches.

Included with this soil in mapping are a few small areas of Hayesville and Evard soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for pasture.

This soil has low potential for row crops and medium potential for pasture plants such as tall fescue, orchardgrass, bluegrass, clover, and sericea lespedeza. The potential for both uses is limited by slope and the hazard of erosion. Careful management is necessary to help to reduce runoff and erosion. The production potential for apples is low because slope limits the operation of spraying and harvesting equipment.

This soil has low potential for most urban uses, such as septic tank absorption fields, roads, and dwellings, because of slope. Onsite evaluation and planning are needed when this soil is used for development. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass VIe; woodland group 2r.

FaF—Fannin silt loam, 25 to 45 percent slopes. This well drained soil is on the mountainsides that generally face south and west. Areas are irregularly shaped and are 20 to 60 acres in size.

Typically, the surface layer is dark brown silt loam 6 inches thick. The subsoil is yellowish red silty clay loam and silt loam 30 inches thick. The underlying layer, to a depth of 60 inches, is yellowish red to strong brown schist saprolite that crushes to loam. Fragmental schist rock is at a depth of 60 inches.

Included with this soil in mapping are a few areas of Evard soils and a few small areas of soils that have a subsoil of loam.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil are wooded. A few small areas have been cleared and are used for pasture.

This soil has low potential for row crops or pasture plants such as bluegrass and orchardgrass because of steep slopes and the hazard of erosion. Careful management is necessary to help to reduce runoff and erosion. Difficulty in operating spraying and harvesting equipment on the steep slopes generally makes this soil unsuitable for apple orchards.

This soil has low potential for most urban uses, such as roads, dwellings, and septic tank absorption fields, because of steep slopes. Onsite evaluation and planning are needed if this soil is used for urban development. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass VIIe; woodland group 2r.

Ha—Hatboro loam. This poorly drained, nearly level soil is in depressional areas on stream flood plains. Areas are somewhat elongated and are 6 to 40 acres in size.

Typically, the surface layer is dark grayish brown loam 12 inches thick. The subsoil is dark gray loam 24 inches thick. The underlying layer, to a depth of 62 inches, is dark grayish brown loamy sand and grayish brown sand.

Included with this soil in mapping are small areas of Toxaway and Codorus soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is slightly acid to strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at or near the surface. This soil is subject to frequent flooding.

Most areas of this soil have been cleared and are used for crops or pasture. A few areas are wooded.

This soil has moderate production potential for water-tolerant row crops and hay and pasture plants. Because of flooding, however, these crops may be damaged. Cabbage, green beans, squash, and corn can be grown continuously. Minimum tillage, using cover crops, and including grasses and legumes in the conservation cropping system help to maintain soil tilth and production. The production potential for apples is low because of the hazard of flooding and a seasonal high water table. Winter crops, such as wheat, are commonly damaged by excessive wetness.

This soil has low potential for most urban uses, such as dwellings, roads, and septic tank absorption fields. The hazard of flooding and a seasonal high water table are difficult and costly to overcome.

This soil has high potential for water-tolerant hardwoods and pines. Wetness is the main limitation to woodland use and management. Capability subclass IIIw; woodland group 1w.

HyB—Hayesville loam, 2 to 7 percent slopes. This well drained soil is on broad, smooth ridgetops at the lower elevations in the county. Areas are somewhat elongated and are 6 to 35 acres in size.

Typically, the surface layer is dark brown loam 4 inches thick. The subsurface layer is brown loam 4 inches thick. The subsoil is 36 inches thick. The upper part is yellowish red clay loam, the middle part is yellowish red and red clay loam, and the lower part is red sandy clay loam and sandy loam. The underlying layer is 68 inches thick. The upper part is red saprolite that crushes to sandy loam, the lower part is gray and light gray soft saprolite that crushes to sandy loam.

Included with this soil in mapping are small areas of soils that have a surface layer of fine sandy loam. Also included are a few areas of eroded soils and a few small areas of Evard, Bradson, and Fannin soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium to high. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for crops. Some areas are used as building sites and farmsteads.

This soil has high production potential for row crops such as corn, tobacco, cabbage, potatoes, beans, and squash and for pasture and hay plants such as Kentucky bluegrass, fescue, orchardgrass, sericea lespedeza, and alfalfa. Erosion is a hazard if cultivated crops are grown. Minimum tillage, contour farming, using cover crops, including grasses and legumes in the cropping system, and grassing of waterways are practices that help to reduce runoff and control erosion. The production potential for apples is high on this soil (fig. 3).

This soil has moderate potential for most urban uses. Permeability limits the performance of septic tank absorption fields, but this limitation can be reduced in places by modifying the field or increasing the size of the filter area. When this soil is used for dwellings or local roads, low shear strength limits performance and increases maintenance needs.

This soil has high potential for hardwoods and pines or other conifers. There are no major limitations to woodland use or management. Capability subclass IIe; woodland group 2o.

HyC—Hayesville loam, 7 to 15 percent slopes. This well drained soil is on broad, smooth, rolling foot ridges at the lower elevations. Areas are irregularly shaped and are 6 to 50 acres in size.

Typically, the surface layer is dark brown loam 4 inches thick. The subsurface layer is brown loam 4 inches thick. The subsoil is 36 inches thick. The upper part is yellowish red clay loam, the middle part is yellowish red and red clay loam, and the lower part is red sandy clay loam and sandy loam. The underlying layer is 68 inches thick. The upper part is red saprolite that crushes to sandy loam, and the lower part is gray and light gray soft saprolite that crushes to sandy loam.

Included with this soil in mapping are areas of soils that have a surface layer of fine sandy loam and a few areas of eroded soils. Also included are small areas of Bradson, Evard, and Fannin soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium to high. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Almost all areas of this soil have been cleared and are used for crops or pasture. Some areas are used for building sites and farmsteads.

This soil has medium potential for row crops such as corn, tobacco, potatoes, squash, green beans, and cabbage. Erosion is a hazard when this soil is cultivated, but practices such as minimum tillage, using a conservation cropping system that includes legumes and grasses, contour farming, grassing of waterways, stripcropping, and constructing terraces and diversions help to prevent excessive soil losses. The production potential is high for hay and pasture plants such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. The potential for apples is high, but slope is a limitation when the soil is used for this purpose.

This soil has moderate potential for most urban uses. Permeability and slope limit the performance of septic tank absorption fields, but this limitation can be reduced in places by modifying the field or increasing the size of the filter area. Low shear strength and slope limit performance and increase maintenance needs when this soil is used for dwellings or local roads.

This soil has high potential for hardwoods and pines or other conifers. There are no major limitations to woodland use and management. Capability subclass IIIe; woodland group 2o.

HyE—Hayesville loam, 15 to 25 percent slopes. This well drained soil is on smooth ridges at the lower elevations. Areas are irregularly shaped and are 6 to 30 acres in size.

Typically, the surface layer is dark brown loam 4 inches thick. The subsurface layer is brown loam 4 inches thick. The subsoil is 36 inches thick. The upper part is yellowish red clay loam, the middle part is yellowish red and red clay loam, and the lower part is red sandy clay loam and sandy loam. The underlying layer is 68 inches thick. The upper part is red saprolite that crushes to sandy loam, and the lower part is gray and light gray soft saprolite that crushes to sandy loam.

Included with this soil in mapping are small areas of soils that have a surface layer of fine sandy loam, and in some places there are some small areas of eroded soils. Also included are small areas of Evard and Fannin soils.

The organic-matter content of the surface layer is medium. Permeability is moderate, and available water capacity is medium to high. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for crops or pasture.

This soil has medium potential for most locally grown crops such as corn, tobacco, beans, and cabbage, but the hazard of erosion is very severe when the soil is cultivated. Practices such as minimum tillage, using a conservation cropping system that has long-term sod crops, contour farming, grassing of waterways, and establishing diversions help to reduce soil losses, conserve moisture, and maintain production. The production potential is medium for hay and pasture plants such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for apples is medium, but slope is a limitation to the operation of spraying and harvesting equipment.

This soil has low potential for most urban uses, such as septic tank absorption fields and dwellings and roads, because of slope. Extensive modification of the soil or major planning, special design, and intensive maintenance are generally required to overcome the limitation of slope. Erosion is a hazard where ground cover is removed. Permeability and slope limit the performance of septic tank filter fields.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass IVe; woodland group 2r.

Ko—Kinkora loam. This poorly drained, nearly level soil is on low terraces along the larger streams. Areas are irregularly shaped and are 4 to 20 acres in size.

Typically, the surface layer is dark gray loam 7 inches thick. The subsoil is mottled gray clay loam or clay 26 inches thick. The underlying layer, to a depth of 60 inches, is mottled gray clay.

Included with this soil in mapping are small areas of Hatboro and Delanco soils and a few areas of a soil that is not so wet as Kinkora soils.

The organic-matter content of the surface layer is low to medium. Permeability is moderately slow, and available water capacity is high. Shrink-swell potential is moderate. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 72 inches. The seasonal high water table is at or near the surface for 2 to 6 months each year. This soil is subject to occasional, brief flooding.

Most areas of this soil are cleared and used for crops or pasture.

This soil has medium production potential for corn and water-tolerant plants such as tall fescue, clover, and reed canarygrass. Production is limited because of flooding and a seasonal high water table.

This soil is slow to warm up in spring. Management practices such as minimum tillage, using cover crops, including legumes and grasses in the conservation cropping system, and draining the surface help to maintain soil tilth and production potential. Wetness limits the use of this soil for apple orchards. Winter crops, such as wheat, are commonly damaged by excessive wetness.

This soil has low potential for most urban uses. Slow permeability, a seasonal high water table, and flooding limit the use of the soil for building sites, septic tank absorption fields, and roads. The limitation of flooding and the moderate shrink-swell potential are difficult and costly to overcome. Special design and intensive maintenance are needed for roads and dwellings.

This soil has high potential for water-tolerant hardwoods and pines. Wetness is the main limitation to woodland use and management. Capability subclass IVw; woodland group 2w.

PoE—Porters stony loam, 15 to 25 percent slopes. This well drained soil is on mountainsides. Areas are elongated and are 6 to 25 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown stony loam 6 inches thick. The subsoil is 26 inches thick.

The upper part is dark brown loam, the middle part is yellowish brown clay loam, and the lower part is yellowish brown loam. The underlying layer, to a depth of 42 inches is brown saprolite that crushes to sandy loam. Hard gneiss is at a depth of 42 inches (fig. 4).

Included with this soil in mapping are small areas of nonstony soils and small areas of Edneyville, Evard, and Tusquitee soils.

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is medium acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is 40 to 72 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil are wooded or are reverting to woodland. A few summer cottages or vacation cabins have been built on sites that are accessible and have esthetic value. This soil has a low potential for cultivated crops and apples because of steep slopes, stoniness, and rapid runoff. It has medium potential for pasture plants such as bluegrass or sericea lespedeza.

This soil has low potential for most urban uses because of slope. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the main limitations to woodland use and management. Capability subclass VIs; woodland group 2x.

PoF—Porters stony loam, 25 to 45 percent slopes. This well drained soil is on north- and east-facing slopes of high mountains. Areas are irregularly shaped and are 10 to 40 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown stony loam 6 inches thick. The subsoil is 26 inches thick. The upper part is dark brown loam, the middle part is yellowish brown clay loam, and the lower part is yellowish brown loam. The underlying layer, to a depth of 42 inches, is brown saprolite that crushes to sandy loam. Hard gneiss is at a depth of 42 inches.

Included with this soil in mapping are small areas of nonstony soils. Also included are a few small areas of Edneyville and Tusquitee soils and a few very small areas of rock outcrop.

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is medium acid or strongly acid througout the profile unless the soil is limed. Depth to bedrock is 40 to 72 inches. The seasonal high water table is at a depth of more than 6 feet.

Almost all areas of this soil are wooded. A few areas are used as pasture. A few summer cottages or vacation cabins have been built on sites that are accessible and have esthetic value.

This soil has low production potential for cultivated crops, pasture plants, and apples because of slope and stoniness.

This soil has low potential for most urban uses because of slope. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the main limitations to woodland use and management. Capability subclass VIIs; woodland group 2x.

PoG—Porters stony loam, 45 to 70 percent slopes. This well drained soil is on the sides of high mountains. Areas are irregularly shaped and are 10 to 40 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is very dark grayish brown stony loam 6 inches thick. The subsoil is 26 inches thick. The upper part is dark brown loam, the middle part is yellowish brown clay loam, and the lower part is yellowish brown loam. The underlying layer, to a depth of 42 inches, is brown saprolite that crushes to sandy loam. Hard gneiss is at a depth of 42 inches.

Included with this soil in mapping are a few small areas of Edneyville and Ashe soils and a few very small areas of rock outcrop.

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is medium acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is 40 to 72 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil are wooded. A few isolated areas are used as native pasture or as sites for vacation homes.

This soil has low potential for row crops, hay, pasture plants, and apples. Slope and surface stones limit the potential of this soil for these uses.

This soil has low potential for most urban uses because of slope. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the main limitations to woodland use and management. Capability subclass VIIs; woodland group 2x.

Ro—Rosman loam. This well drained and moderately well drained nearly level soil is in slightly elevated positions commonly adjacent to streams on wide flood plains. Areas are somewhat elongated and are 4 to 20 acres in size.

Typically, the surface layer is dark brown loam 15 inches thick. The subsoil is yellowish brown loam and fine sandy loam 33 inches thick. The underlying layer, to a depth of 70 inches, is dark yellowish brown and dark grayish brown sandy loam.

Included with this soil in mapping are small areas of Comus and Codorus soils. Also included are a few areas of soils that have a water table nearer the surface than the Rosman soil.

The organic-matter content of the surface layer is medium. Permeability is moderately rapid, and available water capacity is medium. Shrink-swell potential is low.

Reaction is strongly acid to slightly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is below a depth of 4 feet. This soil is subject to frequent, very brief flooding.

Most areas of this soil have been cleared and are used for crops and pasture.

This soil has high potential for water-tolerant row crops and hay and pasture plants; however, because of flooding, these crops are damaged in places. Cabbage, green beans (fig. 5), squash, and corn can be grown continuously, but minimum tillage, cover crops, and including grasses and legumes in the conservation cropping system help to maintain soil tilth and production. The production potential for apples is low because of the hazard of flooding and the seasonal high water table.

This soil has low potential for most urban uses such as dwellings, roads, and septic tank absorption fields. The hazard of flooding is difficult and costly to overcome.

This soil has high potential for hardwoods and pines or other conifers. There are no major limitations to woodland use and management. Capability subclass IIw; woodland group 1o.

SpF—Spivey stony loam, 10 to 40 percent slopes. This well drained soil is on the upper side slopes of mountains. Areas are elongated and are 4 to 15 acres in size. Large stones cover 5 to 15 percent of the surface.

Typically, the surface layer is very dark brown stony loam 13 inches thick. The subsoil is dark brown stony loam 24 inches thick. The underlying layer, to a depth of 42 inches, is dark brown stony sandy loam (fig. 6).

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

The organic-matter content of the surface layer is high. Permeability is moderate to moderately rapid, and available water capacity is medium. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is 40 to 75 inches or more. The seasonal high water table is at a depth of more than 5 feet.

Almost all areas of this soil are wooded.

This soil has low potential for row crops, hay and pasture plants, and apple orchards. Slope and stoniness limit the suitability of this soil for these uses.

This soil has low potential for most urban uses because of steep slopes.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the main limitations to woodland use and management. Capability subclass VIIs; woodland group 2x.

Su—Suncook loamy sand. This excessively drained, nearly level soil is on flood plains. Areas consist of long narrow strips adjacent to streams and are 4 to 15 acres in size.

Typically, the surface layer is dark grayish brown loamy sand 9 inches thick. The underlying layer, to a depth of 72 inches, is brown loamy sand and sand.

Included with this soil in mapping are small areas of Comus and Rosman soils.

The organic-matter content of the surface layer is medium. Permeability is rapid, and available water capacity is low. Shrink-swell potential is low. Reaction is strongly acid to slightly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of 3 to 6 feet. This soil is subject to frequent, brief flooding.

Most areas of this soil have been cleared and are used as pasture. A few areas are used for crops or woodland.

This soil has medium production potential for corn and drought-tolerant truck crops. Potential is limited because of flooding and the low available water capacity. The production potential for sericea lespedeza and other drought-tolerant forage plants is high on this soil, but the potential for forage production is medium when tall fescue and orchardgrass are grown. Use of minimum tillage, cover crops, and grasses and legumes in the conservation cropping system helps to control erosion and increase the available water capacity. The production potential is low for apples because of frost pockets.

This soil has low potential for urban uses, such as dwellings, roads, and septic tank absorption fields, because of the hazard of flooding. Special design and intensive maintenance to overcome this limitation are difficult and costly.

This soil has high potential for pines or hardwoods. Sandiness and low available water capacity are the main limitations for woodland use and management. Capability subclass IIIs; woodland group 5s.

TaF—Talladega silt loam, 25 to 45 percent slopes. This well drained soil is on uneven sides of mountains. Areas are irregularly shaped and are 6 to 50 acres in size.

Typically, the surface layer is dark yellowish brown silt loam 5 inches thick. The subsoil is yellowish red silty clay loam 19 inches thick. The underlying layer, to a depth of 36 inches, is yellowish red saprolite that crushes to loam. Moderately hard schist is at a depth of 36 inches.

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

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is medium. Shrink-swell potential is low. Reaction is very strongly acid or strongly acid throughout the profile unless the soil is limed. Depth to bedrock is more than 26 inches. The seasonal high water table is at a depth of more than 6 feet.

Almost all areas of this soil are wooded. A few areas are used as pasture. A few summer cottages or vacation cabins have been built on sites that are accessible and have esthetic value.

This soil has low production potential for cultivated crops, pasture plants, and apples because of slope.

This soil has low potential for most urban uses because of slope. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has a medium potential for pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass VIIs; woodland group 3r.

TeB—Tate fine sandy loam, 2 to 7 percent slopes. This well drained soil is on smooth foot slopes and in lower coves. Areas are somewhat elongated and are 4 to 15 acres in size.

Typically, the surface layer is dark brown fine sandy loam 9 inches thick. The subsoil is 46 inches thick. The upper part is yellowish brown and brownish yellow clay loam, and the lower part is mottled pale brown sandy clay loam. The underlying layer, to a depth of 65 inches, is mottled light gray fine sandy loam.

Included with this soil in mapping are small areas of Brevard and Delanco soils.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is very strongly acid to medium acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Areas of this soil have been cleared and are used for crops.

This soil has high production potential for row crops such as corn, tobacco, cabbage, potatoes, beans, and squash and for pasture and hay forage plants such as Kentucky bluegrass, fescue, orchardgrass, sericea lespedeza, and alfalfa. The hazard of erosion is moderate if cultivated crops are grown. Minimum tillage, contour farming, using cover crops, including grasses and legumes in the cropping system, and grassing of waterways are practices that help to reduce runoff, control erosion, and maintain production potential. The production potential for apples is high. Management limitations are minor for this use, but frost pockets are a hazard in places.

This soil has high potential for most urban uses, such as dwellings and roads. Good performance and low maintenance can be expected. The permeability limits performance of septic tank absorption fields, but this limitation can be overcome by modifying the field or increasing the size of the filter area.

This soil has high potential for hardwoods and pines or other conifers. There are no limitations to woodland use and management. Capability subclass IIe; woodland group 2o.

TeC—Tate fine sandy loam, 7 to 15 percent slopes. This well drained soil is on smooth foot slopes and in lower coves. Areas are somewhat elongated and are 4 to 15 acres in size.

Typically, the surface layer is dark brown fine sandy loam 9 inches thick. The subsoil is 46 inches thick. The upper part is yellowish brown and brownish yellow clay loam, and the lower part is mottled pale brown sandy clay loam. The underlying layer, to a depth of 65 inches, is mottled light gray fine sandy loam.

Included with this soil in mapping are some small areas of Brevard and Tusquitee soils.

The organic-matter content of the surface layer is low to medium. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is very strongly acid to medium acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for crops. A few areas are used for pasture.

This soil has medium potential for row crops such as corn, tobacco, potatoes, squash, green beans, and cabbage. The hazard of erosion is severe when this soil is cultivated, but practices such as minimum tillage, using a conservation cropping system that includes legumes and grasses, contour farming, grassing of waterways, stripcropping, and constructing terraces and diversions help to reduce runoff and erosion and maintain optimum production. The production potential is high for hay and pasture plants such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for apples is medium, but slope is a minor limitation.

This soil has moderate potential for most urban uses, such as dwellings, septic tank absorption fields, and roads. The limitation of slope can be reduced or modified by special planning, design, or maintenance. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. There are no major limitations to woodland use and management. Capability subclass IIe; woodland group 2o.

To—Toxaway silt loam. This very poorly drained and poorly drained, nearly level soil is in depressional areas on the larger flood plains. Areas are irregularly shaped and are 4 to 30 acres in size.

Typically, the surface layer is 36 inches thick. The upper part is very dark gray to black silt loam, and the lower part is very dark gray loam. The underlying layer, to a depth of 72 inches, is very dark gray sandy loam in the upper part, grayish brown sand in the middle part, and gray sandy clay loam or loamy sand in the lower part.

Included with this soil in mapping are a few small areas of soils that are better drained than this Toxaway soil. Also included are small areas of Hatboro and Codorus soils.

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at or near the surface. This soil is subject to frequent, very brief flooding.

Most areas of this soil have been cleared and are used for pasture or crops. A few areas are wooded.

This soil has medium production potential for corn and water-tolerant plants such as tall fescue, clover, and reed canarygrass. Production is limited because of flooding and a seasonal high water table. This soil is slow to warm up in spring. Management practices such as minimum tillage, using cover crops, including legumes and grasses in the conservation cropping system, and draining the surface help to maintain soil tilth and production. Wetness limits the use of this soil for apple orchards.

This soil has low potential for most urban uses. Slow water movement through the soil and the hazard of flooding limit use for septic tank absorption fields. The limitation of flooding is difficult and costly to overcome for roads and dwellings.

This soil has high potential for water-tolerant hardwoods and pines. Wetness is the main limitation to woodland use and management. Capability subclass IVw; woodland group 2w.

TsC—Tusquitee loam, 7 to 15 percent slopes. This well drained soil is on smooth foot slopes and in coves on high mountains. Areas are somewhat elongated and are 4 to 25 acres in size.

Typically, the surface layer is 10 inches thick. The upper part is very dark grayish brown loam, and the lower part is dark brown loam. The subsoil is 41 inches thick. The upper part is brown clay loam and dark brown clay loam, and the lower part is yellowish brown loam. The underlying layer, to a depth of 70 inches, is brown fine sandy loam in the upper part and pale brown sandy loam in the lower part.

Included with this soil in mapping are small areas of Tate and Brevard soils.

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil have been cleared and are used for crops. A few areas are used for pasture.

This soil has medium potential for row crops such as corn, tobacco, potatoes, squash, green beans, and cabbage. The hazard of erosion is severe when this soil is cultivated, but practices such as minimum tillage, using a conservation cropping system that includes legumes and grasses, contour farming, grassing of waterways, stripcropping, and establishing terraces and diversions help to reduce runoff and erosion and maintain optimum production. The production potential is high for hay and pasture plants such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for apples is medium, but slope is a minor limitation to this use.

This soil has moderate potential for most urban uses, such as dwellings, septic tank absorption fields, and roads. The limitation of slope can be reduced or modified by special planning, design, or maintenance. Erosion is a hazard where ground cover is removed.

This soil has high potential for hardwoods and pines or other conifers. There are no major limitations to woodland use and management. Capability subclass IIIe; woodland group 2o.

TsE—Tusquitee loam, 15 to 25 percent slopes. This well drained soil is on foot slopes, in coves, and on high mountains. Areas are somewhat elongated and are 6 to 40 acres in size.

Typically, the surface layer is 10 inches thick. The upper part is very dark grayish brown loam, and the lower part is dark brown loam. The subsoil is 41 inches thick. The upper part is brown clay loam and dark brown clay loam, and the lower part is yellowish brown loam. The underlying layer, to a depth of 70 inches, is brown fine sandy loam in the upper part and pale brown sandy loam in the lower part.

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

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Most areas of this soil are cleared and used for crops. A few areas are used for pasture or are wooded.

This soil has medium potential for most locally grown crops such as corn, tobacco, beans, and cabbage, but the hazard of erosion is very severe when the soil is cultivated. Practices such as minimum tillage, using conservation cropping systems with long-term sod crops, contour farming, grassing of waterways, and establishing diversions help to reduce soil losses, conserve moisture, and maintain production. The production potential is medium for hay and pasture plants such as tall fescue, bluegrass, orchardgrass, clover, and sericea lespedeza. Proper pasture management helps to insure adequate protective cover. The potential for apples is medium, but slope is a limitation to the operation of spraying and harvesting equipment.

This soil has low potential for most urban uses, such as septic tank absorption fields and dwellings and roads, because of slope. Extensive modification of the soil or major planning, design, and intensive maintenance are generally required to overcome the limitation of slope. Erosion is a hazard where ground cover is removed. Permeability and slope limit performance of septic tank filter fields.

This soil has high potential for hardwoods and pines or other conifers. Slope is the main limitation to woodland use and management. Capability subclass IVe; woodland group 2r.

TuC—Tusquitee stony loam, 7 to 15 percent slopes. This well drained soil is on foot slopes and in coves of high mountains (fig. 7). Areas are somewhat elongated and are 4 to 25 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is 10 inches thick. The upper part is very dark grayish brown stony loam, and the lower part is dark brown stony loam. The subsoil is 41 inches thick. The upper part is brown clay loam, and the lower part is dark brown clay loam and yellowish brown loam. The underlying layer, to a depth of 70 inches, is brown fine sandy loam in the upper part and pale brown sandy loam in the lower part.

Included with this soil in mapping are small areas of Tate and Brevard soils.

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Some areas of this soil have been cleared and are used for pasture, and others are wooded.

This soil has low potential for row crops, but potential is medium for pasture plants. The potential for both uses is limited by slope and surface stones. Controlled grazing, brush and weed control, and fertilization help to maintain production potential, control erosion, and reduce runoff. The production potential for apples is medium. Slope and surface stones are limitations to management for this soil.

This soil has moderate potential for urban uses, such as dwellings, roads, and septic tank absorption fields. The limitation of slope can be reduced, but in most places it is difficult and costly to alter the slope or to design a system that will function properly.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the main limitations to woodland use and management. Capability subclass IVs; woodland group 2x.

TuE—Tusquitee stony loam, 15 to 25 percent slopes. This well drained soil is on foot slopes and in coves on high mountains. Areas are somewhat elongated and are 6 to 50 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is 10 inches thick. The upper part is very dark grayish brown stony loam, and the lower part is dark brown stony loam. The subsoil is 41 inches thick. The upper part is brown and dark brown clay loam, and the lower part is yellowish brown loam. The underlying layer, to a depth of 70 inches, is brown fine sandy loam in the upper part and pale brown sandy loam in the lower part.

Included with this soil in mapping are small areas of Brevard and Tate soils.

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Almost all areas of this soil are wooded. A few areas are used for pasture (fig. 8). A few summer cottages or vacation cabins have been built on sites that are accessible and have esthetic value.

This soil has a low production potential for cultivated crops, pasture plants, and apples because of slope and stoniness.

This soil has low potential for most urban uses because of slope. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the main limitations to woodland use and management. Capability subclass VIe; woodland group 2x.

TuF—Tusquitee stony loam, 25 to 45 percent slopes. This well drained soil is in coves on high mountains. Areas are somewhat elongated and are 10 to 50 acres in size. Stones cover 5 to 15 percent of the surface.

Typically, the surface layer is 10 inches thick. The upper part is very dark grayish brown stony loam, and the lower part is dark brown stony loam. The subsoil is 41 inches thick. The upper part is brown and dark brown clay loam, and the lower part is yellowish brown loam. The underlying layer, to a depth of 70 inches, is brown fine sandy loam in the upper part and pale brown sandy loam in the lower part.

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

The organic-matter content of the surface layer is high. Permeability is moderate, and available water capacity is high. Shrink-swell potential is low. Reaction is strongly acid or medium acid throughout the profile unless the soil is limed. Depth to bedrock is more than 60 inches. The seasonal high water table is at a depth of more than 6 feet.

Almost all areas of the soil are wooded. A few areas are used for pasture. A few summer cottages or vacation cabins have been built on sites that are accessible and have esthetic value.

This soil has low potential for cultivated crops, pasture plants, and apples because of slope and stoniness.

This soil has low production potential for most urban uses because of slope. Onsite evaluation and planning are needed when this soil is used for septic tank absorption fields, roads, or dwellings.

This soil has high potential for hardwoods and pines or other conifers. Slope and stoniness are the main limitations to woodland use and management. Capability subclass VIIs; woodland group 2x.

Planning the Use and Management of the Soils

The soil survey is a detailed analysis and evaluation of the most basic resource of the survey area—the soil. It may be used to fit the use of the land, including urbanization, to the limitations and potentials of the natural resources and the environment and to help avoid soil-related failures in uses of the land.

During a soil survey soil scientists, conservationists, engineers, and others keep extensive notes, not only about the nature of the soils but also about unique aspects of behavior of these soils in the field and at construction sites. These notes include observations of erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors relating the kinds of soil and their productivity, potentials, and limitations under various uses and management. In this way field experience incorporated with measured data on soil properties and performance is used as a basis for predicting soil behavior.

Information in this section will be useful in applying basic facts about the soils to plans and decisions for use and management of soils for crops and pasture, woodland, and many nonfarm uses, including building sites, highways and other transportation systems, sanitary facilities, parks and other recreational developments, and wildlife habitat. From the data presented, the potential of each soil for specified land uses may be determined, soil limitations to these land uses may be identified, and costly failures in homes and other structures, because of unfavorable soil properties, may be avoided. A site can be selected where the soil properties are favorable, or practices can be planned that will overcome the soil limitations.

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. Both of these factors are closely related to the nature of the soil. Plans can be made to maintain or create a land use pattern in harmony with the natural soil.

Contractors can find information 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 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, trees and shrubs, and most other uses of land are influenced by the nature of the soil.

Crops and Pasture

E. R. WALLER, JR., conservation agronomist, Soil Conservation Service, assisted in the preparation of this section.

The main crops, other than woodland, that are grown in Henderson County are corn, forage plants, and apples. In some areas truck crops and burley tobacco are grown.

According to the Conservation Needs Inventory of North Carolina, in 1967 about 60,000 acres in the survey area was used for crops and pasture: 25,000 acres for permanent pasture and 35,000 acres for row crops. Acreage used for crops and pasture has gradually decreased as more land has been converted to urban development or woodland.

The major use and management concerns vary in different parts of the county. In the valleys and foothills the concerns are wetness, steepness of slope, and in places stoniness. Management objectives are improvement and maintenance of fertility and drainage and the reduction of erosion.

In the mountainous areas, very little farming is done, except in the narrow valleys. Many areas of soils are stony. These soils are used for woodland or as sites for summer homes. The use of the soils for woodland is discussed in the section, "Woodland Management and Productivity."

Management is needed on the soils used for crops to help control erosion, to provide drainage, and to maintain or improve tilth, organic-matter content, and fertility.

Soil erosion is the major concern on most of the cropland and pasture in Henderson County, particularly the Hayesville, Evard, and Bradson soils. If slope is more than 2 percent, the hazard of erosion is a concern. Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Second, erosion on farmland results in sediment entering streams. Control of erosion minimizes the pollution of streams by sediment and improves the quality of water for municipal use, for recreation, and for fish and wildlife.

Erosion control practices also help to maintain protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps plant cover on the soil for extended periods can hold erosion losses to amounts that will not reduce the productive capacity of the soils. On livestock farms that require pasture and hay, using legumes and grasses in the cropping system reduces erosion on sloping soils and improves tilth for other crops.

Cropping systems that provide substantial plant cover must be used to control erosion if minimum tillage is not practiced. Minimizing tillage and leaving crop residue on the surface help to increase infiltration and reduce the hazards of runoff and erosion. These practices can be applied to most soils in the survey area that are used for cropland. No-till farming on soils used for corn is effective in reducing erosion on sloping land. This practice can be used on most soils in the survey area, but it is more difficult to use successfully on the soils that have a clayey surface layer.

Establishing terraces and diversions reduces the length of slope and reduces runoff and erosion. This practice is better suited to deep, well-drained soils that have regular slopes, such as Bradson and Hayesville soils.

Farming on the contour is a widespread erosion-control practice in the survey area. This practice is well suited to soils that have smooth, uniform slopes, such as Edneyville, Fannin, and Hayesville soils. Information on erosion-control practices suitable for use on each kind of soil is available in local offices of the Soil Conservation Service.

Drainage is the major concern of management on a few of the soils, such as Kinkora and Hatboro soils, when they are used for crops and pasture. These soils are so wet that the production of crops common to the area is limited unless a drainage system is installed.

Wet soils warm up more slowly in spring than better drained soils. On wet soils, tillage is delayed in spring and farm machinery often bogs down. Drainage can be improved by constructing ditches and installing tile. Tile can be used to remove excess water in drainageways, seeps, and depressions. Shallow waterways can be used to remove water from depressions in fields.

Returning crop residue to the soil reduces crusting and evaporation, adds organic matter, and helps to maintain tilth and fertility. Soils that are tilled when wet lose their granular structure and become cloddy and hard when dry. Bare soils tend to develop a hard surface crust upon drying.

Most of the well drained soils in the survey area are suitable for orchards, vegetables, and tobacco, but soils in low positions, where frost is frequent and drainage is poor, generally have low potential for early vegetables and apple orchards. Tobacco and vegetables generally are grown on the alluvial soils, such as Rosman or Elsinboro soils, where tilth is good and moisture is sufficient. Steep slopes limit use of spraying and harvesting equipment.

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

The application of lime, manure, and commercial fertilizer helps to maintain tilth and improve productivity. Application rates should be according to the needs indicated by soil tests. Consideration needs to be given to past use of the soil, as well as to the potential of the soil to produce the desired yields.

Yields Per Acre

The per acre average yields 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 table 4 because of seasonal variations in rainfall and other climatic factors. Absence of a yield estimate indicates that the crop is not suited to or not commonly grown on the soil.

The predicted yields are 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 latest soil and crop management practices used by many farmers in the county are assumed in predicting the yields. Hay and pasture yields are predicted for varieties of grasses and legumes suited to the soil. A few farmers may be using more advanced practices and are obtaining average yields higher than those shown in table 4.

The management needed to achieve the indicated yields of the various crops depends upon 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.

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

Capability Classes and Subclasses

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The soils are grouped 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 rice, cranberries, horticultural crops, or other crops that require special management. This classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for range, for forest trees, or for engineerng purposes.

In this survey, all kinds of soils are grouped into capability class and subclass. These levels are defined in the following paragraphs.

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, defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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, range, woodland, wildlife habitat, or recreation.

The capability subclass is identified in the description of each soil mapping unit in the section "Soil Maps for Detailed Planning."

Woodland Management and Productivity

Table 5 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for those soils suitable for wood crops are listed alphabetically by soil name, and the ordination symbol for the woodland group of 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 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 no significant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the order in which the letters are listed above—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. The ratings of slight, moderate, and severe are used to indicate the degree of major soil limitations.

Ratings of the hazard of erosion 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. The ratings are for seedlings from good planting stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The potential productivity of merchantable 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.

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

Engineering

JOHN F. RICE, assistant state conservation engineer, assisted with this section.

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

The ratings in tables in this section 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 the soil survey and used in determining the ratings in this section are grain-size distribution, liquid limit, plasticity index, soil reaction, depth to and hardness of bedrock within 5 or 6 feet of the surface, soil wetness characteristics, depth to a seasonal 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.

Based on the information assembled about soil properties, ranges of values may 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 may be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to—(1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternate routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternate 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 and testing.

The information is presented mainly in tables. Table 6 shows, for each kind of soil, ratings of 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 different meanings in soil science and in engineering; the Glossary defines many of these terms.

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 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 used for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by the soil wetness of a high seasonal 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 foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence from settling or shear failure of the foundation do 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 the 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 limitation.

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 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 AASHTO and Unified 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, all of which affect stability and ease of excavation, were also considered.

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 deal with the 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 these uses and for use of the soil as daily cover for landfills.

If the degree of soil limitation is indicated by the rating *slight*, soils are favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance are 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 effect the absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and a shallow depth to bedrock interfere with installation. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas. Also, soil erosion and soil slippage are hazards where absorption fields are installed in sloping soils.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and as a result ground water supplies in the area may be contaminated.

Percolation tests are performed to determine the absorptive capacity of the soil and its suitability for septic tank absorption fields. These tests should be performed during the season when the water table is highest and the soil is at minimum absorptive capacity.

In many of the soils that have moderate or severe limitations for septic tank absorption fields, it may be possible to install special systems that lower the seasonal water table or to increase the size of the absorption field so that satisfactory performance is achieved.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor area surrounded by cut slopes or embankments of compacted, nearly impervious soil material. Aerobic bacteria generally are designed so that depth of the sewage is 2 to 5 feet. Impervious soil for the lagoon floor and sides is required to minimize seepage and contamination of local ground water. Soils that are very high in organic matter and those that have stones and boulders are undesirable. Unless the soil has very slow permeability, contamination of local ground water is a hazard in areas 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 its capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the location 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, either in excavated trenches or on the surface of the soil. The waste is spread, compacted in layers, and covered with thin layers of soil. Landfill areas are subject to heavy vehicular traffic. Ease of excavation, risk of polluting ground water, and trafficability affect the suitability of a soil for this purpose. The best soils have a loamy or silty texture, have moderate or slow permeability, are deep to bedrock and a seasonal water table, are free of large stones and boulders, and are not subject to flooding. In areas where the seasonal water table is high, water seeps into the trenches and causes problems in excavating and filling the trenches. Also, seepage into the refuse increases the risk of pollution of ground water. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability that might allow noxious liquids to contaminate local ground water.

Unless otherwise stated, the ratings in table 7 apply only to soil properties and features within a depth of about 6 feet. If the trench is deeper, ratings of slight or moderate may not be valid. Site investigation is needed before a site is selected.

In the area type of sanitary landfill, refuse is placed on the surface of the soil in successive layers. The limitations caused by soil texture, depth to bedrock, and stone content do not apply to this type of landfill. Soil wetness, however, may be a limitation because of difficulty in operating equipment.

Daily cover for sanitary landfills should be soil that is easy to excavate and spread over the compacted fill during both 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.

In addition to these features, the soils selected for final cover of landfills should be suitable for growing plants. In comparison with other 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, such as 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 and described as the survey is made, generally about 6 feet.

Roadfill is soil material used in embankments for roads. The ratings reflect the ease of excavating and working the material and the expected performance of the material after 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 soil properties that determine such performance is given in the descriptions of soil series.

The ratings apply to the soil profile 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 the profile. The estimated engineering properties in table 12 provide more specific information about the nature of each horizon that can help determine its suitability for roadfill.

Soils rated *good* 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 high shrink-swell potential, high potential frost action, steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*, regardless of the quality of the suitable material.

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, reaction, and stratification are given in the soil series descriptions and in tables 12 and 13.

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 sustain the growth of plants. Also considered is the damage that would result to the area from which the topsoil is taken.

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

Soils rated *fair* are loose, sandy 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, 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 much 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. Consequently, careful preservation and use of material from these horizons is desirable.

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 limitation 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 rated 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 suitable for this use have low seepage potential, which is determined by the permeability and depth over fractured or permeable bedrock or other permeable material.

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

An *aquifer-fed excavated pond* is a body of water created 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, structure, depth to claypan or other layers that influence 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.

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

Grassed waterways are constructed to channel runoff at nonerosive velocities to outlets. Features that affect the use of soils for waterways are slope, permeability, erodibility, 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 camp areas, picnic areas, playgrounds, and paths and trails. 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 recreational use by the duration of flooding and the season when it occurs. Onsite assessment of height, duration, and frequency of flooding is essential in planning recreational facilities.

In table 10 the limitations of soils are rated 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 additional 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 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 nor 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 not wet nor 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 rock should be sufficient to allow necessary grading.

The design and layout of paths and trails for walking, horseback riding, and bicycling 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 period of use. They should have moderate slopes and have few or no stones or boulders on the surface.

Wildlife Habitat

JOHN P. EDWARDS, biologist, assisted in the preparation of this section.

Approximately 28,000 acres of Federal and State owned or leased land is available for wildlife habatat. Many privately owned areas are also used for wildlife habitat.

Waterfowl populations generally are limited to ducks using the French Broad River and adjoining tributaries and larger ponds.

Primary species that are hunted are squirrels, quails, doves, and rabbits. Larger species, such as bears, deer, and wild turkeys, are hunted mainly on the Pisgah National Forest.

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

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by properly managing the existing plant cover, and by fostering 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—

1. Planning the use of parks, wildlife refuges, nature study areas, and other developments for wildlife.
2. Selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat.
3. Determining the intensity of management needed for each element of the habitat.
4. Determining areas that are suitable for acquisition to manage for wildlife.

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. Moderate intensity of management and fairly frequent attention are 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 requires intensive effort. 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, sorghum, wheat, oats, barley, millet, buckwheat, cowpeas, soybeans, and sunflowers. 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, bluegrass, lovegrass, switchgrass, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, and crownvetch. 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 herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are bluestem, indiangrass, goldenrod, beggarweed, pokeweed, partridgepea, wheatgrass, fescue, 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, persimmon, sassafras, sumac, hickory, hazelnut, black walnut, blackberry, grape, blackhaw, viburnum, blueberry, bayberry, and briers. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated good are Russian-olive, autumn-olive, and crabapple. 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 that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are pine, spruce, hemlock, fir, yew, cedar, and juniper. Major soil properties that affect the growth of coniferous plants shrubs are depth of the root zone, available water capacity, and wetness.

Shrubs are bushy woody plants that produce fruits, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Examples are mountainmahogany, bitterbrush, snowberry, and big sagebrush. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture.

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, rushes, sedges, reeds, wildrice, cordgrass, and cattail. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness.

Shallow water areas are bodies of surface water that have an average depth of less than 5 feet and 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 muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife 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 croplands, pastures, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, killdeer, cottontail rabbit, red fox, and woodchuck.

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

Wetland habitat consists of water-tolerant plants in open, marshy, or swampy shallow water areas. Examples of wildlife attracted to this habitat are ducks, geese, rails, kingfishers, muskrat, mink, and beaver.

Soil Properties

Extensive data about soil properties collected during the soil survey 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 samples selected from representative soil profiles in the field.

When he makes soil borings during field mapping, the soil scientist can identify several important soil properties. He notes the seasonal soil moisture condition, or the presence of free water and its depth in the profile. For each horizon, he notes the thickness of the soil and its color; the texture, or the amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or natural pattern of cracks and pores in the undisturbed soil; and the consistence of soil in-place under the existing soil moisture conditions. He records the root depth of existing plants, determines soil pH or reaction, and identifies any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to characterize 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 of the soil series are available from nearby areas.

Based on summaries of available field and laboratory data, and listed in tables in this section, are estimated ranges in engineering properties and classifications and in physical and chemical properties for each major horizon of each soil in the survey area. Also, pertinent soil and water features and engineering test data are presented.

Engineering Properties

Table 12 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area. These estimates are presented as ranges in values most likely to exist in areas where the soil is mapped.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Information is presented for each of these contrasting horizons. Depth to the upper and lower boundaries of each horizon in a typical profile of each soil is indicated. More information about the range in depth and in properties of each horizon is given for each soil series in "Soil Series and Morphology."

Texture is described in table 12 in standard terms used by the United States 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 used by USDA are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified soil classification system (*2*) and the American Association of State Highway and Transportation Officials soil classification system (AASHTO) (*1*). In table 12 soils in the survey area are classified according to both systems.

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 as 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 as 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 more 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 cobbles, or the rock fragments more than 3 inches in diameter, are estimated for each major horizon. These estimates are determined largely by observing volume percentage in the field and then converting it, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four standard sieves 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 consistency of soil. These indexes are used in both the Unified and the 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.

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 representative profile 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 between 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 water movement in a vertical direction when the soil is saturated. Not considered in the estimates are lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in the planning and design of 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 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 and ornamental 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 it was estimated on the basis of the kind of clay and on measurements of similar soils. Size of imposed loadings and the magnitude of changes in soil moisture content are also important factors that 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, as used in table 13, 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 rating of soils for corrosivity to concrete is based mainly on the sulfate content, soil texture, and acidity. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Installations of steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely within one kind of soil or within one soil horizon.

Soil and Water Features

Features that relate to runoff or infiltration of water, to flooding, and to grading and excavation of each soil are indicated in table 14. This information is helpful in planning land uses and engineering projects that are likely to be affected by the amount of runoff from watersheds, by flooding and a seasonal high water table, or by the presence of bedrock in the upper 5 or 6 feet of the soil.

Flooding is rated in general terms that describe the frequency, duration, and period of the year when flooding is most likely. The ratings are based on evidences 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; absence of distinctive soil horizons that form in soils of the area that are not subject to flooding local information about floodwater heights and the extent of flooding; and local knowledge that relates the unique landscape position of each soil to historic floods. Most soils in low positions on the landscape where flooding is likely to occur are classified as fluvents at the suborder level or as fluventic subgroups. See the section "Classification of the Soils."

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.

A seasonal high water table is the highest level of a saturated zone more than 6 inches thick in soils 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 during the course of the soil survey. Indicated are the depth to the seasonal high water table; the kind of water table, whether perched, artesian, or the upper part of the ground water table; and the months of the year that the high water commonly is present. Only those 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 to construct basements 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 depths of 5 to 6 feet or less. For many soils, limited ranges in 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 other observations during the soil mapping. The kind of bedrock and its relative 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

Samples of 6 soils were tested by the North Carolina State Highway Commission so that the soils could be evaluated for engineering purposes. For the soil series not tested, classification was estimated from descriptions of soil profiles written by the soil scientists. The test data are given in table 15. The test data indicate the characteristics of the soil at the specified location. The physical characteristics of similar soils at other locations may vary from those of the soil sampled. All samples were obtained at a depth of less than 7 feet.

The engineering classifications in table 15 are based on data obtained by mechanical analyses and by tests made to determine liquid limits and plastic limits. Mechanical analyses were made by combined sieve and hydrometer methods.

Moisture density data are obtained by compacting soil material at a successively higher moisture content. Assuming that the compactive effort remains constant, the density of the compacted material increases until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest density obtained in the compaction test is termed "maximum dry density." Optimum stability is obtained if the soil is compacted to about the maximum dry density when it is at approximately the optimum moisture content.

The tests to determine plastic limit and liquid limit measure the effect of water on the consistency of the soil material. As the moisture content of a clayey soil increases from a dry state, the material changes from a semisolid to a plastic state. As the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the material passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the material passes from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. The plasticity index indicates the range of moisture content within which soil material is in a plastic condition.

Classification of the Soils

This section describes the soil series of the survey area, defines the current system of classifying soils, and classifies the soils of the area according to that system.

Soil Series and Morphology

On the following pages each soil series in the survey area is described in detail. The series descriptions are presented in alphabetic order by series name.

For each series, some facts about the soil and its parent material are presented first. 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 mapped in this survey area. Phases, or mapping units, of each soil series are described in the section "Soil Maps for Detailed Planning."

Ashe Series

The Ashe series consists of somewhat excessively drained, moderately rapidly permeable, moderately steep to very steep soils that formed in residuum weathered dominantly from granite and gneiss but in some places from arkose and graywacke. Slopes are 15 to 70 percent.

Typical pedon of Ashe stony sandy loam, 25 to 45 percent slopes, about 2 miles east of Bat Cave, in a wooded area, 1.1 miles south of N.C. Highway 9 and 50 feet east of State Road 1609:

O1—2 inches to 1 inch, fresh leaves and twigs.

O2—1 inch to 0, black mat of live fine roots and decayed vegetation.

A11—0 to 1 inch, dark brown (10YR 4/3) stony sandy loam; weak fine granular structure; very friable; many fine and medium roots; 5 percent stones; very strongly acid; abrupt smooth boundary.

A12—1 to 7 inches, yellowish brown (10YR 5/4) stony sandy loam; weak fine granular structure; very friable; many fine roots; 5 percent coarse quartz fragments; very strongly acid; clear smooth boundary.

B2—7 to 21 inches, yellowish brown (10YR 5/4) sandy loam; weak medium subangular blocky structure; very friable; common fine roots; few flakes of mica; about 10 percent coarse fragments; very strongly acid; gradual wavy boundary.

C—21 to 30 inches, gray (10YR 6/1) saprolite that crushes to sandy loam; rock controlled structure; friable; few fine roots; about 30 percent coarse fragments; very strongly acid; abrupt smooth boundary.

R—30 inches, moderately hard granite-gneiss rock; hardness increases with depth.

The solum is 20 to 36 inches thick. Depth to bedrock is 20 to 40 inches. About 5 to 15 percent of the surface is covered with stones. The profile is very strongly acid or strongly acid throughout, unless limed.

The A horizon is very dark grayish brown, grayish brown, dark brown, brown, or yellowish brown loam or sandy loam.

The B2 horizon is yellowish brown, strong brown, or brownish yellow loam or sandy loam.

The C horizon is gray, brownish yellow, or pale brown granite gneiss saprolite that crushes to sandy loam and is 15 to 30 percent coarse fragments.

Bradson Series

The Bradson series consists of well drained, moderately permeable, gently sloping to strongly sloping soils that formed in colluvium and alluvium derived from a mixture of crystalline rocks. Slopes are 2 to 15 percent.

Typical pedon of Bradson gravelly loam, 2 to 7 percent slopes, in a field 0.5 mile southwest of Etowah Post Office and 200 feet south of U.S. Highway 64 and State Road 1205 intersection, 50 feet west of State Road 1205:

Ap—0 to 6 inches, reddish brown (5YR 4/4) gravelly loam; weak coarse and fine granular structure; friable; many fine roots; few fine flakes of mica; 20 percent smooth rounded quartz gravel; medium acid; abrupt smooth boundary.

B21t—6 to 24 inches, red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm; sticky and slightly plastic; few fine roots; thin continuous clay films on faces of peds; about 10 percent smooth quartz gravel; strongly acid; gradual smooth boundary.

B22t—24 to 40 inches, red (2.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; sticky and slightly plastic; few fine roots; common fine flakes of mica; thin continuous clay films on faces of peds; few smooth gravel; strongly acid; gradual smooth boundary.

B3—40 to 65 inches, red (2.5YR 4/8) clay loam; weak medium subangular blocky structure; friable; slightly sticky and slightly plastic; thin discontinuous clay films on faces of peds; common soft fragments of minerals; very strongly acid; gradual smooth boundary.

IIC—65 to 75 inches, reddish yellow (5YR 6/8) saprolite that crushes to loam; rock controlled structure; friable; slightly sticky and plastic; very strongly acid.

The Bradson soils have a solum that is 60 to 80 inches thick. Depth to bedrock is more than 60 inches. Gravel covers 5 to 25 percent of the surface. The profile is very strongly acid to strongly acid throughout, unless limed.

The A horizon is brown, dark brown, reddish brown, or yellowish red gravelly loam or gravelly sandy loam.

The B1 horizon, if present, is red or yellowish red clay loam or sandy clay loam. The B2t horizon is red or yellowish red clay loam, sandy clay, or clay. The B3 horizon is red or yellowish red clay loam or sandy clay loam. In some pedons the B3 horizon is underlain by a stone line or a B horizon of an older land surface.

The IIC horizon is variegated yellowish red, red, and reddish yellow loamy alluvium.

Brevard Series

The Brevard series consists of well drained, moderately permeable, sloping to steep soils that formed in colluvium and alluvium derived from a mixture of crystalline rocks. Slopes are 7 to 45 percent.

Typical pedon of Brevard loam, 15 to 25 percent slopes, about 12 miles northwest of Hendersonville, in a wooded area in Pisgah National Forest, 0.3 mile north of Mills River Recreation Area on Wash Creek Road, and 30 feet east of road:

O1—1 1/2 inches to 1/2 inch, fresh leaves and litter.

O2—1/2 inch to 0, black mat of organic matter and live fine roots.

A1—0 to 4 inches, dark brown (10YR 3/3) loam; weak fine and medium granular structure; very friable; many fine and few medium roots; few fine flakes of mica; strongly acid; clear smooth boundary.

A2—4 to 7 inches, dark yellowish brown (10YR 4/4) loam; weak fine and medium granular structure; very friable; common fine and few medium roots; few fine flakes of mica; strongly acid; clear smooth boundary.

B1—7 to 12 inches, yellowish red (5YR 4/6) loam; weak medium subangular blocky structure; friable common fine roots; common fine flakes of mica; strongly acid; gradual smooth boundary.

B21t—12 to 45 inches, yellowish red (5YR 5/8) sandy loam; moderate medium subangular blocky structure; friable; sticky; few fine roots; thin discontinuous clay films on faces of peds; common fine flakes of mica; strongly acid; gradual smooth boundary.

B22t—45 to 58 inches, red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin continuous clay films on faces of peds; common fine flakes of mica; medium acid; gradual smooth boundary.

B3—58 to 70 inches, red (2.5YR 4/6) gravelly sandy clay loam; weak medium subangular blocky structure; friable 60 percent angular quartz gravel; common fine flakes of mica; medium acid; abrupt smooth boundary.

IIC—70 to 90 inches, strong brown (7.5YR 5/6) weathered mica gneiss that crushes to fine sandy loam; very friable; medium acid.

The solum is 60 to 120 inches thick. Depth to bedrock is more than 60 inches. The profile is strongly acid or medium acid throughout, unless limed.

The A1 horizon is dark brown, dark reddish brown, very dark grayish brown, or dark grayish brown loam or sandy loam. The A2 horizon is pale brown, brown, yellowish brown, or dark yellowish brown loam or sandy loam.

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

The C horizon is unconsolidated loamy colluvial material containing gravel or saprolite from gneiss or schist rock.

Chandler Series

The Chandler series consists of somewhat excessively drained, moderately rapidly permeable, very steep soils that formed in residuum weathered from mica schist, mica gneiss, phyllite, and similar rocks. Slopes are 45 to 70 percent.

Typical pedon of Chandler stony loam, 45 to 70 percent slopes, in a wooded area about 15 miles northwest of Hendersonville, 0.5 mile west of Bent Gap and 0.2 mile southeast of Blue Ridge Parkway overlook, and 300 feet southwest of Parkway along a logging road:

O2—1 inch to 0, mat of decomposing organic material with many fine roots, moss, and lichens.

A1—0 to 5 inches, dark brown (7.5YR 4/4) stony loam; weak fine granular structure; very friable; common fine and few medium roots; common fine flakes of mica; 10 percent stones; strongly acid; clear smooth boundary.

B2—5 to 26 inches, strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; very friable; common fine roots in upper part and few in lower part; many fine flakes of mica; strongly acid; clear wavy boundary.

C—26 to 54 inches, dark yellowish brown (10YR 4/4) micaceous saprolite that crushes to sandy loam; friable; very strongly acid.

R—54 inches, moderately hard schist rock.

The solum is 20 to 40 inches thick. Depth to bedrock is 40 to 60 inches. About 5 to 15 percent of the surface is covered with stones. The profile is very strongly acid or strongly acid throughout, unless limed.

The A horizon is dark grayish brown, grayish brown, dark brown, or brown stony loam, loam, or fine sandy loam.

The B2 horizon is strong brown or yellowish brown loam or sandy loam.

The C horizon is micaceous saprolite that crushes to sandy loam or loam.

Clifton Series

The Clifton series consists of well drained, moderately permeable, moderately steep and steep soils that formed in residuum weathered from rocks that are high in ferromagnesian minerals. Slopes are 15 to 45 percent.

Typical pedon of Clifton stony loam, 15 to 25 percent slopes, in an apple orchard about 2.5 miles south of Ottanola Baptist Church, 20 feet north of a farm road and 0.4 mile east of State Road 1714.

A1—0 to 4 inches, dark brown (7.5YR 3/2) stony loam; weak fine granular structure; friable; few fine flakes of mica; 10 percent stones; medium acid; clear smooth boundary.

A2—4 to 9 inches, dark reddish brown (5YR 3/4) stony loam; weak fine granular structure; very friable; few fine flakes of mica; 10 percent stones and gravel; medium acid; gradual smooth boundary.

B1—9 to 13 inches, yellowish red (5YR 4/6) clay loam; weak medium subangular blocky structure; few fine flakes of mica; 15 percent stones and gravel; medium acid; gradual wavy boundary.

B2t—13 to 36 inches, red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; few fine flakes of mica; 25 percent gravel and stones; medium acid; gradual wavy boundary.

B3—36 to 42 inches, red (2.5YR 4/8) loam; weak medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; many soft weathered coarse fragments and pockets of clay loam; common fine flakes of mica; slightly acid; abrupt clear boundary.

R—42 inches, hard dark colored gneiss.

The solum is 20 to 48 inches thick. Depth to bedrock is 40 to 60 inches. About 2 to 15 percent of the surface is covered with stones. The profile is slightly acid or medium acid throughout, unless limed. It is 5 to 25 percent stones and gravel fragments.

The A1 horizon is dark reddish brown, very dark brown, or dark brown loam or fine sandy loam.

The B1 horizon is yellowish red, strong brown, or reddish brown loam or clay loam. The B2t horizon is yellowish red or red clay loam or sandy clay loam. The B3 horizon, if present, is red or yellowish red loam, sandy clay loam or fine sandy loam.

The B horizon is underlain by hard rock or a C horizon of gneiss saprolite.

Codorus Series

The Codorus series consists of moderately well drained to somewhat poorly drained, moderately permeable, nearly level soils that formed in alluvium containing medium to large amounts of mica. Slopes are 0 to 2 percent.

Typical pedon of Codorus loam, about 1 mile east of Hendersonville, in a pasture, 150 yards east of Tracy Grove Road bridge and 200 feet south of Devil's Fork creek, 0.4 mile south of U.S. Highway 64:

Ap—0 to 12 inches, brown (10YR 4/2) loam; weak fine and medium granular structure; friable; common fine flakes of mica; neutral; clear smooth boundary.

B21—12 to 30 inches, dark brown (10YR 3/3) loam; weak medium subangular blocky structure; friable; slightly sticky; common fine flakes of mica; medium acid; clear smooth boundary.

B22—30 to 45 inches, grayish brown (10YR 5/2) fine sandy clay loam; common fine distinct yellowish brown mottles in root channels; weak medium subangular blocky structure; friable; slightly sticky and slightly plastic; common fine flakes of mica; medium acid; clear smooth boundary.

C—45 to 60 inches, dark gray (10YR 4/1) loamy sand with thin strata of sand and gravel; medium acid.

The profile is 3 1/2 to 5 feet deep to stratified sand and gravel. Depth to bedrock is more than 60 inches. The profile is medium acid or slightly acid throughout, unless limed. Flakes of mica range from common to many throughout the solum.

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

The B21 horizon is brown or dark brown, and the B22 horizon is dark grayish brown or grayish brown loam, fine sandy loam, or fine sandy clay loam.

The C horizon commonly is gray or dark gray loam or loamy sand, but is sandy or gravelly unconsolidated alluvial deposits in places.

Comus Series

The Comus series consists of well drained, moderately permeable, nearly level soils that formed in recent alluvium containing moderate to large amounts of mica. Slopes are less than 2 percent.

Typical pedon of Comus fine sandy loam in a cultivated field about 1 mile south of Fletcher, 150 feet west of U.S. Highway 25 and 200 feet south of Cane Creek:

Ap—0 to 10 inches, brown (10YR 4/3) fine sandy loam; weak fine and medium granular structure; very friable; common fine flakes of mica; medium acid; gradual smooth boundary.

A12—10 to 20 inches, brown (10YR 4/3) fine sandy loam; weak fine and medium granular structure; very friable; slightly sticky; common fine flakes of mica; medium acid; gradual smooth boundary.

B2—20 to 36 inches, yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; slightly sticky; common fine flakes of mica; strongly acid; gradual smooth boundary.

C1—36 to 50 inches, brown (10YR 5/3) loam; common medium faint grayish brown (10YR 5/2) mottles; massive; friable; slightly sticky; common fine flakes of mica; strongly acid; clear smooth boundary.

C2—50 to 70 inches, grayish brown (10YR 5/2) sandy loam with sand and gravel pockets; common medium distinct yellowish brown (10YR 5/6) mottles; massive; common fine flakes of mica; strongly acid.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 72 inches. The profile is strongly acid to medium acid throughout, unless limed. Flakes of mica range from common to many throughout the solum.

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

The B2 horizon is brown, dark brown, or yellowish brown loam or fine sandy loam.

The C horizon is brown, grayish brown, or dark grayish brown stratified sand, loam, and gravel alluvial deposits.

Delanco Series

The Delanco series consists of moderately well drained, moderately permeable, nearly level to sloping soils that formed in old alluvium containing moderate to large amounts of mica. Slopes are 0 to 7 percent.

Typical pedon of Delanco loam, 2 to 7 percent slopes, in a cultivated field about 0.5 mile southeast of Fletcher, 0.25 mile southeast of intersection of State Roads 1006 and 1539, and 150 feet south of tenant dwelling on north side of State Road 1539:

Ap—0 to 10 inches, brown (10YR 4/3) loam; weak fine and medium granular structure; friable; slightly acid; clear smooth boundary.

B21t—10 to 20 inches, yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable; thin discontinuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

B22t—20 to 30 inches, brown (10YR 5/3) clay loam; common medium faint grayish brown (10YR 5/2) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; thin discontinuous clay films on faces of peds; very strongly acid; gradual smooth boundary.

B3g—30 to 40 inches, light brownish gray (10YR 6/2) sandy clay loam; common coarse distinct yellowish brown (10YR 5/4) mottles; weak coarse angular blocky structure; firm; very strongly acid; gradual smooth boundary.

C—40 to 60 inches, gray (10YR 6/1) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; massive; very firm; very strongly acid.

The solum is 30 to 46 inches thick. Depth to bedrock is more than 72 inches. The profile is strongly acid or very strongly acid throughout, unless limed.

The Ap horizon is brown, dark brown, yellowish brown, and dark yellowish brown loam, fine sandy loam, or silt loam.

The B2t horizon is yellowish brown and brown. The B3g horizon is light brownish gray, brownish gray or grayish brown.

The C horizon is gray, light gray, or grayish brown unconsolidated alluvium of variable texture.

Edneyville Series

The Edneyville series consists of well drained, moderately permeable, sloping to steep soils that formed in residuum weathered from granite and gneiss. Slopes are 7 to 45 percent.

Typical pedon of Edneyville fine sandy loam, 15 to 25 percent slopes, in a wooded area about 7 miles southwest of Hendersonville; 1,000 feet north of Crab Creek Baptist Church on State Road 1133, and 30 feet east of road:

O1—1 1/2 inches to 1/2 inch, fresh leaves and twigs.

O2—1/2 inch to 0, black mat of fine live roots and decayed leaves.

A1—0 to 1 inch, dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

A2—1 to 5 inches, brown (10YR 5/3) fine sandy loam; weak fine and medium granular structure; very friable; common fine roots; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B1—5 to 10 inches, yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; very friable; few fine and medium roots; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B2t—10 to 25 inches, yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; thin discontinuous clay films in pores and root channels; very strongly acid; gradual smooth boundary.

B3—25 to 30 inches, yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; very friable; few fine roots; common fine flakes of mica; very strongly acid; gradual smooth boundary.

C1—30 to 50 inches, light yellowish brown (10YR 6/4) fine sandy loam; rock controlled structure; very friable; common fine flakes of mica; very strongly acid; gradual smooth boundary.

C2—50 to 60 inches, light brownish gray (10YR 6/2) fine sandy loam; rock controlled structure; very friable; common fine flakes of mica; very strongly acid.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 40 inches. The profile is very strongly acid throughout, unless limed.

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

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

The C horizon is granite-gneiss saprolite that crushes to sandy loam or fine sandy loam.

Elsinboro Series

The Elsinboro series consists of well drained, moderately permeable, nearly level and gently sloping soils that formed in unconsolidated old alluvium from areas of crystalline rock that contains much mica. Slopes are 0 to 3 percent.

Typical pedon of Elsinboro loam, 0 to 3 percent slopes, in a cultivated field about 14 miles west of Hendersonville, 600 feet east of intersection of N.C. Highway 280 and State Road 1328, and 250 feet east of State Road 1328:

Ap—0 to 9 inches, brown (10YR 4/3) loam; weak fine and medium granular structure; friable; 4 percent small pieces of gravel; strongly acid; abrupt smooth boundary.

B21t—9 to 22 inches, yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine flakes of mica; 3 percent small pieces of gravel; strongly acid; gradual smooth boundary.

B22t—22 to 32 inches, brownish yellow (10YR 6/6) clay loam; moderate medium subangular blocky structure; friable; common fine flakes of mica; 3 percent small pieces of gravel; strongly acid; gradual smooth boundary.

B3—32 to 38 inches, yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable; common fine flakes of mica; 10 percent small pieces of gravel; strongly acid; clear smooth boundary.

IIC—38 to 55 inches, brown (10YR 4/3) gravelly loamy sand; single grained; loose; common fine flakes of mica; 20 percent small pieces of gravel; strongly acid.

The solum is 28 to 40 inches thick. Depth to bedrock is more than 72 inches. The profile is strongly acid or very strongly acid throughout, unless limed. Flakes of mica range from few to common throughout the solum. Gravel content ranges from 0 to 20 percent on the surface and throughout the solum.

The Ap horizon is brown or dark brown.

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

The C horizon is unconsolidated sandy and gravelly alluvial material.

Evard Series

The Evard series consists of well drained, moderately permeable, sloping to very steep soils that formed in residuum weathered from granite or gneiss. Slopes are 7 to 70 percent.

Typical pedon of Evard sandy loam in an area of Evard soils, 25 to 45 percent slopes, in a wooded area, 3/4 mile south of the Buncombe County line, and on the north side of a logging road 0.3 mile east of State Road 1423:

O1—1 1/2 inches to 1/2 inch, partially decomposed leaves and twigs.

O2—1/2 inch to 0, black mat of humus and fine live roots.

A1—0 to 2 inches, dark brown (10YR 4/3) sandy loam; weak fine granular structure; friable; many fine and medium roots; few fine flakes of mica; 5 percent gravel fragments; strongly acid; abrupt smooth boundary.

A2—2 to 6 inches, dark brown (7.5YR 4/4) sandy loam; weak medium granular structure; very friable; many medium roots; common fine flakes of mica; 5 percent gravel pieces; strongly acid; clear smooth boundary.

B2t—6 to 18 inches, yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; 15 percent gravel fragments; strongly acid; gradual wavy boundary.

B3—18 to 30 inches, yellowish red (5YR 4/8) sandy loam; weak medium subangular blocky structure; very friable; few fine roots; common fine flakes of mica; 20 percent gravel fragments; strongly acid; gradual wavy boundary.

C—30 to 53 inches, yellowish red (5YR 4/8) saprolite that crushes to sandy loam; rock controlled structure; about 50 percent hard coarse fragments of gravel, cobble, and stone size; strongly acid.

R—53 inches, hard quartz mica gneiss that has small amounts of soil material in fractures.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 48 inches. The profile is strongly acid or very strongly acid throughout, unless limed.

The A1 horizon is very dark grayish brown or dark brown sandy loam, fine sandy loam, or loam. The A2 horizon is dark brown, brown, or yellowish brown sandy loam or fine sandy loam.

The B2t horizon is yellowish red or red. The B3 horizon is yellowish red or red sandy clay loam or sandy loam.

Fannin Series

The Fannin series consists of well drained, moderately permeable, sloping to steep soils that formed in residuum weathered mainly from mica schist and mica gneiss, and to a lesser extent from chlorite schist, phyllites, and other rocks that have a high content of mica. Slopes are 7 to 45 percent.

Typical pedon of Fannin silt loam, 7 to 15 percent slopes, about 0.5 mile west of Fletcher, in a wooded area 0.3 mile west of U.S. Highway 25, 50 feet east of St. John Road:

A1—0 to 6 inches, dark brown (7.5YR 3/2) silt loam; weak fine and medium granular structure; very friable; many fine and medium roots; about 10 percent small platy fragments; strongly acid; abrupt smooth boundary.

B2t—6 to 27 inches, yellowish red (5YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; thin continuous clay films on faces of peds; about 10 percent small platy fragments; many fine flakes of mica; strongly acid; clear smooth boundary.

B3—27 to 36 inches, yellowish red (5YR 4/8) silt loam; weak medium subangular blocky structure; very friable; about 50 percent soft platy fragments; many fine flakes of mica; strongly acid; gradual wavy boundary.

C—36 to 60 inches, yellowish red (5YR 4/8) to strong brown (7.5YR 5/6) schist saprolite that crushes to loam.

R—60 inches, fragmental schist rock.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 60 inches. The profile is very strongly acid or strongly acid throughout, unless limed. Flakes of mica range from common to many throughout the profile.

The A horizon is dark grayish brown, dark brown, brown, and strong brown silt loam or loam.

The Bt horizon is yellowish red or red silty clay loam or clay loam. If present, the B3 horizon is silt loam or loam.

The C horizon is schist saprolite.

Hatboro Series

The Hatboro series consists of poorly drained, moderately permeable, nearly level soils that formed in alluvium from schist, gneiss, and other metamorphic and crystalline rocks. Slopes are 0 to 2 percent.

Typical pedon of Hatboro loam about 1 mile east of Hendersonville and 0.5 mile south of U.S. Highway 64, and 100 feet east of Mud Creek in a field:

Ap—0 to 12 inches, dark grayish brown (10YR 4/2) loam; weak fine and medium granular structure; friable; slightly sticky; medium acid; clear smooth boundary.

B2g—12 to 36 inches, dark gray (10YR 4/1) loam; weak medium and coarse subangular blocky structure; friable; slightly sticky; common fine flakes of mica; strongly acid; clear smooth boundary.

IIC1—36 to 48 inches, dark grayish brown (10YR 4/2) loamy sand; single grained; loose; few fine flakes of mica; slightly acid; gradual smooth boundary.

IIC2—48 to 62 inches, grayish brown (10YR 5/2) sand; single grained; loose few fine flakes of mica; slightly acid.

Depth to stratified sand and gravel ranges from 3 to 5 feet. The profile is strongly acid to slightly acid throughout, unless limed. Flakes of mica range from few to many throughout the soil.

The A horizon is dark grayish brown, very dark grayish brown, dark gray, and very dark gray loam, fine sandy loam, and silt loam.

The B horizon is dark gray, very dark gray, and dark grayish brown loam, silt loam, or silty clay loam.

The C horizon is loamy and sandy, gravelly, stratified alluvial deposits.

Hayesville Series

The Hayesville series consists of well drained, moderately permeable, gently sloping to moderately steep soils that formed in residuum from rocks such as granite, gneiss, and schist. Slopes are 2 to 25 percent.

Typical pedon of Hayesville loam, 7 to 15 percent slopes, about 8 miles northwest of Hendersonville, in a wooded area 125 feet south of the Fanning Bridge Road opposite the driveway of the Mountain Horticultural Experiment Station:

A1—0 to 4 inches, dark brown (10YR 3/3) loam; moderate fine granular structure; very friable; high in organic matter content; numerous medium and fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

A2—4 to 8 inches, brown (7.5YR 4/4) loam; weak fine subangular blocky structure; very friable; common medium and fine roots; many medium and fine pores; few fine flakes of mica; strongly acid; clear smooth boundary.

B1—8 to 16 inches, yellowish red (5 YR 5/6) clay loam; weak medium subangular blocky structure; friable; few medium and fine roots; few fine pores; few thin patchy clay films on faces of peds; few fine flakes of mica; few quartz gravel; strongly acid; clear smooth boundary.

B21t—16 to 24 inches, yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few medium and fine roots; few fine pores; thin continuous clay films on faces of peds; few flakes of mica; few quartz gravel; strongly acid; clear smooth boundary.

B22t—24 to 35 inches, red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few medium and fine roots; few fine and medium pores; thin continuous clay films on faces of peds; common medium and fine flakes of mica; common quartz gravel; strongly acid; gradual wavy boundary.

B31—35 to 39 inches, red (10R 4/6) sandy clay loam; moderate medium angular blocky structure; friable; slightly sticky; few fine roots; few distinct clay films on faces of peds; common to many flakes of mica; common bodies of saprolite; strongly acid; gradual irregular boundary.

B32—39 to 44 inches, red (10R 4/6) sandy loam; weak medium angular blocky and platy rock structure; very friable; few fine roots; few thin patchy clay films and dark coatings on vertical faces of peds; common flakes of mica; common quartz gravel; strongly acid; gradual irregular boundary.

C1—44 to 72 inches, red (10R 4/6) saprolite that crushes to sandy loam; rock controlled structure; very friable; few fine roots; small amounts of clay in cracks; common bodies of dark minerals; common flakes of mica; strongly acid; gradual irregular boundary.

C2—72 to 112 inches, gray (10YR 5/1) and light gray (10YR 7/1) soft saprolite that crushes to sandy loam; rock controlled structure; very friable; few dark coatings on faces of structural units; few interbedded ledges of mica schist; strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 60 inches. The profile is very strongly acid or strongly acid throughout, unless limed.

The A1 horizon is brown, dark brown, reddish brown, or dark reddish brown loam or fine sandy loam. The A2 horizon is brown, dark brown, or reddish brown loam or fine sandy loam.

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

The C horizon is gneiss or schist saprolite that crushes to sandy loam or loam.

The B1 horizon is clay loam, sandy clay loam,

Kinkora Series

The Kinkora series consists of poorly drained, moderately slowly permeable, nearly level soils that formed in old alluvium, mainly from areas of acid crystalline rocks. Slopes are 0 to 2 percent.

Typical pedon of Kinkora loam in an idle field in the Mills River Community along N.C. Highway 191, 1.2 miles west of the French Broad River and 1,000 feet north of highway on field road, 30 feet east of field road:

Ap—0 to 7 inches, dark gray (10YR 4/1) loam; weak medium and coarse granular structure; friable; slightly sticky and slightly plastic; many fine roots; very strongly acid; clear smooth boundary.

B21tg—7 to 16 inches, gray (10YR 5/1) clay loam; few fine distinct yellowish brown mottles; weak medium subangular blocky structure; friable; sticky and slightly plastic; common fine roots; continuous clay films on faces of peds and in channels; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B22tg—16 to 33 inches, gray (10YR 5/1) clay; few fine distinct yellowish brown mottles; weak medium and coarse subangular blocky structure; firm; sticky and plastic; few fine roots; thin continuous clay films on faces of peds and in channels; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg—33 to 60 inches, gray (10YR 5/1) clay; few fine distinct yellowish brown mottles; massive; firm; sticky and plastic; common fine flakes of mica; very strongly acid.

The solum is 24 to 40 inches thick. Depth to bedrock is more than 72 inches. The profile is very strongly acid or strongly acid throughout, unless limed.

The A horizon is dark gray, gray, or dark grayish brown loam or silt loam.

The B2t horizon is gray or light gray clay loam, clay, silty clay, or silty clay loam.

The C horizon is gray or light gray unconsolidated alluvial deposits.

Porters Series

The Porters series consists of well drained, moderately permeable, moderately steep to very steep soils that formed in material derived from rocks containing a relatively large amount of ferromagnesian minerals. Slopes are 15 to 70 percent.

Typical pedon of Porters stony loam, 25 to 45 percent slopes, in a wooded area about 1.5 miles west of Bear Wallow Mountain Fire Tower, 0.2 mile north of State Road 1594, and 75 feet east of State Road 1596:

O1—1 inch to 0, layer of leaves and green moss.

A1—0 to 6 inches, very dark grayish brown (10YR 3/2) stony loam; weak fine granular structure; very friable; slightly sticky and slightly plastic; many fine roots; few fine flakes of mica; 10 percent stones; strongly acid; clear smooth boundary.

B1—6 to 10 inches, dark brown (10YR 3/3) loam; weak medium subangular blocky structure; very friable; slightly sticky and slightly plastic; common fine roots; few fine flakes of mica; medium acid; clear smooth boundary.

B2t—10 to 23 inches, yellowish brown (10YR 5/4) clay loam; weak medium subangular blocky structure; friable; sticky and slightly plastic; few fine roots; few thin clay films on faces of peds; few moderately hard and soft coarse rock fragments; few fine flakes of mica; strongly acid; gradual wavy boundary.

B3—23 to 32 inches, yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; very friable; slightly sticky; few fine roots; common moderately hard and soft rock fragments; few fine flakes of mica; strongly acid; clear irregular boundary.

C—32 to 42 inches, brown (10YR 5/3) saprolite that crushes to sandy loam; moderately hard rock in places; medium acid; clear irregular boundary.

R—42 inches, hard gneiss with common fractures.

The solum is 20 to 40 inches thick. Depth to bedrock is 40 to 72 inches. Stones cover 5 to 15 percent of the surface. The profile is medium acid or strongly acid throughout, unless limed.

The A1 horizon is very dark grayish brown, dark brown, or very dark brown.

The B1 horizon is dark brown or brown loam or sandy clay loam. The B2t horizon is yellowish brown, dark yellowish brown, or strong brown loam, sandy clay loam, or clay loam. The B3 horizon, if present, is yellowish brown, dark yellowish brown, or brown loam or sandy clay loam.

The C horizon, if present, is brown or brownish yellow.

Rosman Series

The Rosman series consists of well drained and moderately well drained, moderately rapidly permeable, nearly level soils that formed in sediment containing few to many mica flakes. Slopes are 0 to 2 percent.

Typical pedon of Rosman loam about 6 miles northwest of Hendersonville, in a cultivated field 500 feet northeast of N.C. Highway 191 and 200 feet southwest of Hendersonville Water Pumping Station:

Ap—0 to 10 inches, dark brown (10YR 3/3) loam; weak fine and medium granular structure; very friable; slightly sticky; common fine flakes of mica; slightly acid; clear smooth boundary.

A12—10 to 15 inches, dark brown (10YR 3/3) loam; weak fine and medium granular structure; very friable; slightly sticky; common fine flakes of mica; slightly acid; clear smooth boundary.

B21—15 to 30 inches, yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; slightly sticky and slightly plastic; many fine flakes of mica; slightly acid; gradual smooth boundary.

B22—30 to 48 inches, yellowish brown (10YR 5/4) fine sandy loam; weak medium subangular blocky structure; very friable; many fine flakes of mica; slightly acid; gradual smooth boundary.

C1—48 to 62 inches, dark yellowish brown (10YR 4/4) sandy loam; massive; very friable; many fine flakes of mica; slightly acid; gradual smooth boundary.

C2—62 to 70 inches, dark grayish brown (10YR 4/2) sandy loam; massive; very friable; many fine flakes of mica; slightly acid.

Stratified loamy or sandy material is at a depth of 3 to 5 feet. Depth to bedrock is more than 60 inches. The profile is strongly acid to slightly acid throughout, unless limed. Flakes of mica range from common to many.

The A horizon is very dark grayish brown, dark grayish brown, very dark brown, and dark brown loam, silt loam, or fine sandy loam.

The B2 horizon is dark yellowish brown, yellowish brown, or brown loam, silt loam, or fine sandy loam. Grayish mottles are in some pedons below a depth of 20 inches.

The C horizon is brown, grayish brown, dark grayish brown, or dark yellowish brown stratified alluvial deposits.

Spivey Series

The Spivey series consists of well drained, moderately rapidly permeable, strongly sloping to steep soils that formed in local alluvium moved downslope from soils underlain by phyllite and gneiss. Slopes are 10 to 40 percent.

Typical pedon of Spivey stony loam about 14 miles northwest of Hendersonville, in Pisgah National Forest, 2 miles west of Mills River Recreation Area in a wooded area 500 feet north of Yellow Gap Road:

O1—1 inch to 0, fresh and partially decomposed forest litter.

A1—0 to 13 inches, very dark brown (10YR 3/2) stony loam; weak fine granular structure; very friable; many fine roots; few fine flakes of mica; about 60 percent by volume gravel, cobbles, and stones; very strongly acid; clear smooth boundary.

B2—13 to 36 inches, dark brown (7.5YR 4/4) stony loam; weak medium subangular blocky structure; friable; common fine flakes of mica; about 60 percent gravel, cobbles, and stones; very strongly acid; clear wavy boundary.

IIC—36 to 42 inches, dark brown (7.5YR 4/4) stony sandy loam; massive; very friable; many fine flakes of mica; about 70 percent gravel, cobbles, and stones; very strongly acid.

The solum is 30 to 60 inches thick. Depth to bedrock is 40 to 75 inches or more. Stones cover 5 to 15 percent of the surface. The profile is very strongly acid or strongly acid throughout, unless limed.

The A1 horizon is very dark brown, dark brown, or very dark grayish brown loam or stony loam. It is 30 to 60 percent coarse fragments.

The B1 horizon, if present, is dark brown or dark yellowish brown loam or stony loam. The B2 horizon is dark brown, brown, or dark yellowish brown stony loam, loam, or sandy loam. It is 35 to 60 percent coarse fragments.

The C horizon is yellowish brown, brown, or dark brown loam, stony sandy loam, or sandy loam that has a high percentage of gravel, cobbles, and stones.

Suncook Series

The Suncook series consists of excessively drained, rapidly permeable, nearly level soils that formed in recent alluvial deposits derived mainly from crystalline rocks of gneiss, schist, granite, and quartzite. Slopes are less than 2 percent.

Typical pedon of Suncook loamy sand at Blantyre Community in a cultivated field, 0.2 mile east of U.S. Highway 64, and 300 feet south of State Road 1191:

Ap—0 to 9 inches, dark grayish brown (10YR 4/2) loamy sand; weak coarse granular structure; very friable; common fine flakes of mica; slightly acid; clear smooth boundary.

C1—9 to 40 inches, brown (10YR 4/3) loamy sand; weak medium subangular blocky structure; very friable; common fine flakes of mica; slightly acid; clear smooth boundary.

C2—40 to 72 inches, brown (10YR 5/3) sand; single grained; loose; common fine flakes of mica; slightly acid.

Bedrock is at a depth of more than 60 inches. The profile is strongly acid to slightly acid throughout, unless limed.

The Ap horizon is loamy sand or loamy fine sand.

The C horizon is brown, brownish yellow, or dark grayish brown loamy fine sand, loamy sand, sand, or fine sand.

Talladega Series

The Talladega series consists of well drained, moderately permeable, steep soils that formed in material weathered mainly from schist. Slopes are 25 to 45 percent.

Typical pedon of Talladega silt loam, 25 to 45 percent slopes, in a wooded area about 1 mile east of Boyleston Baptist Church, 0.2 mile northwest of intersection of State Roads 1325 and 1323, and 50 feet north of State Road 1323:

O1—2 inches to 1 inch, pine needles.

O2—1 inch to 0, black mat of organic material and live roots.

A1—0 to 5 inches, dark yellowish brown (10YR 3/4) silt loam; weak fine granular structure; very friable; slightly sticky; many fine roots; 10 percent hard platy fragments less than 1/2 inch long; very strongly acid; clear smooth boundary.

B2t—5 to 24 inches, yellowish red (5YR 4/6) silty clay loam; weak medium subangular blocky structure; friable; sticky and slightly plastic; common fine roots in upper part and few fine roots in lower part; 20 percent thin platy fragments of saprolite 1/4 inch to 3 inches long in upper part, increasing to 50 percent in lower part; very strongly acid; gradual irregular boundary.

C—24 to 36 inches, yellowish red (5YR 5/6) saprolite that crushes to loam; very friable; slightly sticky; few fine roots; 60 percent thin platy fragments 1/4 inch to 10 inches long; very strongly acid; clear irregular boundary.

R—36 inches, moderately hard schist that is fractured on a vertical plane.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 26 inches. The profile is very strongly acid or strongly acid throughout, unless limed.

The A horizon is dark yellowish brown, dark brown, or dark grayish brown silt loam or loam.

The B2t horizon is yellowish red, strong brown, or yellowish brown silt loam or silty clay loam. It is 35 to 50 percent coarse fragments.

The C horizon, if present, is saprolite that crushes to loam or silt loam.

Tate Series

The Tate series consists of well drained, moderately permeable, gently sloping to strongly sloping soils that formed in colluvium from granite and gneiss. Slopes are 2 to 15 percent.

Typical pedon of Tate fine sandy loam, 7 to 15 percent slopes, in an idle field 3 miles west of Hendersonville, 0.7 mile north of U.S. Highway 64 on State Road 1309, and 200 feet north of Hendersonville Water Pumping Station:

Ap—0 to 9 inches, dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; slightly sticky; many fine roots; strongly acid; clear smooth boundary.

B21t—9 to 26 inches, yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; friable; sticky and slightly plastic; few fine roots; thin discontinuous clay films on faces of peds and in root channels; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B22t—26 to 36 inches, brownish yellow (10YR 6/6) clay loam; moderate medium subangular blocky structure; friable; sticky and slightly plastic; thin discontinuous clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B3—36 to 55 inches, pale brown (10YR 6/3) sandy clay loam; common medium faint light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; very strongly acid; clear smooth boundary.

C—55 to 65 inches, light gray (10YR 7/2) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles and pockets of clay loam; massive; 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. The solum is very strongly acid to medium acid throughout, unless limed.

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

The B2 horizon is yellowish brown or brownish yellow clay loam or sandy clay loam. In places grayish mottles are below a depth of 24 inches.

The C horizon is unconsolidated colluvium or saprolite.

Toxaway Series

The Toxaway series consists of very poorly drained and poorly drained, moderately permeable, nearly level soils that formed in alluvial deposits. Slopes are 0 to 2 percent.

Typical pedon of Toxaway silt loam in an idle field about 1.5 miles east of Hendersonville, 800 feet southeast of Hendersonville-Meyer Airport, 600 feet east of Airport Road, and 100 feet south of drainage ditch:

A11—0 to 26 inches, very dark gray (10YR 3/1) to black (10YR 2/1) silt loam; moderate medium granular structure; friable; common fine roots; few fine flakes of mica; medium acid; gradual smooth boundary.

A12—26 to 36 inches, very dark gray (10YR 3/1) loam; weak medium granular structure; friable; few fine roots; common fine flakes of mica; medium acid; clear smooth boundary.

C1g—36 to 43 inches, very dark gray (10YR 3/1) sandy loam; massive; very friable; common fine flakes of mica; medium acid; clear smooth boundary.

C2g—43 to 53 inches, grayish brown (10YR 5/2) sand; single grained; loose; common fine flakes of mica; medium acid; clear smooth boundary.

C3g—53 to 65 inches, gray (N 6/) sandy clay loam that has lenses of sandy loam; massive; friable; slightly sticky and slightly plastic; common fine flakes of mica; medium acid; clear smooth boundary.

C4g—65 to 72 inches, gray (N 6/0) loamy sand; single grained; loose; common fine flakes of mica; medium acid.

The profile commonly is 40 to 60 inches thick over sandy layers. Depth to bedrock is more than 60 inches. The profile is strongly acid or medium acid throughout, unless limed.

The A horizon is very dark gray, very dark grayish brown, or black silt loam or loam.

The C horizon is stratified alluvial sediment of sandy loam, sand, sandy clay loam, and loamy sand.

Tusquitee Series

The Tusquitee series consists of well drained, moderately permeable, sloping to steep soils that formed in colluvium derived from schist, gneiss, and granite. Slopes are 7 to 45 percent.

Typical pedon of Tusquitee loam, 15 to 25 percent slopes, in a wooded area in Pisgah National Forest, 1/4 mile north of Yellow Gap and 100 yards north of Yellow Gap Road:

O1—1 inch to 0, fresh leaves and twigs.

A11—0 to 4 inches, very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable; slightly sticky; many fine roots; 5 percent gravel size fragments; few fine flakes of mica; strongly acid; abrupt smooth boundary.

A12—4 to 10 inches, dark brown (7.5YR 3/2) loam; weak fine and medium granular structure; very friable; slightly sticky; common fine roots; few fine flakes of mica; strongly acid; clear wavy boundary.

B21t—10 to 23 inches, brown (7.5YR 5/4) clay loam; weak medium subangular blocky structure; friable; sticky and slightly plastic; few fine roots; few thin clay films on faces of peds; common fine flakes of mica; strongly acid; gradual smooth boundary.

B22—23 to 44 inches, dark brown (7.5YR 4/4) clay loam; weak medium subangular blocky structure; friable; sticky and slightly plastic; few fine roots; few thin clay films on faces of peds; common fine flakes of mica; strongly acid; gradual smooth boundary.

B3—44 to 51 inches, yellowish brown (10YR 5/4); weak medium subangular blocky structure: friable; slightly sticky; few fine roots; many fine flakes of mica; strongly acid; gradual smooth boundary.

C1—51 to 61 inches, brown (10YR 5/3) fine sandy loam; weak medium subangular blocky structure; very friable; many fine flakes of mica; strongly acid; gradual smooth boundary.

C2—61 to 70 inches, pale brown (10YR 6/3) sandy loam; weak medium subangular blocky structure; very friable; many fine flakes of mica; strongly acid.

The solum is more than 40 inches thick. Depth to bedrock is more than 60 inches. The profile is strongly acid or medium acid throughout unless limed. Gravel and stones cover 0 to 15 percent of the surface.

The A horizon is very dark grayish brown, dark brown, very dark brown, or dark yellowish brown loam, stony loam, or fine sandy loam.

The B2t horizon is brown, strong brown, yellowish brown, dark brown, dark yellowish brown, or yellowish red loam, sandy clay loam, or clay loam.

The C horizon is colluvial material of fine sandy loam and sandy loam that contains coarse fragments in places.

Classification

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965 (*4*). Readers interested in further details about the system should refer to the latest literature available. See the unpublished working document "Selected Chapters from the Unedited Text of the Soil Taxonomy," available in the SCS State Office, Raleigh, North Carolina.

The system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the bases for classification are 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. Classes of the system are briefly discussed in the following paragraphs.

ORDER. Ten soil orders are recognized. 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 that are important to plant growth or that were 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. The name of a great group ends with the name of a suborder. A prefix added to the name 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 is divided into three kinds of 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 that have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. The names of subgroups are derived by placing one or more adjectives before the name of the great group. The adjective *Typic* is used 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 a group of soils that are formed from a particular kind of parent material and have horizons that, except for texture of the surface soil, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

Formation of the Soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation.

Factors of Soil Formation

Soil is the product of combined effects of parent material, climate, plant and animal life, relief, and time. The characteristics of a soil at any place depend upon a combination of these five environmental factors at that place. All these factors affect the formation of every soil, but in many places one or two of the factors are dominant.

Parent Material

Parent material is the mass from which a soil is formed. It is primarily responsible for the chemical and mineralogical composition of soils. In Henderson County the parent material consists primarily of granite, gneiss, schist, and materials transported by water or gravity and laid down as deposits of sand, silt, and clay or as large rock fragments. The kinds of parent material recognized in Henderson County vary in mineral and chemical composition and physical characteristics. The differences in the soils reflect the original differences in the characteristics of the geologic material. Parent material has been important in causing differences in the soils of this survey area.

The parent material of the southern and eastern two-thirds of the county is mostly granite and gneiss. This parent material contains considerable amounts of quartz and feldspar and lenses of hornblende and muscovite. The Ashe, Edneyville, and Hayesville soils formed in residuum from this material.

The parent material in the northwestern part of the county is a mica gneiss. Chandler and Fannin soils, which have a very high mica content, and the Edneyville, Hayesville and Porters soils, which have a lower mica content, formed in material weathered from this mica gneiss.

A narrow belt of Brevard schist crosses the county from Fletcher to Etowah. Fannin and Talladega soils formed in material weathered from this Brevard schist.

The soils on the flood plains and terraces formed in alluvial deposits of sand, silt, clay, and gravel alluvial deposits. The largest areas of these deposits are along the French Broad and Mills Rivers, but they also occur as narrow bands along most of the drainageways in the county. The soils that formed from these alluvial deposits include the Comus, Rosman, Suncook, Toxaway, and Codorus soils on the flood plains and the Delanco and Kinkora soils on the terraces. The Toxaway soils formed in part from alluvial deposits and in part from the decay of plants that grew on these soils when they were undrained. The soils formed in the upland draws and on foot slopes from local alluvial materials washed down from the surrounding areas of Tate, Tusquitee, and Brevard soils.

The differences in the soils reflect the original differences in the characteristics of the geologic material. Parent material has been important in causing differences in the soils of Henderson County.

Climate

Climate affects the physical, chemical, and biological relationships in the soil, primarily through the influence of precipitation and temperature. Water is necessary for biological activity. It dissolves minerals and transports them and organic residues through the soil profile. Temperature influences the kind and growth of organisms and the speed of physical and chemical reaction in the soils.

The average annual rainfall in Henderson County is relatively high. This has had a general effect of leaching out the soluble bases of the soils, causing them to be less fertile and more acid. The soils in the county rarely become dry, and this has been a factor in retarding soil horizon development.

Temperatures within the county are variable because of the range in elevation. As elevation increases, the humus content of the soil generally increases. Humus content increases most rapidly under cool, moist conditions. The Porters soil, which is high in organic matter content, is only at elevations exceeding about 3,000 feet. The Toxaway soils are high in organic matter content because of the poorly drained condition in which they formed.

Plant and Animal Life

Plant and animal life, in or on the soil, modify to some extent the formation of the soil. The kinds and number of organisms that exist are mainly determined by the climate and to a varying degree by parent material, relief, and age of the soil. Bacteria, fungi, and other micro-organisms aid in weathering rock and decomposing organic matter. The larger plants and animals furnish organic matter and transfer elements from the subsoil to the surface layer.

The activity of fungi and micro-organisms in the soils is generally confined to the upper few inches. Earthworms and other small invertebrates carry on a slow, continued cycle of soil mixing, also mostly in the upper few inches of soil.

Henderson County was originally covered by a wide variety of hardwoods and several kinds of conifers. These trees took up elements from the subsoil and added organic matter by depositing leaves, roots, twigs, and eventually the whole plant on the surface. This organic matter then decayed and was acted on by micro-organisms, earthworms, and other forms of life and by direct chemical reactions. Organic matter decays fairly rapidly, particularly in well drained soils, such as Edneyville soils. Excess moisture retards oxidation of organic matter; therefore, decay is slow on wet soils, such as Toxaway soils.

Plants and animals mainly determine the kinds of organic matter added to the soil and the way in which it is incorporated with the soil. They transfer nutrient elements from one horizon to another, and in many places they transport soil material from one horizon to another. Plants and animals also affect changes in content of organic matter, content of nitrogen and other plant nutrients, soil structure, porosity, and other soil characteristics.

Relief

Relief is largely determined by the underlying rock formations and the geologic history of the region, which includes crustal movements, dissection by rivers and streams, and landscape development through slope retreat. Relief influences soil formation through its effect on moisture, erosion, temperature, and plant cover. The influence of topography is modified by the other factors of soil formation.

Relief has been a very important factor in the formation of the soils of Henderson County. The shallowest soils, such as the Talladega soils, are on narrow, convex ridges and steep slopes where geologic erosion removes soil material in places as rapidly as it forms. This erosion results in thinner soils and weak soil development. Soils such as the Hayesville soils formed on broad, smooth ridges and side slopes. Soils such as Brevard soils are on the foot slopes.

Relief has largely determined natural drainage of a soil. The very poorly drained Toxaway soils are nearly level on the flood plains. Some small areas of sloping soils are wet because of hillside seeps.

Time

The length of time required for a soil to develop depends on the other factors of soil formation. Less time is required for a soil to develop in a humid, warm region covered with lush vegetation than in a dry, cold region that has sparse vegetation.

The age of soils varies considerably in Henderson County. Generally, the older soils, such as the Hayesville soils, have well defined horizons and a smoother topography. By contrast, the younger soils, such as the Talladega and Ashe soils, have weakly defined horizons and are uneven and steeper. The younger soils are shallower to bedrock and have less development because of geologic erosion. The combined influence of relief and geologic erosion removes material from the surface of the steeper soils and deposits it on the alluvial bottoms; therefore, a soil surface on the steeper slopes is not maintained long enough to allow the other factors of soil formation to develop a well defined profile. The alluvial soils, such as Rosman and Suncook, have not been in place long enough to develop a well defined profile.

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(2) American Society for Testing and Materials. 1974. Method for classification of soils for engineering purposes. ASTM Stand. D 2487-69. *In* 1974 Annual Book of ASTM Standards, Part 19, 464 pp., illus.

(3) United States Department of Agriculture. 1951. Soil survey manual. U.S. Dep. Agric. Handb. 18, 503 pp., illus. [Supplements replacing pp. 173-188 issued May 1962]

(4) United States Department of Agriculture. 1960. Soil classification, a comprehensive system, 7th approximation. Soil Conserv. Serv., 265 pp., illus. [Supplements issued March 1967, September 1968, April 1969.]

Glossary

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

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

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

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

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

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.

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.

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

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

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

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

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

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

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

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

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

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

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

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

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

Cemented.—Hard; little affected by moistening.

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

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

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

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

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

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

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.

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.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

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.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. Inadequate strength for supporting loads.

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.

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.

Percolation. The downward movement of water through the soil.

Percs slowly. The 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).

Piping. Moving water forms subsurface tunnels or pipelike cavities in the soil.

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

Root zone. The part of the soil than can be penetrated by plant roots.

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.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

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.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

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.

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."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Illustrations

Figure 1.—An area of rock outcrop in the Ashe-Rock outcrop complex, 15 to 70 percent slopes.

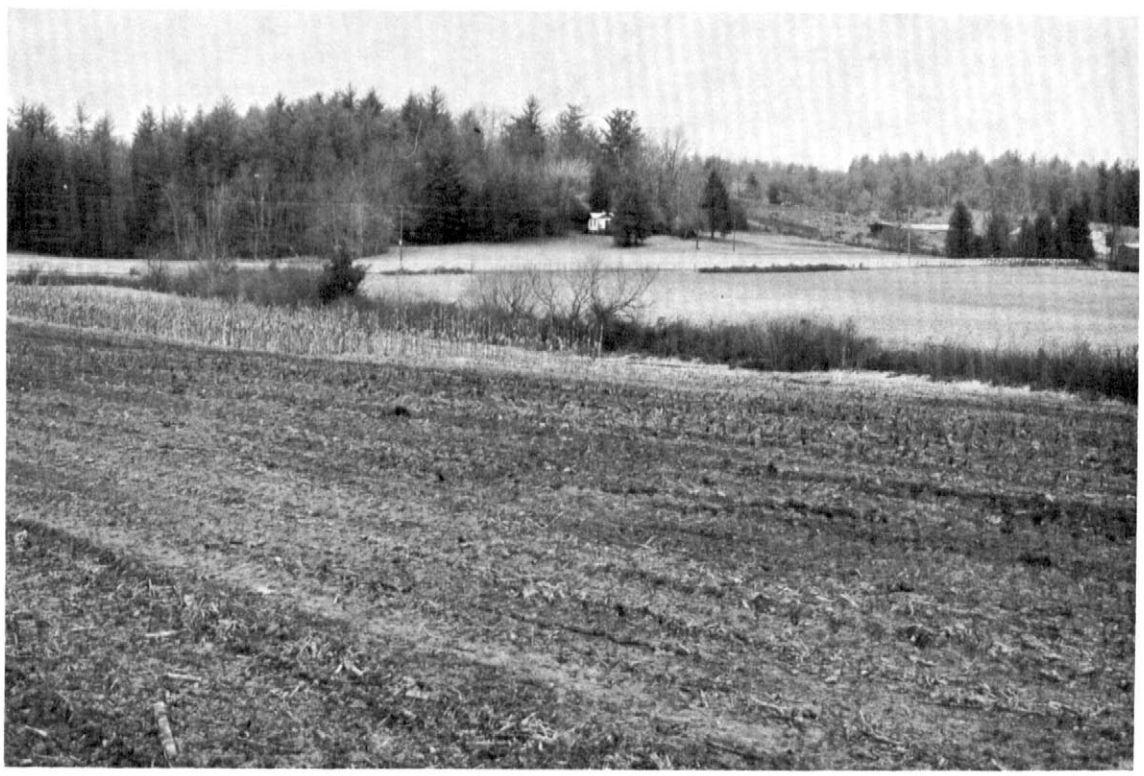

Figure 2.—Comus fine sandy loam along a drainageway.

Figure 3.—Apple orchard on Hayesville loam, 2 to 7 percent slopes. Evard-Edneyville-Ashe association in background.

Figure 4.—Profile of Porters stony loam, 15 to 25 percent slopes.

Figure 5.—Green beans on Rosman loam.

Figure 6.—A profile of Spivey stony loam, 10 to 40 percent slopes. This soil is in coves and in concave positions. It has stones on the surface and throughout.

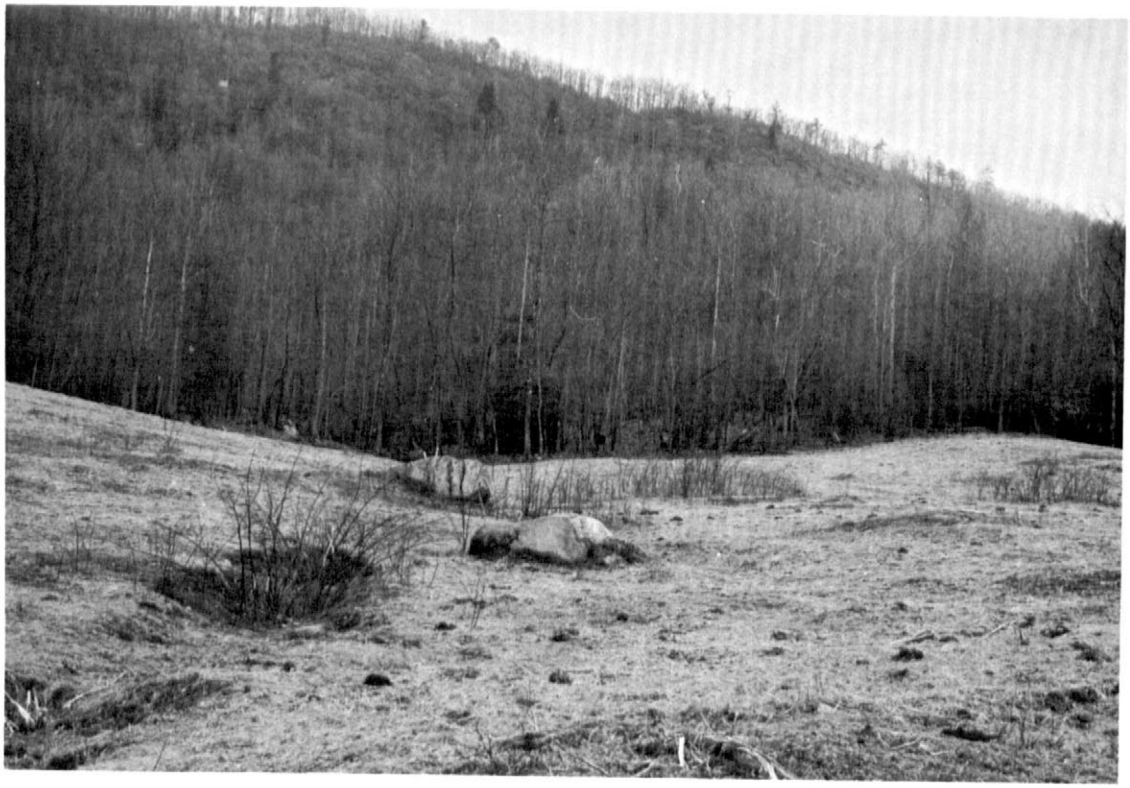

Figure 7.—Tusquitee stony loam, 7 to 15 percent slopes, in foreground and Ashe stony loam on mountain in background.

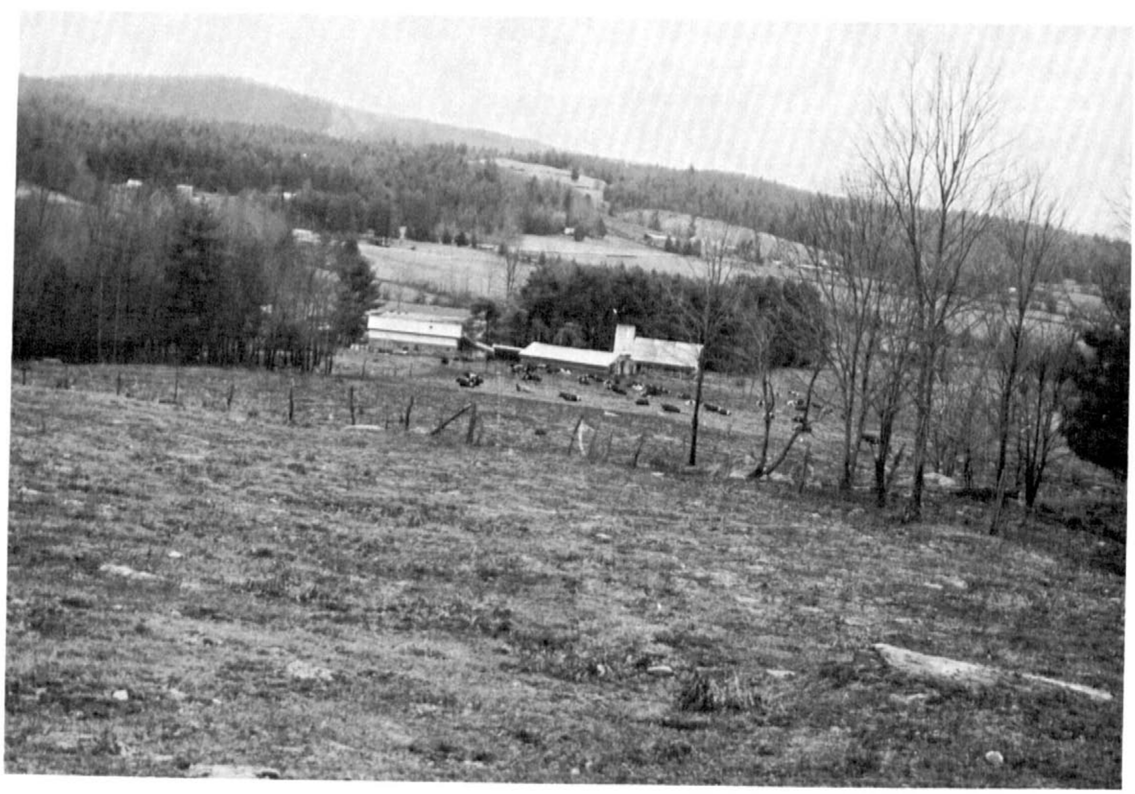

Figure 8.—Pasture on Tusquitee stony loam, 15 to 25 percent slopes.

Tables

TABLE 1.--CLIMATIC DATA

[All data from Hendersonville, or estimated as indicated, for Henderson County, N.C.]

Month	Temperature				Precipitation					
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with-- Maximum temperature equal to or higher than--	Two years in 10 will have at least 4 days with-- Minimum temperature equal to or lower than--	Average monthly total	One year in 10 will have-- Less than--	One year in 10 will have-- More than--	Average number of days with snow cover of 1.0 inch or more	Average depth of snow on days with snow cover	Average soil temperature at 4-inch depth on bare, level ground (estimated)
	F	F	F	F	In	In	In		In	F
January----	52	29	64	8	4.8	1.5	6.3	3	2	41
February---	53	29	68	14	4.6	1.5	7.5	3	2	42
March------	60	34	76	20	5.5	2.9	8.1	2	2	48
April------	70	42	83	27	4.5	1.4	8.3	(1)	(1)	57
May--------	78	50	88	36	4.1	1.6	5.8	0	0	66
June-------	84	58	92	46	4.8	2.1	9.5	0	0	73
July-------	85	62	92	52	6.2	2.5	9.6	0	0	75
August-----	85	61	91	49	5.5	1.7	13.4	0	0	75
September--	80	55	87	40	4.0	0.5	9.1	0	0	69
October----	71	43	79	27	3.8	0.4	9.7	0	0	60
November---	59	33	72	18	3.6	1.6	5.4	(1)	(1)	48
December---	51	28	66	12	4.7	1.4	7.8	1	1	41
Year------	69	44	(2) 93	(3) 3	56.1	46.7	72.4	9	2	58

[1]Less than one-half day.
[2]Average annual highest maximum.
[3]Average annual lowest minimum.

TABLE 2.--PROBABILITIES OF LAST FREEZING TEMPERATURES IN SPRING AND FIRST IN FALL

[Hendersonville, Henderson County, N. C.]

Probability	Dates for given probability and temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than---	Mar. 15	Mar. 21	Apr. 10	Apr. 25	May. 7
2 years in 10 later than---	Mar. 4	Mar. 13	Apr. 3	Apr. 19	Apr. 30
5 years in 10 later than---	Feb. 20	Mar. 3	Mar. 23	Apr. 9	Apr. 22
Fall:					
1 year in 10 earlier than-	Nov. 15	Nov. 8	Oct. 30	Oct. 16	Oct. 6
2 years in 10 earlier than-	Nov. 22	Nov. 14	Nov. 7	Oct. 21	Oct. 11
5 years in 10 earlier than-	Dec. 2	Nov. 24	Nov. 17	Oct. 29	Oct. 19

TABLE 3.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ae	Arents, loamy	411	0.2
AhE	Ashe stony sandy loam, 15 to 25 percent slopes	3,642	1.5
AhF	Ashe stony sandy loam, 25 to 45 percent slopes	15,548	6.4
AhG	Ashe stony sandy loam, 45 to 70 percent slopes	17,734	7.3
ArG	Ashe-Rock outcrop complex, 15 to 70 percent slopes	2,118	0.9
BaB	Bradson gravelly loam, 2 to 7 percent slopes	5,192	2.1
BaC	Bradson gravelly loam, 7 to 15 percent slopes	2,882	1.2
BrC	Brevard loam, 7 to 15 percent slopes	3,007	1.2
BrE	Brevard loam, 15 to 25 percent slopes	3,518	1.5
BrF	Brevard loam, 25 to 45 percent slopes	843	0.3
CaG	Chandler stony loam, 45 to 70 percent slopes	1,797	0.7
CfE	Clifton stony loam, 15 to 25 percent slopes	1,054	0.4
CfF	Clifton stony loam, 25 to 45 percent slopes	1,285	0.5
Co	Codorus loam	9,376	3.9
Cu	Comus fine sandy loam	1,753	0.7
DeA	Delanco loam, 0 to 2 percent slopes	1,470	0.6
DeB	Delanco loam, 2 to 7 percent slopes	3,257	1.3
EdC	Edneyville fine sandy loam, 7 to 15 percent slopes	4,176	1.7
EdE	Edneyville fine sandy loam, 15 to 25 percent slopes	17,328	7.2
EdF	Edneyville fine sandy loam, 25 to 45 percent slopes	16,269	6.7
EnB	Elsinboro loam, 0 to 3 percent slopes	826	0.3
EvC	Evard fine sandy loam, 7 to 15 percent slopes	9,500	3.9
EwE	Evard soils, 15 to 25 percent slopes	15,818	6.5
EwF	Evard soils, 25 to 45 percent slopes	17,874	7.4
EwG	Evard soils, 45 to 70 percent slopes	4,862	2.0
FaC	Fannin silt loam, 7 to 15 percent slopes	2,393	1.0
FaE	Fannin silt loam, 15 to 25 percent slopes	3,116	1.3
FaF	Fannin silt loam, 25 to 45 percent slopes	2,123	0.9
Ha	Hatboro loam	1,674	0.7
HyB	Hayesville loam, 2 to 7 percent slopes	6,903	2.9
HyC	Hayesville loam, 7 to 15 percent slopes	19,000	7.9
HyE	Hayesville loam, 15 to 25 percent slopes	6,345	2.6
Ko	Kinkora loam	633	0.3
PoE	Porters stony loam, 15 to 25 percent slopes	1,237	0.5
PoF	Porters stony loam, 25 to 45 percent slopes	2,839	1.2
PoG	Porters stony loam, 45 to 70 percent slopes	3,782	1.6
Ro	Rosman loam	2,375	1.0
SpF	Spivey stony loam, 10 to 40 percent slopes	463	0.2
Su	Suncook loamy sand	286	0.1
TaF	Talladega silt loam, 25 to 45 percent slopes	1,069	0.4
TeB	Tate fine sandy loam, 2 to 7 percent slopes	2,463	1.0
TeC	Tate fine sandy loam, 7 to 15 percent slopes	5,611	2.3
To	Toxaway silt loam	3,216	1.3
TsC	Tusquitee loam, 7 to 15 percent slopes	2,010	0.8
TsE	Tusquitee loam, 15 to 25 percent slopes	2,750	1.1
TuC	Tusquitee stony loam, 7 to 15 percent slopes	574	0.2
TuE	Tusquitee stony loam, 15 to 25 percent slopes	7,294	3.0
TuF	Tusquitee stony loam, 25 to 45 percent slopes	1,968	0.8
	Total	241,664	100.0

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1975. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Corn	Corn silage	Cabbage	Snap beans	Grass-clover (Hay)	Pasture
	Bu	Ton	Crate	Bu	Ton	AUM[1]
Arents, loamy:						
Ae	---	---	---	---	---	---
Ashe:						
AhE	---	---	300	---	---	4.0
AhF, AhG	---	---	---	---	---	---
[2]ArG	---	---	---	---	---	---
Bradson:						
BaB	85	17	500	275	4.2	7.0
BaC	75	15	450	250	3.6	6.0
Brevard:						
BrC	85	17	550	250	3.6	6.0
BrE	70	14	375	---	3.3	5.5
BrF	---	---	---	---	---	4.0
Chandler:						
CaG	---	---	---	---	---	---
Clifton:						
CfE	---	---	375	225	---	---
CfF	---	---	---	---	---	---
Codorus:						
Co	90	26	450	225	5.4	9.0
Comus:						
Cu	100	20	500	250	4.8	8.0
Delanco:						
DeA	110	22	500	250	4.8	8.0
DeB	100	20	450	300	4.5	7.5
Edneyville:						
EdC	80	16	400	225	3.6	6.0
EdE	70	14	350	---	3.3	5.5
EdF	---	---	---	---	---	4.0
Elsinboro:						
EnB	115	23	550	300	3.9	6.5
Evard:						
EvC	75	15	375	225	3.6	6.0
EwE	---	---	---	---	---	4.5
EwF	---	---	---	---	---	---
EwG	---	---	---	---	---	---
Fannin:						
FaC	85	17	450	250	3.6	6.0
FaE, FaF	---	---	---	---	---	4.0
Hatboro:						
Ha	90	23	450	180	4.8	8.0

See footnotes at end of table.

TABLE 4.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Cabbage	Snap beans	Grass-clover (Hay)	Pasture
	Bu	Ton	Crate	Bu	Ton	AUM[1]
Hayesville:						
HyB	100	20	500	275	4.5	7.5
HyC	80	16	450	250	4.2	7.0
HyE	---	---	375	---	3.3	5.5
Kinkora:						
Ko	80	16	375	180	3.6	6.0
Porters:						
PoE	---	---	---	---	3.3	5.5
PoF	---	---	---	---	---	4.0
PoG	---	---	---	---	---	---
Rosman:						
Ro	110	22	550	300	5.0	8.5
Spivey:						
SpF	---	---	---	---	---	---
Suncook:						
Su	70	14	375	200	3.0	5.0
Talladega:						
TaF	---	---	---	---	---	---
Tate:						
TeB	105	21	550	275	4.5	7.5
TeC	85	17	500	250	4.2	7.0
Toxaway:						
To	110	22	500	200	5.0	8.5
Tusquitee:						
TsC, TuC	90	18	550	275	3.6	6.0
TsE, TuE	---	---	450	200	---	5.0
TuF	---	---	---	---	---	---

[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 problems: Erosion hazard	Management problems: Equipment limitation	Management problems: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant[1]
Ashe:							
AhE, AhF	3x	Slight	Moderate	Moderate	Pitch pine	57	Fraser fir,
					Shortleaf pine	56	Scotch pine,
					Virginia pine	65	Norway spruce,
					Eastern white pine	84	shortleaf pine.
AhG	3x	Slight	Severe	Severe	Pitch pine	57	Fraser fir,
					Shortleaf pine	56	Scotch pine,
					Virginia pine	65	Norway spruce,
					Eastern white pine	84	shortleaf pine.
[2]ArG:							
Ashe part	3x	Slight	Severe	Severe	Pitch pine	57	Fraser fir,
					Shortleaf pine	56	Scotch pine,
					Virginia pine	65	Norway spruce,
					Eastern white pine	84	shortleaf pine.
Rock outcrop part.							
Bradson:							
BaB, BaC	2o	Slight	Slight	Slight	Pitch pine	77	Fraser fir,
					Shortleaf pine	71	northern red oak,
					Virginia pine	76	loblolly pine,
					Eastern white pine	93	Scotch pine,
					Northern red oak	80	shortleaf pine,
					Yellow-poplar	95	eastern white pine,
							Norway spruce,
							black walnut,
							yellow-poplar.
Brevard:							
BrC	2o	Slight	Slight	Slight	Shortleaf pine	70	Fraser fir,
					Virginia pine	80	northern red oak,
					Eastern white pine	90	yellow-poplar,
					Northern red oak	75	Scotch pine,
					Yellow-poplar	95	shortleaf pine,
							eastern white pine,
							Norway spruce,
							black walnut.
BrE, BrF	2r	Slight	Moderate	Moderate	Shortleaf pine	70	Fraser fir,
					Virginia pine	80	northern red oak,
					Eastern white pine	90	yellow-poplar,
					Northern red oak	75	Scotch pine,
					Yellow-poplar	95	shortleaf pine,
							eastern white pine,
							Norway spruce,
							black walnut.
Chandler:							
CaG	3x	Severe	Severe	Slight	Pitch pine	67	Scotch pine,
					Shortleaf pine	70	shortleaf pine,
					Virginia pine	68	Virginia pine,
					Eastern white pine	81	eastern white pine.
					Yellow-poplar	80	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi- nation symbol	Management problems: Erosion hazard	Management problems: Equip- ment limita- tion	Management problems: Seedling mortal- ity	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant[1]
Clifton:							
CfE	2x	Slight	Moderate	Slight	Yellow-poplar	93	Fraser fir,
					Pitch pine	66	northern red oak,
					Eastern white pine	93	yellow-poplar,
					Shortleaf pine	70	Scotch pine,
					Virginia pine	75	shortleaf pine,
					Northern red oak	75	eastern white pine,
							Norway spruce,
							black walnut.
CfF	2x	Moderate	Moderate	Slight	Yellow-poplar	93	Fraser fir,
					Pitch pine	66	northern red oak,
					Eastern white pine	93	yellow-poplar,
					Shortleaf pine	70	Scotch pine,
					Virginia pine	75	shortleaf pine,
					Northern red oak	75	eastern white pine,
							Norway spruce,
							black walnut.
Codorus:							
Co	1w	Slight	Slight	Slight	Northern red oak	90	Yellow-poplar,
					White ash	90	black walnut,
					Sugar maple	90	white ash,
					Yellow-poplar	100	sugar maple,
					Eastern white pine	100	European larch,
					Black walnut	100	Norway spruce,
							eastern white pine.
Comus:							
Cu	1o	Slight	Slight	Slight	Shortleaf pine	80	White ash,
					White pine	100	Fraser fir,
					Red oaks	90	northern red oak,
					Sycamore	90	Scotch pine,
					Yellow-poplar	100	shortleaf pine,
							white pine,
							Norway spruce,
							sycamore,
							black walnut,
							yellow-poplar.
Delanco:							
DeA, DeB	2w	Slight	Moderate	Slight	Shortleaf pine	70	White pine,
					White pine	90	yellow-poplar.
					Red oaks	80	
					Yellow-poplar	95	
Edneyville:							
EdC	2o	Slight	Slight	Slight	Shortleaf pine	75	Fraser fir,
					Virginia pine	75	Scotch pine,
					Eastern white pine	92	Norway spruce,
					Northern red oak	75	eastern white pine,
					Yellow-poplar	99	yellow-poplar,
							shortleaf pine.
EdE, EdF	2r	Slight	Moderate	Moderate	Shortleaf pine	75	Fraser fir,
					Virginia pine	75	Scotch pine,
					Eastern white pine	92	Norway spruce,
					Northern red oak	75	eastern white pine,
					Yellow-poplar	99	yellow-poplar,
							shortleaf pine.

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management problems: Erosion hazard	Management problems: Equipment limitation	Management problems: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant[1]
Elsinboro:							
EnB	2o	Slight	Slight	Slight	Shortleaf pine	75	Fraser fir,
					Virginia pine	80	northern red oak,
					White pine	90	loblolly pine,
					Upland oaks	75	Scotch pine,
					Yellow-poplar	95	shortleaf pine,
							white pine,
							Norway spruce,
							black walnut,
							yellow-poplar.
Evard:							
EvC, EwE, EwF	2r	Moderate	Moderate	Slight	Pitch pine	80	Shortleaf pine,
					Shortleaf pine	70	white pine,
					Virginia pine	70	yellow-poplar.
					White pine	90	
					Upland oaks	70	
					Yellow-poplar	90	
EwG	2r	Severe	Severe	Slight	Pitch pine	80	Shortleaf pine,
					Shortleaf pine	70	white pine,
					Virginia pine	70	yellow-poplar.
					White pine	90	
					Upland oaks	70	
					Yellow-poplar	90	
Fannin:							
FaC	2o	Slight	Slight	Slight	Eastern white pine	90	Eastern white pine,
					Shortleaf pine	70	shortleaf pine,
					Virginia pine	70	Norway spruce,
					Yellow-poplar	100	Fraser fir,
					Northern red oak	80	Scotch pine,
							yellow-poplar.
FaE, FaF	2r	Moderate	Moderate	Slight	Eastern white pine	90	Eastern white pine,
					Shortleaf pine	70	shortleaf pine,
					Virginia pine	70	Norway spruce,
					Yellow-poplar	100	Fraser fir,
					Northern red oak	80	Scotch pine,
							yellow-poplar.
Hatboro:							
Ha	1w	Slight	Severe	Slight	Northern red oak	80	Green ash,
					Sweetgum	90	white pine,
					Yellow-poplar	90	sycamore,
							yellow-poplar.
Hayesville:							
HyB, HyC	2o	Slight	Slight	Slight	Pitch pine	81	Fraser fir,
					Shortleaf pine	66	Scotch pine,
					Virginia pine	70	shortleaf pine,
					Eastern white pine	86	eastern white pine,
					Northern red oak	70	Norway spruce.
					Yellow-poplar	93	
HyE	2r	Slight	Slight	Slight	Pitch pine	81	Fraser fir,
					Shortleaf pine	66	Scotch pine,
					Virginia pine	70	shortleaf pine,
					Eastern white pine	86	eastern white pine,
					Northern red oak	70	Norway spruce.
					Yellow-poplar	93	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management problems: Erosion hazard	Management problems: Equipment limitation	Management problems: Seedling mortality	Potential productivity: Important trees	Potential productivity: Site index	Trees to plant[1]
Kinkora:							
Ko	2w	Slight	Severe	Severe	Shortleaf pine	80	White pine, sycamore.
					White pine	90	
					Sweetgum	90	
					Yellow-poplar	80	
					Water oaks	90	
Porters:							
PoE	2x	Slight	Slight	Moderate	Shortleaf pine	70	Fraser fir, Scotch pine, Norway spruce, eastern white pine, black walnut, yellow-poplar.
					Virginia pine	80	
					Eastern white pine	90	
					Northern red oak	75	
					Yellow-poplar	100	
PoF	2x	Slight	Moderate	Moderate	Shortleaf pine	70	Fraser fir, Scotch pine, Norway spruce, eastern white pine, black walnut, yellow-poplar.
					Virginia pine	80	
					Eastern white pine	90	
					Northern red oak	75	
					Yellow-poplar	100	
PoG	2x	Slight	Severe	Severe	Shortleaf pine	70	Fraser fir, Scotch pine, Norway spruce, eastern white pine, black walnut, yellow-poplar.
					Virginia pine	80	
					Eastern white pine	90	
					Northern red oak	75	
					Yellow-poplar	100	
Rosman:							
Ro	1o	Slight	Slight	Slight	Shortleaf pine	80	Yellow-poplar, black walnut, eastern white pine.
					Eastern white pine	100	
					Northern red oak	90	
					American sycamore	95	
					Black walnut	100	
					Yellow-poplar	105	
Spivey:							
SpF	2x	Moderate	Severe	Moderate	Yellow-poplar	100	Too stony to plant.
					Northern red oak	80	
					White pine	90	
Suncook:							
Su	5s	Slight	Slight	Severe	Eastern white pine	55	Eastern white pine, red pine.
					Black oak	50	
					Northern red oak	50	
					Red maple	50	
Talladega:							
TaF	3r	Slight	Moderate	Moderate	White pine	80	White pine, shortleaf pine, Virginia pine, Scotch pine.
					Shortleaf pine	60	
					Virginia pine	70	
					Pitch pine	70	
Tate:							
TeB, TeC	2o	Slight	Slight	Slight	Loblolly pine	90	Fraser fir, Scotch pine, Norway spruce, northern red oak, shortleaf pine, eastern white pine, black walnut, yellow-poplar.
					Shortleaf pine	75	
					Virginia pine	80	
					Eastern white pine	90	
					Northern red oak	80	
					Yellow-poplar	95	

See footnotes at end of table.

TABLE 5.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management problems			Potential productivity		Trees to plant[1]
		Erosion hazard	Equipment limitation	Seedling mortality	Important trees	Site index	
Toxaway:							
To	2w	Slight	Severe	Severe	Pitch pine	71	Green ash,
					Shortleaf pine	75	white ash,
					Virginia pine	80	northern red oak,
					Eastern white pine	93	yellow-poplar,
					Northern red oak	75	Scotch pine,
					Yellow-poplar	100	shortleaf pine,
							eastern white pine,
							American sycamore.
Tusquitee:							
TsC	2o	Slight	Slight	Slight	Shortleaf pine	75	Fraser fir,
					Virginia pine	80	Scotch pine,
					Eastern white pine	90	Norway spruce,
					Northern red oak	80	northern red oak,
					Yellow-poplar	95	eastern white pine,
							black walnut,
							yellow-poplar.
TsE	2r	Moderate	Moderate	Slight	Shortleaf pine	75	Fraser fir,
					Virginia pine	80	Scotch pine,
					Eastern white pine	90	Norway spruce,
					Northern red oak	80	northern red oak,
					Yellow-poplar	95	eastern white pine,
							black walnut,
							yellow-poplar.
TuC, TuE	2x	Slight	Moderate	Slight	Shortleaf pine	75	Fraser fir,
					Virginia pine	80	Scotch pine,
					Eastern white pine	90	Norway spruce,
					Northern red oak	80	northern red oak,
					Yellow-poplar	95	eastern white pine,
							black walnut,
							yellow-poplar.
TuF	2x	Moderate	Moderate	Moderate	Shortleaf pine	75	Fraser fir,
					Virginia pine	80	Scotch pine,
					Eastern white pine	90	Norway spruce,
					Northern red oak	80	northern red oak,
					Yellow-poplar	95	eastern white pine,
							black walnut,
							yellow-poplar.

[1]Fraser fir, Scotch pine, and Norway spruce are planted for Christmas tree production--not for pulpwood or sawlogs.

[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 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
Arents, loamy:					
Ae.					
Ashe:					
AhE, AhF, AhG	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope.
[1]ArG:					
Ashe part	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope.
Rock outcrop part.					
Bradson:					
BaB, BaC	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Severe: slope.	Moderate: low strength.
Brevard:					
BrC	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
BrE, BrF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chandler:					
CaG	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Clifton:					
CfE, CfF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Codorus:					
Co	Severe: floods, wetness.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: floods.
Comus:					
Cu	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Delanco:					
DeA	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
DeB	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Edneyville:					
EdC	Moderate: depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.
EdE, EdF	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope.
Elsinboro:					
EnB	Slight.	Slight.	Slight.	Slight.	Slight.

See footnotes 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
Evard:					
EvC	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
EwE, EwF, EwG	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fannin:					
FaC	Moderate: slope.	Moderate: low strength.	Moderate: slope.	Severe: slope.	Severe: low strength.
FaE, FaF	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: depth to rock.	Severe: low strength.
Hatboro:					
Ha	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
Hayesville:					
HyB	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
HyC	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Severe: slope.	Moderate: low strength.
HyE	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Kinkora:					
Ko	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe; wetness,
Porters:					
PoE, PoF, PoG	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope.
Rosman:					
Ro	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Spivey:					
SpF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Suncook:					
Su	Severe: floods, cutbanks cave.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Talladega:					
TaF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnotes 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
Tate:					
TeB	Slight.	Slight.	Slight.	Moderate: slope.	Moderate: low strength.
TeC	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
Toxaway:					
To	Severe: wetness, cutbanks cave.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Tusquitee:					
TsC, TuC	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
TsE, TuE, TuF	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

["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," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Arents, loamy: Ae.					
Ashe: AhE, AhF, AhG	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: seepage.	Poor: thin layer.
[1]ArG: Ashe part	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: seepage.	Poor: thin layer.
Rock outcrop part.					
Bradson: BaB	Slight	Moderate: seepage.	Moderate: too clayey.	Slight	Poor: too clayey.
BaC	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Poor: too clayey.
Brevard: BrC	Moderate: slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
BrE, BrF	Severe: slope.	Severe: slope.	Severe: seepage.	Severe: slope.	Poor: slope.
Chandler: CaG	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, thin layer.
Clifton: CfE	Severe: slope.	Severe: slope.	Moderate: depth to rock.	Severe: slope.	Poor: slope.
CfF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Codorus: Co	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Fair: too clayey.
Comus: Cu	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Good.
Delanco: DeA	Severe: wetness, floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: too clayey.
DeB	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.

See footnotes 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
Edneyville:					
EdC	Moderate: slope.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
EdE	Severe: slope.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
EdF	Severe: slope.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: slope.
Elsinboro:					
EnB	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
Evard:					
EvC	Moderate: slope.	Severe: slope.	Severe: seepage.	Severe: seepage.	Fair: thin layer.
EwE, EwF, EwG	Severe: slope.	Severe: slope.	Severe: seepage.	Severe: slope.	Poor: slope.
Fannin:					
FaC	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: thin layer.
FaE, FaF	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope.	Severe: slope.
Hatboro:					
Ha	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness, seepage.	Severe: floods, wetness.	Poor: wetness.
Hayesville:					
HyB	Moderate: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
HyC	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey.
HyE	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
Kinkora:					
Ko	Severe: floods, wetness, percs slowly.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.

See footnotes 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
Porters:					
PoE, PoF, PoG	Severe: slope.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: thin layer.
Rosman:					
Ro	Severe: floods.	Severe: floods, seepage.	Severe: floods; seepage.	Severe: floods; seepage.	Good.
Spivey:					
SpF	Severe: slope, stones.	Severe: slope, stones.	Severe: slope.	Severe: slope.	Poor: slope, stones.
Suncook:					
Su	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Poor: area reclaim.
Talladega:					
TaF	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope.	Poor: slope.
Tate:					
TeB	Slight	Severe: seepage.	Severe: seepage.	Slight	Good.
TeC	Moderate: slope.	Severe: seepage.	Severe: seepage.	Moderate: slope.	Fair: slope.
Toxaway:					
To	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Poor: wetness, excess humus.
Tusquitee:					
TsC, TuC	Moderate: slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: slope.
TsE, TuE, TuF	Severe: slope.	Severe: slope.	Severe: seepage.	Severe: slope.	Poor: 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 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," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Arents, loamy: Ae.				
Ashe: AhE, AhF, AhG	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
[1]ArG: Ashe part	Poor: thin layer.	Unsuited	Unsuited	Poor: thin layer.
Rock outcrop part.				
Bradson: BaB, BaC	Fair: low strength, area reclaim.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Brevard: BrC, BrE	Fair: low strength.	Unsuited	Unsuited	Poor: thin layer, slope.
BrF	Poor: slope.	Unsuited	Unsuited	Poor: thin layer, slope.
Chandler: CaG	Poor: thin layer, slope.	Unsuited	Unsuited	Poor: slope, thin layer.
Clifton: CfE, CfF	Poor: low strength.	Unsuited	Unsuited	Poor: thin layer.
Codorus: Co	Fair: wetness.	Unsuited	Unsuited	Fair: too clayey, small stones.
Comus: Cu	Fair: low strength.	Unsuited	Unsuited	Good.
Delanco: DeA, DeB	Fair: low strength.	Unsuited	Unsuited	Fair: thin layer.
Edneyville: EdC	Fair: slope.	Unsuited	Unsuited	Fair: thin layer.
EdE, EdF	Poor: slope.	Unsuited	Unsuited	Fair: thin layer.
Elsinboro: EnB	Fair: low strength.	Unsuited	Unsuited	Fair: thin layer.

See footnotes at end of table.

TABLE 8.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Evard:				
EvC	Fair: low strength.	Unsuited	Unsuited	Poor: thin layer.
EwE, EwF, EwG	Poor: slope.	Unsuited	Unsuited	Poor: slope.
Fannin:				
FaC, FaE, FaF	Poor: low strength, thin layer.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Hatboro:				
Ha	Poor: wetness.	Unsuited	Unsuited	Poor: wetness.
Hayesville:				
HyB, HyC, HyE	Poor: low strength.	Unsuited	Unsuited	Poor: thin layer, area reclaim.
Kinkora:				
Ko	Poor: wetness.	Unsuited	Unsuited	Poor: wetness.
Porters:				
PoE	Fair: low strength.	Unsuited	Unsuited	Poor: slope.
PoF, PoG	Poor: slope.	Unsuited	Unsuited	Poor: slope.
Rosman:				
Ro	Fair: low strength.	Poor: excess fines.	Unsuited	Good.
Spivey:				
SpF	Poor: slope, stones.	Unsuited	Unsuited	Poor: slope, stones.
Suncook:				
Su	Good	Poor: excess fines.	Unsuited	Poor: too sandy.
Talladega:				
TaF	Poor: slope, thin layer.	Unsuited	Unsuited	Poor: slope.
Tate:				
TeB, TeC	Fair: low strength.	Unsuited	Unsuited	Fair: thin layer.
Toxaway:				
To	Poor: wetness.	Unsuited	Unsuited	Poor: wetness.
Tusquitee:				
TsC, TsE, TuC, TuE	Fair: low strength.	Unsuited	Unsuited	Good.
TuF	Poor: slope.	Unsuited	Unsuited	Good.

[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-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
Arents, loamy: Ae.						
Ashe: AhE, AhF, AhG	Severe: depth to rock, seepage.	Severe: depth to rock.	Severe: no water.	Not needed	Slope, depth to rock.	Slope, rooting depth.
[1]ArG: Ashe part	Severe: depth to rock, seepage.	Severe: depth to rock.	Severe: no water.	Not needed	Slope, depth to rock.	Slope, rooting depth.
Rock outcrop part.						
Bradson: BaB	Slight	Moderate: low strength, compressible.	Severe: deep to water.	Not needed	Favorable	Favorable.
BaC	Slight	Moderate: low strength, compressible.	Severe: deep to water.	Not needed	Slope, erodes easily.	Slope, erodes easily.
Brevard: BrC, BrE, BrF	Moderate: seepage.	Moderate: seepage, low strength.	Severe: no water.	Not needed	Slope	Slope.
Chandler: CaG	Severe: slope.	Severe: thin layer.	Severe: no water.	Slope	Slope	Slope.
Clifton: CfE, CfF	Moderate: seepage.	Moderate: thin layer.	Severe: no water.	Not needed	Slope	Slope, erodes easily.
Codorus: Co	Severe: seepage, wetness.	Severe: piping, floods.	Slight	Floods, wetness.	Not needed	Floods, wetness.
Comus: Cu	Severe: seepage.	Moderate: fair slope, stability.	Severe: seepage.	Not needed	Not needed	Not needed.
Delanco: DeA	Moderate: seepage.	Moderate: piping.	Moderate: deep to water.	Floods	Not needed	Not needed.
DeB	Moderate: seepage.	Moderate: piping.	Moderate: deep to water.	Floods	Not needed	Erodes easily.
Edneyville: EdC, EdE, EdF	Severe: seepage.	Moderate: piping.	Severe: no water.	Not needed	Not needed	Slope.
Elsinboro: EnB	Severe: seepage.	Severe: seepage, piping.	Severe: deep to water.	Not needed	Favorable	Favorable.

See footnotes at end of table.

TABLE 9.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Evard:						
EvC	Severe: seepage.	Moderate: depth to rock, thin layer.	Severe: deep to water.	Not needed	Slope	Slope.
EwE, EwF, EwG	Severe: seepage.	Severe: slope.	Severe: deep to water.	Not needed	Slope	Slope.
Fannin:						
FaC, FaE, FaF	Moderate: depth to rock.	Severe: low strength, hard to pack.	Severe: no water.	Not needed	Complex slope, depth to rock.	Erodes easily, rooting depth.
Hatboro:						
Ha	Severe: seepage, wetness.	Severe: piping, floods.	Slight	Floods, wetness.	Not needed	Wetness, floods.
Hayesville:						
HyB	Moderate: seepage.	Severe: low strength.	Severe: no water.	Not needed	Favorable	Slope, erodes easily.
HyC, HyE	Moderate: seepage.	Severe: low strength.	Severe: no water.	Not needed	Slope, erodes easily.	Slope, erodes easily.
Kinkora:						
Ko	Moderate: seepage.	Severe: piping.	Slight	Floods, wetness.	Not needed	Not needed.
Porters:						
PoE, PoF, PoG	Severe: depth to rock.	Severe: depth to rock.	Severe: no water.	Not needed	Slope, depth to rock.	Slope, depth to rock.
Rosman:						
Ro	Severe: seepage.	Moderate: low strength, piping.	Severe: no water.	Not needed	Not needed	Not needed.
Spivey:						
SpF	Severe: seepage, stones, slope.	Severe: stones.	Severe: deep to water.	Not needed	Not needed	Not needed.
Suncook:						
Su	Severe: seepage, floods.	Severe: seepage, erodes easily.	Severe: deep to water.	Not needed	Not needed	Not needed.
Talladega:						
TaF	Severe: slope.	Moderate: thin layer.	Severe: deep to water.	Not needed	Not needed	Not needed.

See footnotes 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	Terraces and diversions	Grassed waterways
Tate:						
TeB	Moderate: seepage.	Moderate: seepage, low strength.	Severe: no water.	Not needed	Favorable	Favorable.
TeC	Moderate: seepage.	Moderate: seepage, low strength.	Severe: no water.	Not needed	Slope	Slope.
Toxaway:						
To	Severe: seepage.	Moderate: seepage, piping.	Slight	Wetness, cutbanks cave.	Not needed	Wetness.
Tusquitee:						
TsC, TsE, TuC, TuE, TuF	Moderate: seepage.	Moderate: seepage, low strength.	Severe: no water.	Not needed	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

["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"]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Arents, loamy: Ae.				
Ashe: AhE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
AhF, AhG	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ArG: Ashe part	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop part.				
Bradson: BaB	Moderate: small stones.	Moderate: small stones.	Moderate: small stones.	Moderate: small stones.
BaC	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope.	Moderate: small stones.
Brevard: BrC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
BrE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
BrF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Chandler: CaG	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Clifton: CfE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
CfF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Codorus: Co	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: wetness, floods.
Comus: Cu	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
Delanco: DeA	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
DeB	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness.

See fotnotes at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Edneyville:				
EdC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
EdE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
EdF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Elsinboro:				
EnB	Slight	Slight	Slight	Slight.
Evard:				
EvC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
EwE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
EwF, EwG	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fannin:				
FaC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
FaE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
FaF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Hatboro:				
Ha	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Hayesville:				
HyB	Slight	Slight	Moderate: slope.	Slight.
HyC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
HyE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Kinkora:				
Ko	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Porters:				
PoE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
PoF, PoG	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rosman:				
Ro	Severe: floods.	Severe: floods.	Severe: floods.	Slight.
Spivey:				
SpF	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.

See footnotes at end of table.

TABLE 10.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
Suncook:				
Su	Moderate: too sandy, floods.	Moderate: too sandy, floods.	Moderate: too sandy, floods.	Moderate: too sandy, floods.
Talladega:				
TaF	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Tate:				
TeB	Slight	Slight	Moderate: slope.	Slight.
TeC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Toxaway:				
To	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.	Severe: wetness, floods.
Tusquitee:				
TsC, TuC	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
TsE, TuE	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
TuF	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: 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
Arents, loamy: Ae.											
Ashe: AhE	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
AhF, AhG	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
[1]ArG: Ashe part	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop part.											
Bradson: BaB	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
BaC	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Brevard: BrC	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
BrE	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BrF	Very poor.	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Chandler: CaG	Very poor.	Poor	Fair	Poor	Poor	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Clifton: CfE	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
CfF	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Codorus: Co	Fair	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Comus: Cu	Poor	Fair	Fair	Good	Good	---	Poor	Very poor.	Fair	Good	Very poor.
Delanco: DeA	Good	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
DeB	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.

See footnotes at end of table.

TABLE 11.--WILDLIFE HABITAT POTENITALS--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
Edneyville:											
EdC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
EdE	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
EdF	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Elsinboro:											
EnB	Good	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
Evard:											
EvC	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
EwE, EwF, EwG	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Fannin:											
FaC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
FaE	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
FaF	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	Very poor.
Hatboro:											
Ha	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Hayesville:											
HyB	Good	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
HyC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
HyE	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	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
Kinkora:											
Ko	Poor	Fair	Fair	Fair	Fair	---	Good	Good	Fair	Fair	Good.
Porters:											
PoE, PoF, PoG	Very poor.	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
Rosman:											
Ro	Good	Good	Good	Good	Good	Good	Fair	Very poor.	Good	Good	Very poor.
Spivey:											
SpF	Very poor.	Very poor.	Fair	Good	Poor	---	Very poor.	Very poor.	Poor	Fair	Very poor.
Suncook:											
Su	Poor	Fair	Fair	Poor	Poor	---	Very poor.	Very poor.	Fair	Poor	Very poor.
Talladega:											
TaF	Very poor.	Poor	Fair	Fair	Fair	---	Very poor.	Very poor.	Poor	Poor	Very poor.
Tate:											
TeB	Fair	Good	Good	Good	Good	---	Poor	Very poor.	Good	Good	Very poor.
TeC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
Toxaway:											
To	Very poor.	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
Tusquitee:											
TsC, TuC	Fair	Good	Good	Good	Good	---	Very poor.	Very poor.	Good	Good	Very poor.
TsE, TuE	Poor	Fair	Good	Good	Good	---	Very poor.	Very poor.	Fair	Good	Very poor.
TuF	Very poor.	Poor	Good	Good	Good	---	Very poor.	Very poor.	Poor	Good	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.

TABLE 12.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Arents, loamy:											
Ae		------	---	0	--	--	--	--	--	--	---
Ashe:											
AhE, AhF, AhG	0-7	Stony sandy loam	SM, SM-SC,	A-2, A-4	5-15	75-90	70-85	50-80	25-45	<25	[1]NP-7
	7-21	Sandy loam	SM, SM-SC	A-2, A-4	5-15	80-95	75-90	55-90	30-45	<25	NP-7
	21-30	Sandy loam	SM	A-2, A-4	15-35	70-90	60-90	50-85	25-45	---	NP
[2]ArG:											
Ashe part	0-7	Stony sandy loam	SM, SM-SC	A-2, A-4	5-15	75-90	70-85	50-80	25-45	<25	NP-7
	7-21	Sandy loam	SM, SM-SC	A-2, A-4	5-15	80-95	75-90	55-90	30-45	<25	NP-7
	21-30	Sandy loam	SM	A-2, A-4	15-35	70-90	60-90	50-85	25-45	---	NP
Rock outcrop part.											
Bradson:											
BaB, BaC	0-6	Gravelly loam	SM, SC, SM-SC	A-2, A-4	0-5	55-85	50-80	30-70	15-49	<35	NP-15
	6-65	Clay loam, clay	ML, MH	A-7	0-5	70-100	70-95	70-90	60-85	41-65	11-25
	65-75	Loam	ML, CL-ML, CL	A-4	5-30	85-100	80-100	80-98	60-85	<25	NP-10
Brevard:											
BrC, BrE, BrF	0-7	Loam	ML, CL, CL-ML	A-4	0-5	98-100	95-100	85-95	60-80	<30	NP-10
	7-58	Sandy loam, clay loam, loam.	CL, CL-ML	A-4, A-6	0-5	95-100	95-100	85-97	51-75	25-35	5-15
	58-70	Gravelly sandy clay loam.	GM	A-1	0-5	20-50	15-40	15-40	13-25	---	NP
Chandler:											
CaG	0-5	Stony loam	ML, MH	A-7	5-15	80-90	80-90	75-90	70-85	41-60	12-26
	5-26	Loam	ML, MH	A-7	5-15	80-90	80-90	75-90	75-85	41-60	12-26
	26-54	Sandy loam	ML, MH	A-7	5-15	80-90	80-90	75-90	75-85	41-60	12-2
Clifton:											
CfE, CfF	0-9	Stony loam	ML, CL, CL-ML	A-4	2-15	80-95	75-90	70-90	51-75	<25	NP-10
	9-36	Clay loam	ML, CL, MH	A-7	15-25	70-85	65-80	60-75	55-75	41-55	12-20
	36-42	Loam	SM, ML, CL, SC, SC-SM, CL-ML	A-4	10-25	70-90	65-80	65-80	45-65	<25	NP-10
Codorus:											
Co	0-12	Loam	ML, CL, ML-CL	A-4, A-6	0	80-100	70-100	65-100	55-95	22-35	2-12
	12-45	Loam, fine sandy clay loam.	ML, CL, ML-CL	A-4, A-6	0	80-100	75-100	65-100	55-85	22-35	2-12
	45-60	Loamy sand	SM, ML	A-2, A-4	0	50-100	40-100	20-85	15-65	---	NP
Comus:											
Cu	0-20	Fine sandy loam	ML, CL, ML-CL	A-4	0-2	90-100	85-100	70-95	60-90	<25	3-1
	20-36	Loam	ML-CL, CL	A-4	0-5	90-100	80-100	70-95	65-90	<25	4-1
	36-70	Loam, sandy loam	ML-CL, ML, SM, SM-SC	A-4	0-15	80-95	70-90	65-90	40-70	<20	NP-7

See footnotes 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	
Delanco:											
DeA, DeB----------	0-10	Loam------------	ML-CL, CL	A-4	0-2	90-100	85-100	80-95	75-90	<25	4-10
	10-40	Clay loam, sandy clay loam.	ML-CL, CL	A-4, A-6	0-2	80-95	75-95	70-90	65-85	<30	4-15
	40-60	Sandy clay loam	ML-CL, CL	A-4, A-6	0-2	85-100	85-100	80-95	70-90	20-35	4-12
Edneyville:											
EdC, EdE, EdF-----	0-5	Fine sandy loam	SM, ML, CL-ML, CL, SC	A-2, A-4	0-5	85-100	80-100	70-90	30-55	<30	NP-10
	5-30	Sandy clay loam, fine sandy loam	SM, ML, CL, SC	A-4, A-6	0-5	85-100	80-100	80-90	36-60	25-35	6-15
	30-60	Fine sandy loam	SM, SM-SC	A-2, A-4	5-15	80-100	75-100	60-95	13-40	<30	NP-7
Elsinboro:											
EnB---------------	0-9	Loam------------	ML, ML-CL	A-4	0-2	85-95	80-95	65-95	55-80	<30	NP-7
	9-38	Clay loam, sandy clay loam.	CL, ML-CL	A-4, A-6	0-2	85-95	80-95	75-90	70-85	20-40	4-1
	38-55	Gravelly loamy sand.	SM, SM-SP	A-2	0-2	80-90	75-85	40-80	10-35	---	NP
Evard:											
EvC, EwE, EwF, EwG	0-6	Sandy loam------	ML, ML-CL SM, SM-SC	A-4	0-5	70-90	60-80	50-70	36-60	<25	NP-7
	6-30	Sandy clay loam, sandy loam.	ML-CL, CL SM-SC, SC	A-4, A-6	0-5	70-90	65-90	60-90	55-85	<30	4-12
	30-53	Sandy loam------	SM, SM-SC	A-2, A-4	15-40	60-70	50-65	45-60	30-50	<20	NP-7
Fannin:											
FaC, FaE, FaF-----	0-6	Silt loam-------	CL, SC	A-4, A-6	0-5	95-100	90-100	60-95	36-85	22-38	8-18
	6-36	Silty clay loam, silt loam.	ML, MH	A-4, A-7	2-10	70-90	70-90	65-85	60-85	35-55	9-23
	36-60	Loam------------	CL, SC	A-4, A-6	2-10	95-100	90-100	70-90	45-80	25-38	8-18
Hatboro:											
Ha----------------	0-12	Loam------------	CL-ML, CL, SC, SM-SC	A-4, A-6	0	95-100	90-100	70-100	40-90	22-35	4-12
	12-36	Loam------------	ML, CL, CL-ML	A-4, A-6	0	85-100	80-100	70-95	55-85	22-35	4-12
	36-62	Sand, loamy sand	SM	A-4	0	75-100	70-100	60-90	45-50	---	NP
Hayesville:											
HyB, HyC, HyE-----	0-8	Loam------------	SC-SM, SM, ML, ML-CL	A-4	0	90-100	85-95	70-95	35-60	<25	NP-7
	8-35	Clay loam-------	ML, MH, CL, CH	A-6, A-7	0	85-95	80-90	70-85	55-75	36-55	11-25
	35-44	Sandy clay loam, sandy loam.	SM, ML, MH, CL	A-6, A-7	0-5	80-90	75-90	70-85	45-65	36-55	11-25
	44-72	Sandy loam------	SM, ML, CL, SC	A-4, A-6	5-15	90-100	90-95	75-90	40-55	<28	NP-12
Kinkora:											
Ko----------------	0-7	Loam------------	ML-CL, ML, CL	A-4	0	90-100	90-100	80-95	60-90	<30	NP-10
	7-33	Clay loam, clay	CH, CL	A-6, A-7	0	80-100	80-100	75-99	70-90	35-65	11-25
	33-60	Clay------------	CH, CL	A-7	0	90-100	90-100	75-95	70-90	41-65	11-25
Porters:											
PoE, PoF, PoG-----	0-6	Stony loam------	ML, SM, CL-ML, SM-SC	A-4	5-15	75-85	65-80	60-80	40-60	<30	NP-7
	6-32	Loam, clay loam	ML, SM	A-4, A-7, A-5	5-15	80-95	70-85	60-70	36-55	35-50	4-15
	32-42	Sandy loam------	SM, SM-SC	A-2, A-4	5-25	75-95	60-95	50-90	30-50	<25	NP-7

See footnotes at end of table.

TABLE 12.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Rosman:											
Ro	0-15	Loam	ML, CL, CL-ML	A-4	0	98-100	90-100	75-98	51-90	<35	NP-10
	15-48	Loam, fine sandy loam.	SM, ML, SM-SC, CL-ML	A-4	0-5	85-100	75-100	60-80	36-70	<30	NP-7
	48-70	Sandy loam	SM, ML, SM-SC, ML-CL	A-4	0-5	80-90	75-90	70-85	36-55	<20	NP-7
Spivey:											
SpF	0-42	Stony loam, stony sandy loam.	GM, GC, GM-GC, SM, SP, SM-SC	A-1, A-2 A-4	15-30	40-65	40-60	35-50	25-40	<25	NP-10
Suncook:											
Su	0-9	Loamy sand	SM	A-2	0	95-100	85-100	65-95	15-35	---	NP
	9-72	Loamy sand, sand	SP, SM	A-2, A-3	0	90-100	85-100	40-95	0-35	---	NP
Talladega:											
TaF	0-5	Silt loam	CL, ML-CL	A-4, A-6	0-5	85-100	85-100	80-95	60-90	<30	5-15
	5-24	Silty clay loam	CL	A-4, A-6	0-5	60-85	60-85	55-80	51-70	<35	8-18
	24-36	Loam	GM, GC, GM-GC, SP, SM, SP-SM	A-2, A-4	0-10	40-65	40-65	35-60	30-50	<25	NP-10
Tate:											
TeB, TeC	0-9	Fine sandy loam	ML-CL, ML, SM, SM-SC	A-4, A-6	0-5	95-100	86-99	68-98	45-82	<30	NP-7
	9-55	Clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0-5	94-100	87-100	75-99	60-91	20-40	4-12
	55-65	Fine sandy loam	SM, ML, ML-CL, SM-SC	A-4, A-6	0-5	90-100	80-95	70-90	45-80	<25	NP-7
Toxaway:											
To	0-26	Silt loam	CL	A-4, A-6	0	98-100	95-100	85-100	51-90	25-40	8-22
	26-36	Loam	CL, ML, SM, SC, ML-CL, SM-SC	A-2, A-4, A-6	0-5	95-100	85-100	60-95	25-90	<30	NP-10
	36-72	Sandy loam, sand, sandy clay loam, loamy sand.	ML-CL, ML, CL, SC-SM, SM, SC	A-2, A-4	0-5	70-100	60-95	50-85	30-65	<25	NP-10
Tusquitee:											
TsC, TsE	0-10	Loam	ML, SM, ML-CL, SM-SC	A-4,	0-5	90-100	80-100	65-95	40-75	<40	NP-7
TuC, TuE, TuF	0-10	Stony loam	ML-CL, ML, SM, SM-SC	A-4	5-15	75-85	65-80	60-80	36-60	<30	NP-7
	10-51	Clay loam, loam	ML, SM, CL-ML, CL, SC, SM-SC	A-4, A-6	0-10	85-100	75-100	65-95	36-75	25-40	4-12
	51-70	Sandy loam, fine sandy loam.	ML, SM, CL-ML, SM-SC	A-4	0-15	60-90	55-85	45-70	36-60	<25	NP-10

[1]NP means nonplastic.
[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 13.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[Dashes indicate data were not available. The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	Permea-bility	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion	
						Uncoated steel	Concrete
	In	In/hr	In/in of soil	pH			
Arents, loamy:							
Ae.							
Ashe:							
AhE, AhF, AhG-----	0-7	2.0-6.0	0.13-0.18	4.5-5.5	Low-------	Low-------	High.
	7-21	2.0-6.0	0.10-0.14	4.5-5.5	Low-------	Low-------	High.
	21-30	2.0-6.0	0.08-0.12	4.5-5.5	Low-------	Low-------	High.
[1]ArG:							
Ashe part--------	0-7	2.0-6.0	0.13-0.18	4.5-5.5	Low-------	Low-------	High.
	7-21	2.0-6.0	0.10-0.14	4.5-5.5	Low-------	Low-------	High.
	21-30	2.0-6.0	0.08-0.12	4.5-5.5	Low-------	Low-------	High.
Rock outcrop part.							
Bradson:							
BaB, BaC----------	0-6	6.0-20	0.06-0.11	4.5-6.0	Low-------	High------	Moderate.
	6-65	0.6-2.0	0.12-0.18	4.5-5.5	Low-------	High------	Moderate.
	65-75	0.6-2.0	0.12-0.18	4.5-5.5	Low-------	High------	Moderate.
Brevard:							
BrC, BrE, BrF-----	0-7	2.0-6.0	0.16-0.24	5.1-5.5	Low-------	Moderate	Moderate.
	7-58	0.6-2.0	0.15-0.20	5.1-6.0	Low-------	Moderate	Moderate.
	58-70	6.0-20	0.04-0.08	5.1-5.5	Low-------	Moderate	Moderate.
Chandler:							
CaG---------------	0-5	2.0-6.0	0.12-0.18	4.5-5.5	Low-------	Low-------	High.
	5-26	2.0-6.0	0.11-0.15	4.5-5.5	Low-------	Low-------	High.
	26-54	2.0-6.0	0.10-0.14	4.5-5.5	Low-------	Low-------	High.
Clifton:							
CfE, CfF----------	0-9	2.0-6.0	0.15-0.20	5.6-6.5	Low-------	Low-------	Moderate.
	9-36	0.6-2.0	0.15-0.20	5.6-6.5	Low-------	Low-------	Moderate.
	36-42	2.0-6.0	0.11-0.15	5.6-6.5	Low-------	Low-------	Moderate.
Codorus:							
Co----------------	0-12	0.6-2.0	0.14-0.20	4.5-7.3	Low-------	High------	Moderate.
	12-45	0.6-2.0	0.14-0.18	5.5-6.5	Low-------	High------	Moderate.
	45-60	2.0-20	0.04-0.08	5.5-6.5	Low-------	High------	Moderate.
Comus:							
Cu----------------	0-20	2.0-6.0	0.11-0.15	5.1-6.0	Low-------	Low-------	Moderate.
	20-36	0.6-2.0	0.15-0.20	5.1-6.0	Low-------	Low-------	Moderate.
	36-70	0.6-2.0	0.10-0.18	5.1-6.0	Low-------	Low-------	Moderate.
Delanco:							
DeA, DeB----------	0-10	2.0-6.0	0.15-0.20	4.5-5.5	Low-------	Moderate	High.
	10-40	0.6-2.0	0.12-0.18	4.5-5.5	Moderate	Moderate	High.
	40-60	0.6-20	0.12-0.17	4.5-5.5	Moderate	Moderate	High.
Edneyville:							
EdC, EdE, EdF-----	0-5	2.0-6.0	0.11-0.17	4.5-5.5	Low-------	Low-------	High.
	5-30	0.6-2.0	0.14-0.16	4.5-5.0	Low-------	Low-------	High.
	30-60	2.0-6.0	0.08-0.12	4.5-5.0	Low-------	Low-------	High.
Elsinboro:							
EnB---------------	0-9	2.0-6.0	0.15-0.20	4.5-5.5	Low-------	Low-------	High.
	9-38	0.6-2.0	0.12-0.20	4.5-5.5	Moderate	Low-------	High.
	38-55	2.0-6.0	0.05-0.08	4.5-5.5	Moderate	Low-------	High.

See footnotes 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	
						Uncoated steel	Concrete
	In	In/hr	In/in of soil	pH			
Evard:							
EvC, EwE, EwF, EwG	0-6	2.0-6.0	0.10-0.14	4.5-5.5	Low--------	Low--------	High.
	6-30	0.6-2.0	0.10-0.17	4.5-5.5	Low - Mod.	Moderate	High.
	30-53	2.0-6.0	0.10-0.14	4.5-5.5	Low--------	Moderate	High.
Fannin:							
FaC, FaE, FaF-----	0-6	2.0-6.0	0.10-0.16	4.5-5.5	Low--------	Low--------	High.
	6-36	0.6-2.0	0.11-0.17	4.5-5.5	Low--------	Low--------	High.
	36-60	0.6-2.0	0.10-0.15	4.5-5.5	Low--------	Low--------	High.
Hatboro:							
Ha----------------	0-12	0.6-2.0	0.16-0.22	4.5-7.3	Low--------	High------	Moderate.
	12-36	0.6-2.0	0.16-0.20	4.5-7.3	Low--------	High------	Moderate.
	36-62	0.6-2.0	0.10-0.14	5.6-6.5	Low--------	High------	Moderate.
Hayesville:							
HyB, HyC, HyE-----	0-8	2.0-6.0	0.12-0.20	4.5-5.5	Low--------	Moderate--	Moderate.
	8-35	0.6-2.0	0.15-0.20	4.5-5.5	Low--------	Moderate	Moderate.
	35-44	0.6-2.0	0.12-0.20	4.5-5.5	Low--------	Moderate	Moderate.
	44-72	2.0-6.0	0.11-0.15	4.5-5.5	Low--------	Moderate	Moderate.
Kinkora:							
Ko----------------	0-7	0.6-2.0	0.15-0.20	4.5-5.5	Low--------	High------	High.
	7-33	0.2-0.6	0.12-0.20	4.5-5.5	Moderate	High------	High.
	33-60	0.2-0.6	0.12-0.18	4.5-5.5	Moderate	High------	High.
Porters:							
PoE, PoF, PoG-----	0-6	0.6-2.0	0.16-0.20	4.5-6.0	Low--------	Low--------	High.
	6-32	0.6-2.0	0.16-0.25	4.5-6.0	Low--------	Low--------	High.
	32-42	2.0-6.0	0.10-0.20	4.5-6.0	Low--------	Low--------	High.
Rosman:							
Ro----------------	0-15	2.0-6.0	0.11-0.24	5.1-6.5	Low--------	Moderate	Moderate.
	15-48	6.0-20	0.08-0.12	5.1-6.5	Low--------	Moderate	Moderate.
	48-70	2.0-6.0	0.10-0.14	5.1-6.5	Low--------	Moderate	Moderate.
Spivey:							
SpF---------------	0-42	0.6-6.0	0.05-0.12	4.5-5.5	Low--------	Low--------	Moderate.
Suncook:							
Su----------------	0-9	>6.0	0.07-0.15	4.5-6.5	Low--------	Low--------	High.
	9-72	>6.0	0.01-0.13	4.5-6.5	Low--------	Low--------	High.

See footnotes 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	
						Uncoated steel	Concrete
	In	In/hr	In/in of soil	pH			
Talladega:							
TaF	0-5	2.0-6.0	0.16-0.24	4.5-5.5	Low	Low	Moderate.
	5-24	0.6-2.0	0.18-0.22	4.5-5.5	Low	Moderate	High.
	24-36	2.0-6.0	0.15-0.20	4.5-5.5	Low	Moderate	High.
Tate:							
TeB, TeC	0-9	2.0-6.0	0.17-0.19	5.1-6.0	Low	Moderate	Moderate.
	9-55	0.6-2.0	0.17-0.19	5.1-6.0	Low	Moderate	Moderate.
	55-65	2.0-6.0	0.08-0.14	5.1-6.0	Low	Moderate	Moderate.
Toxaway:							
To	0-26	0.6-2.0	0.15-0.20	5.1-6.0	Low	High	Moderate.
	26-36	2.0-20	0.05-0.15	5.1-6.0	Low	High	Moderate.
	36-72	2.0-20	0.05-0.15	5.1-6.0	Low	High	Moderate.
Tusquitee:							
TsC, TsE, TuC, TuE, TuF	0-10	2.0-6.0	0.11-0.22	5.1-6.0	Low	Moderate	Moderate.
	10-51	0.6-2.0	0.15-0.21	5.1-6.0	Low	Moderate	Moderate.
	51-70	2.0-6.0	0.08-0.14	5.1-6.0	Low	Moderate	Moderate.

[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. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Flooding			High water table			Bedrock	
	Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
				Ft			In	
Arents, loamy: Ae.								
Ashe: AhE, AhF, AhG	None	---	---	>6.0	---	---	20-40	Rippable.
[1]ArG: Ashe part	None	---	---	>6.0	---	---	20-40	Rippable.
Rock outcrop part.								
Bradson: BaB, BaC	None	---	---	>6.0	---	---	>60	---
Brevard: BrC, BrE, BrF	None	---	---	>6.0	---	---	>60	Rippable.
Chandler: CaG	None	---	---	>6.0	---	---	40-60	---
Clifton: CfE, CfF	None	---	---	>6.0	---	---	40-60	Rippable.
Codorus: Co	Common	---	---	1.0-2.0	Apparent	Nov-Apr	>60	---
Comus: Cu	Frequent	Very brief	Mar-May	2.5-3.5	Apparent	Dec-Apr	>72	---
Delanco: DeA, DeB	Occasional	Very brief	Mar-May	2.5-3.5	Apparent	Feb-Apr	>72	---
Edneyville: EdC, EdE, EdF	None	---	---	>6.0	---	---	>40	Rippable.
Elsinboro: EnB	None	---	---	>5.0	---	---	>72	---
Evard: EvC, EwE, EwF, EwG	None	---	---	>6.0	---	---	>48	Hard.
Fannin: FaC, FaE, FaF	None	---	---	>6.0	---	---	>60	Rippable.
Hatboro: Ha	Common	---	---	0.5	Apparent	Oct-May	>60	---
Hayesville: HyB, HyC, HyE	None	---	---	>6.0	---	---	>60	Rippable.
Kinkora: Ko	Occasional	Brief	Dec-Mar	0-1.0	Apparent	Jan-Apr	>72	---
Porters: PoE, PoF, PoG	None	---	---	>6.0	---	---	40-72	Hard.

See footnotes 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	Hardness
				Ft			In	
Rosman: Ro	Frequent	Very brief	Dec-Apr	4.0	Apparent	Jan-Apr	>60	---
Spivey: SpF	None	---	---	>5.0	---	---	>40	Hard.
Suncook: Su	Common	Brief	Mar-May	3.0-6.0	Apparent	Jan-Apr	>60	---
Talladega: TaF	None	---	---	>6.0	---	---	>26	Rippable.
Tate: TeB, TeC	None	---	---	>6.0	---	---	>60	---
Toxaway: To	Frequent	Very brief	Nov-Mar	0-1.0	Apparent	Nov-Apr	>60	---
Tusquitee: TsC, TsE, TuC, TuE, TuF	None	---	---	>6.0	---	---	>60	---

[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

Soil name and location	Report No.[1] S70NC-45	Depth	Horizon	Moisture density[2]		Mechanical analysis[3]								Liquid limit	Plasticity index	Classification	
						Percentage passing sieve--				Percentage smaller than--							
				Maximum dry density	Optimum moisture	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm			AASHTO[4]	Unified[5]
		In		Pcf	Pct									Pct			
Bradson gravelly loam: 1,000 feet north of Etowah School, 200 feet south of U.S. Highway 64, and 30 feet west of N.C. 1205. (Modal)	3-1	0-6	Ap	106	16	84	78	69	48	46	39	29	22	36	11	A-6(3)	SM-SC
	3-2	6-24	B21t	88	30	100	99	95	80	79	74	64	58	62	23	A-7-5(17)	MH
	3-4	40-80	B3t	95	25		100	97	76	74	66	47	40	53	17	A-7-5(13)	MH
Edneyville fine sandy loam: 7 miles SW of Hendersonville, 1,000 feet north of Crab Creek Baptist Church, and 50 feet east of N.C. 1133. (Modal)	4-2	1-5	A2	105	16		99	90	41	34	26	18	13	26	NP	A-4(1)	SM
	4-4	10-25	B2t	110	16	96	96	88	46	41	34	26	22	29	6	A-4(2)	SM-SC
	4-6	30-50	C1	106	16		100	92	39	32	23	12	9	28	NP	A-4(1)	SM
Kinkora loam: Mills River Community; 1.2 miles west of French Broad River on N.C. Highway 191, 1,000 feet north on field road, and 30 feet east. (Modal)	1-1	0-7	Ap	92	25		100	99	75	73	65	45	32	44	13	A-7-5(10)	ML
	1-3	16-33	B22tg	98	22		100	99	77	76	69	59	49	45	20	A-7-6(13)	ML-CL
	1-4	33-60	Cg	97	23		100	99	78	75	70	61	54	51	24	A-7-6(16)	MH-CH
Rosman loam: 6 miles NW of Hendersonville, 500 feet northeast of N.C. 191, and 200 feet southwest of Hendersonville water pumping station. (Modal)	6-1	0-10	Ap	94	24		100	98	63	55	39	23	15	35	5	A-4(6)	ML
	6-3	15-30	B2	101	20		100	99	67	58	40	25	18	33	4	A-4(6)	ML
	6-5	48-62	C1	103	16		100	96	21	16	13	8	6	25	NP	A-2-4(0)	SM
Tate fine sandy loam: 3 miles west of Hendersonville, 0.7 mile north of U.S. Highway 64 on N.C. 1309, and 200 feet north of Hendersonville water pumping station. (Modal)	5-1	0-9	Ap	110	14	100	99	98	48	41	30	18	11	24	NP	A-4(3)	SM
	5-2	9-26	B21t	107	17	100	99	92	64	59	49	35	27	35	11	A-6(6)	ML-CL
	5-5	55-65	C	108	16	100	99	93	58	49	36	22	17	32	6	A-4(5)	ML

See footnotes at end of table.

TABLE 15.--ENGINEERING TEST DATA

Soil name and location	Report No.[1] S70NC-45	Depth	Horizon	Moisture density[2]: Maximum dry density	Moisture density[2]: Optimum moisture	Mechanical analysis[3], Percentage passing sieve--: No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	Mechanical analysis[3], Percentage smaller than--: 0.05 mm	0.02 mm	0.005 mm	0.002 mm	Liquid limit	Plasticity index	Classification: AASHTO[4]	Classification: Unified[5]
		In		Pcf	Pct									Pct			
Toxaway loam:																	
1.5 miles east of Hendersonville, 800 feet southeast of Hendersonville-Meyer Airport, 600 feet east of Airport Road, and 100 feet south of drainage ditch. (Modal)	2-1	0-26	A11	85	28		100	95	68	63	51	32	20	46	10	A-5(8)	ML
	2-5	53-65	C3g	110	15		100	96	50	46	38	25	19	27	6	A-4(3)	SM-SC

1 Tests performed by North Carolina Department of Transportation, Division of Highways.

2 Based on the Moisture-Density Relations of Soils Using 5-5-lbs. Rammer and 12-in. Drop, AASHTO Designation T 99 (1).

3 Mechanical analyses according to the AASHTO Designation T 88 (1). Results by this procedure frequently may differ somewhat from results that would have been 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 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.

4 Based on AASHTO Designation M 145 (1).

5 Based on the Unified soil classification system (2).

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Ashe	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Bradson	Clayey, oxidic, mesic Typic Hapludults
Brevard	Fine-loamy, oxidic, mesic Typic Hapludults
Chandler	Coarse-loamy, micaceous, mesic Typic Dystrochrepts
Clifton	Fine-loamy, oxidic, mesic Humic Hapludults
Codorus	Fine-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Comus	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Delanco	Fine-loamy, mixed, mesic Aquic Hapludults
Edneyville	Fine-loamy, mixed, mesic Typic Hapludults
Elsinboro	Fine-loamy, mixed, mesic Typic Hapludults
Evard	Fine-loamy, oxidic, mesic Typic Hapludults
Fannin	Fine-loamy, micaceous, mesic Typic Hapludults
Hatboro	Fine-loamy, mixed, nonacid, mesic Typic Fluvaquents
Hayesville	Clayey, oxidic, mesic Typic Hapludults
Kinkora	Clayey, mixed, mesic Typic Ochraquults
Porters	Fine-loamy, mixed, mesic Humic Hapludults
Rosman	Coarse-loamy, mixed, mesic Fluventic Haplumbrepts
Spivey	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Suncook	Mixed, mesic Typic Udipsamments
Talledega	Loamy-skeletal, mixed, mesic Ruptic-Lithic-Entic Hapludults
Tate	Fine-loamy, mixed, mesic Typic Hapludults
Toxaway	Fine-loamy, mixed, acid, mesic Cumulic Humaquepts
Tusquitee	Fine-loamy, mixed, mesic Humic Hapludults

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