United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with
North Carolina
Department of
Environment, Health, and
Natural Resources; North
Carolina Agricultural
Research Service; North
Carolina Cooperative
Extension Service; Gates
Soil and Water
Conservation District; and
Gates County Board of
Commissioners

Soil Survey of Gates County, North Carolina

How To Use This Soil Survey

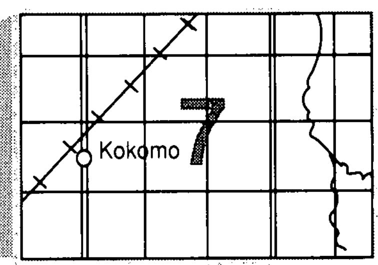
General Soil Map

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

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

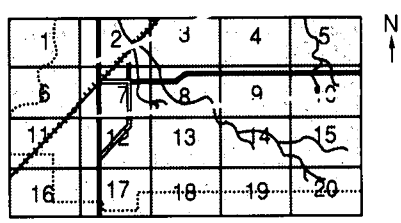
Detailed Soil Maps

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



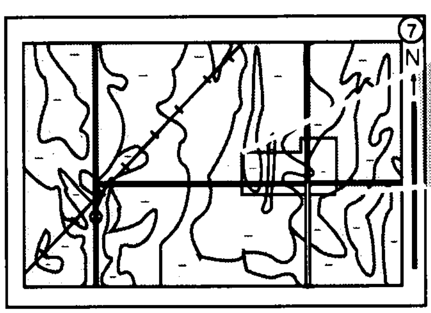
MAP SHEET

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



INDEX TO MAP SHEETS

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



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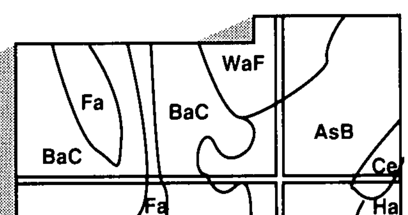

AREA OF INTEREST

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

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

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

Major fieldwork for this soil survey was completed in 1989. Soil names and descriptions were approved in 1990. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1989. This soil survey was made cooperatively by the Natural Resources Conservation Service; the North Carolina Department of Environment, Health, and Natural Resources; North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; Gates Soil and Water Conservation District; and Gates County Board of Commissioners. It is part of the technical assistance furnished to the Gates Soil and Water Conservation District. The Gates County Board of Commissioners provided financial assistance for the survey.

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

The first soil survey of Gates County was published in 1929 by the U.S. Department of Agriculture. This survey updates the first survey, provides more detailed maps on aerial photographs, and contains more interpretive information *(13)*.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: An area of Conetoe fine sand, 0 to 5 percent slopes, used for peanuts, one of the major cash crops grown in Gates County.

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Issued February 1996

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Gates County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

Richard A. Gallo
State Conservationist
Natural Resources Conservation Service

Soil Survey of Gates County, North Carolina

By Phillip L. Tant and John A. Gagnon, Jr., Natural Resources Conservation Service

Soils surveyed by Phillip L. Tant and John A. Gagnon, Jr., Natural Resources Conservation Service, and Timothy A. Dilliplane, North Carolina Department of Environment, Health, and Natural Resources

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
North Carolina Department of Environment, Health, and Natural Resources; North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; Gates Soil and Water Conservation District; and Gates County Board of Commissioners

GATES COUNTY is in the northeastern part of North Carolina (fig. 1). It has a total land area of 216,480 acres. In 1980, it had a population of 8,875.

The county is in the Coastal Plain Soil Region *(8)*. Elevation ranges from near sea level to 80 feet above sea level in the Drum Hill area in the northern part of the county. The soils in the county range from nearly level to steep.

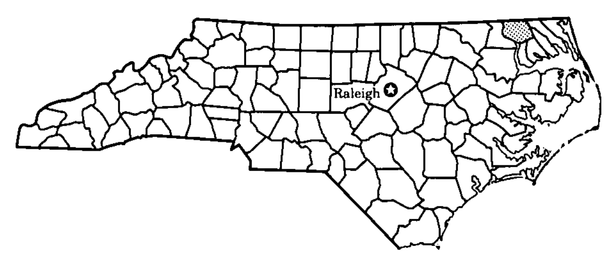

Figure 1.—Location of Gates County in North Carolina.

General Nature of the County

This section gives general information concerning the county. It describes history and settlement, physiography and drainage, water supply, and climate.

History and Settlement

Timothy A. Dilliplane, soil scientist, North Carolina Department of Environment, Health, and Natural Resources, prepared this section.

Nearly 11,000 years ago, Indians were the first inhabitants of the area that is now Gates County. Tools and artifacts used by these people were discovered on the high knolls bordering the Great Dismal Swamp and its tributaries *(11)*. These Indians were from the Middle Archaic time period and depended on hunting, fishing, and gathering. As their population increased, they began to form groups and many camps on the ridges along creeks and rivers. The Indians gradually developed agricultural practices and began growing crops.

Around 1000 A.D., Algonquin-speaking Indians moved southward from Virginia into what is now northeastern North Carolina. These Indians were of the Chowanoac confederacy. The Chowanoacs grew crops for food and used wood and animal materials to make most of their tools and weapons. They used wood, skins, and grasses to build dwellings and clays to manufacture pots and pipes *(3)*.

The first exploration of the area was made by the secretary of the province of Virginia in 1622. His journey took him to the Chowan River, and he praised the soil, the climate, and the friendly Indians *(11)*. Settlers from the province of Virginia began arriving around 1660 and found the area suitable for raising cattle, sheep, horses, and hogs.

Relations between the settlers and the Indians steadily deteriorated from 1669 to 1675, as the settlers' livestock roamed openly and often destroyed the Indians' crops. In late 1675, the Indians attacked, and several families of the settlers were killed. The survivors abandoned the settlements along the creeks and rivers and sought refuge in the wilderness. In late 1677, the Indians were subdued by a force led by Thomas Miller and Zacariah Gilliam. The surviving Chowanoacs were confined to a twelve square mile area south of Bennetts Creek, which was eventually taken away from them. By 1754, very few Indians remained and the Indian nation had virtually vanished *(3)*.

In 1728, a survey party led by William Byrd came to the area to establish the boundary between the Virginia and North Carolina colonies. Byrd's group also surveyed the Great Dismal Swamp, yet Byrd himself walked only around the edges and met the group on the other side. He proclaimed it a "horrible desert" but believed it could be used for profit. He suggested draining parts of the swamp and establishing a plantation for growing crops *(12)*. Meanwhile, a road was established from Norfolk to Edenton in 1738. This road brought in new settlers, who began to cultivate the bottom land along the Chowan River.

In 1763, George Washington visited the area and later purchased land in the Great Dismal Swamp. He later formed the Dismal Swamp Land Company, whose main intention was to build ditches and a canal in parts of the swamp, particularly in the stands of juniper and cypress *(12)*.

In 1778, Gates County was organized from parts of Hertford, Chowan, and Perquimans Counties. It was named for General Horatio Gates, who defeated the British in the Revolutionary War battle at Saratoga. The towns of Gates and Gatesville also bear his name. Gatesville, the county seat, once was a harbor for vessels that could navigate Bennetts Creek. Oil and fertilizer were imported into the area through the harbor, and cotton, lumber, and pulpwood were exports *(11)*.

During the 1880's, the county grew as settlements developed along two railways that were being built through the county. These railways provided outlets for the county's agricultural products. The main agricultural products were corn, cotton, pork, beef, and in some areas, rice. Peanuts were introduced to the county at this time by Jethro Goodman. He reportedly brought peanuts from Virginia and kept the seed "stuffed in a pair of trousers" through the winter *(11)*.

Mills for grinding corn and wheat were an important part of the county's trade. The mill and dam at Merchants Mill Pond were first built in 1811, but the mill's structure was replaced and modified a number of times in succeeding years. Around the turn of the century, it became the largest mill and chief trade center in the county. A mercantile business enabled local farmers to shop while their corn and wheat were being ground into meal and flour; thus, the millpond derived its name "Merchants Mill Pond" *(3)*.

Two donations of land set areas in the county aside for public use. In the early 1970's, logging in the Great Dismal Swamp became too expensive, and 50,000 acres of the swamp in North Carolina and Virginia were turned over to the Nature Conservancy, which, in turn, donated the land to the Federal Government in 1973. By an act of Congress in 1974, the area became the Great Dismal Swamp National Wildlife Refuge *(12)*. About 11,000 acres of the refuge is in Gates County.

In June 1973, the millsite and lands adjacent to Merchants Mill Pond were donated to the North Carolina Division of Parks and Recreation. In December 1973, the Nature Conservancy donated another 925 acres on the millpond's north side. This area is now Merchants Millpond State Park *(3)*.

Physiography and Drainage

Gates County is drained by numerous tributaries of the Chowan River and the Great Dismal Swamp. Waterflow in the tributaries is generally slow or very slow. The general slope of the county is to the south and east. About 92 percent of the land is nearly level, about 6 percent is gently sloping, and about 2 percent is sloping to steep.

The county is underlain primarily by the Croatan formation of the Pliocene era. These sediments are made up of unconsolidated sands, silts, and clays *(7)*. The county is made up of five physiographic areas. Those areas are the uplands of the Wicomico Surface, the uplands of the Talbot Surface, the marine and river terraces of the Pamlico Surface (fig. 2), the Great Dismal Swamp, and the wooded flood plains along streams.

The soils on the Wicomico Surface are estimated to be between 220,000 and 400,000 years old. This surface makes up a small area in the north-central part of the county. The elevation is between 45 and 80 feet above sea level. The relief generally is gently rolling. Most of the soils have a fine-loamy subsoil. Because of the slope, this surface has large areas of well drained and moderately well drained soils. The Wicomico

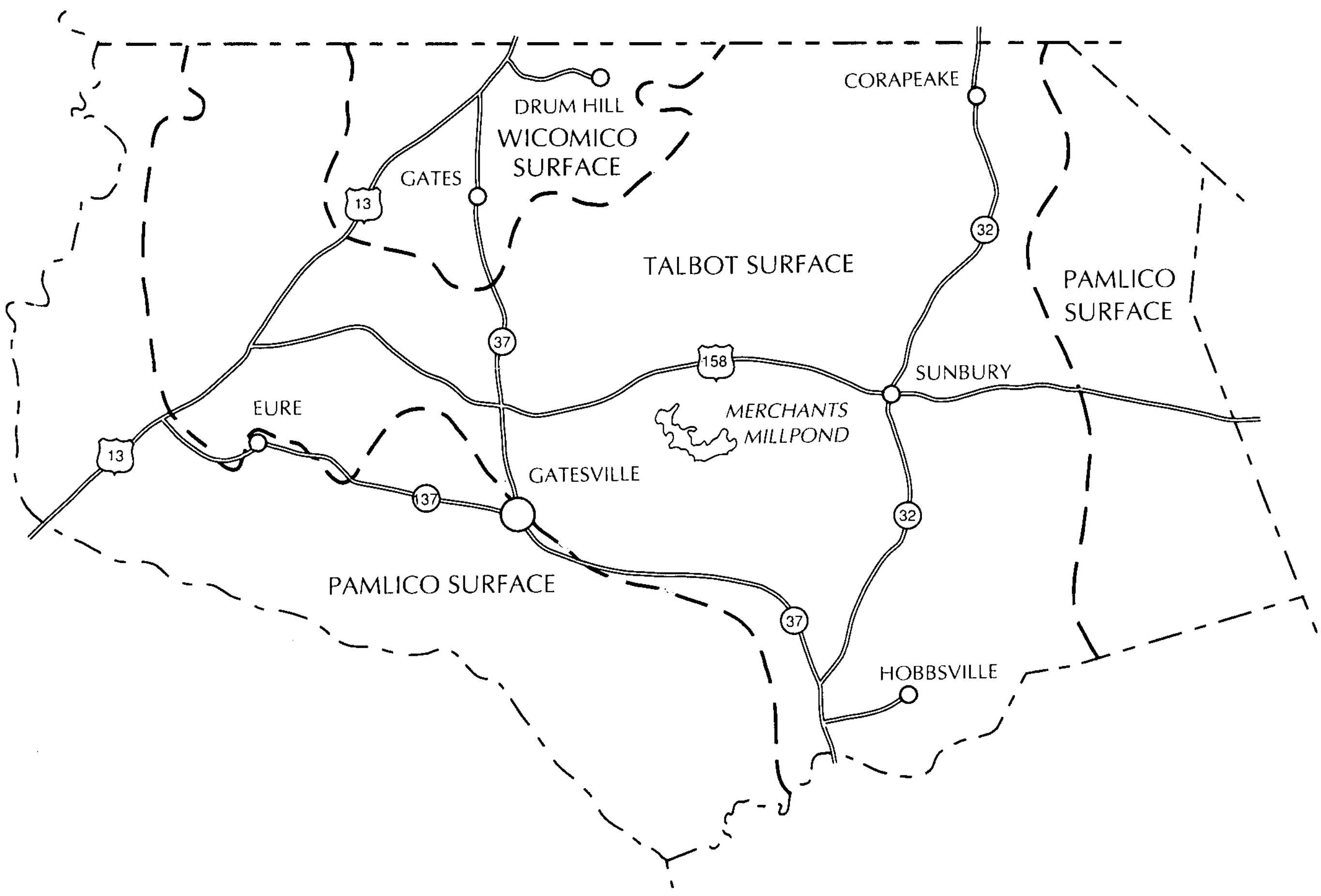

Figure 2.—The geomorphic surfaces of Gates County.

Surface makes up about 9 percent of the county.

The soils on the Talbot Surface are estimated to be between 145,000 and 220,000 years old. This surface makes up most of the county. The elevation is between 25 and 45 feet above sea level. The 25-foot elevation line is the base of the Suffolk Scarp. This scarp is thought to be an old beach line and separates the soils of the older Talbot Surface from those of the younger Pamlico Surface. It runs generally north to south along the eastern side of the county. The 25-foot elevation line also separates the Talbot Surface from the Chowan River terrace, which is another part of the Pamlico Surface. Relief on the Talbot Surface is nearly level to gently rolling. A large part of this surface is made up of soils that have a clayey subsoil. Large areas are poorly drained or very poorly drained because the flatness throughout the areas does not permit natural drainage. The Talbot Surface makes up about 57 percent of the county.

The soils on the Pamlico Surface are estimated to be between 35,000 and 115,000 years old. This surface is in two different areas of the county. One area is along the Chowan River on the western and southwestern borders of the county. The other area is in the eastern part of the county, east of the Suffolk Scarp. These two areas differ in relief. The Pamlico Surface makes up about 34 percent of the county.

The area of the Pamlico Surface along the Chowan River is made up of flood plains directly adjacent to the river and small ridges of well drained and moderately well drained sand further inland. Some of the inland areas also have a loamy or clayey subsoil. Generally, this area is nearly level to gently rolling and contains soils of all drainage classes. The elevation on this surface ranges from about 1 foot to 25 feet above sea level.

The area of the Pamlico Surface east of the Suffolk Scarp is mainly level and is primarily made up of very poorly drained organic soils that formed over mineral soils. Although the landscape appears flat, the organic soils are actually higher in elevation toward the middle of the swamp because of the accumulation of organic matter. The soils along the edge of the swamp generally are poorly drained and very poorly drained and have a clayey subsoil.

Soil drainage in Gates County is based on the concept of the "dry edge" effect. The soils on slopes near drainageways generally have a deeper seasonal high water table than that of the soils at greater distances from the drainageways (fig. 3). Some areas on the Talbot Surface have a large acreage of poorly drained, clayey soils. These wetter soils are in the central part of the county in areas that have few natural drainageways and little or no relief.

Water Supply

Ground water is the only source of water in Gates County. The county is underlain by an estimated 800 to 2,300 feet of alternating sands, clays, and shells. The upper sandy aquifer averages about 200 feet thick in the county. The lower sandy aquifer makes up the rest of the deposits. The depth to salt water varies from 400 to more than 600 feet. Little is known about the water-bearing character of these aquifers, but it is probable that, in many locations, yields of more than 1,000 gallons per minute could be obtained from properly constructed wells.

The water from shallow wells tends to be soft, with a low pH. Wells of a hundred feet or so in depth tend to yield moderately hard water, which may contain excessive fluoride. Water from very deep wells is normally very soft, with a very high pH, high bicarbonate content, and excessive concentrations of fluoride and dissolved solids. The water from wells of all depths tends to have an excessive content of iron *(10)*.

Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at Murfreesboro, North Carolina in the period 1973 to 1986. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 40 degrees F and the average daily minimum temperature is 29 degrees. The lowest temperature on record, which occurred at Murfreesboro on January 21, 1985, is -7 degrees. In summer, the average temperature is 76 degrees and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Murfreesboro on August 2, 1980, is 103 degrees.

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

The total annual precipitation is 48 inches. Of this, 26 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19 inches. The heaviest 1-day rainfall during the period of record was 7.75 inches at Murfreesboro on September 26, 1985. Thunderstorms occur on about 45 days each year, and most occur in summer.

The average seasonal snowfall is 6 inches. The greatest snow depth at any one time during the period of record was 8 inches. On the average, 1 day had at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 60 percent of the time possible in summer and 55 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9 miles per hour, in spring.

How This Survey Was Made

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

Soils occur in an orderly pattern that results from the combined influence over time of climate, parent material, relief, and plants and animals. Each kind of soil is associated with a particular kind of landscape or

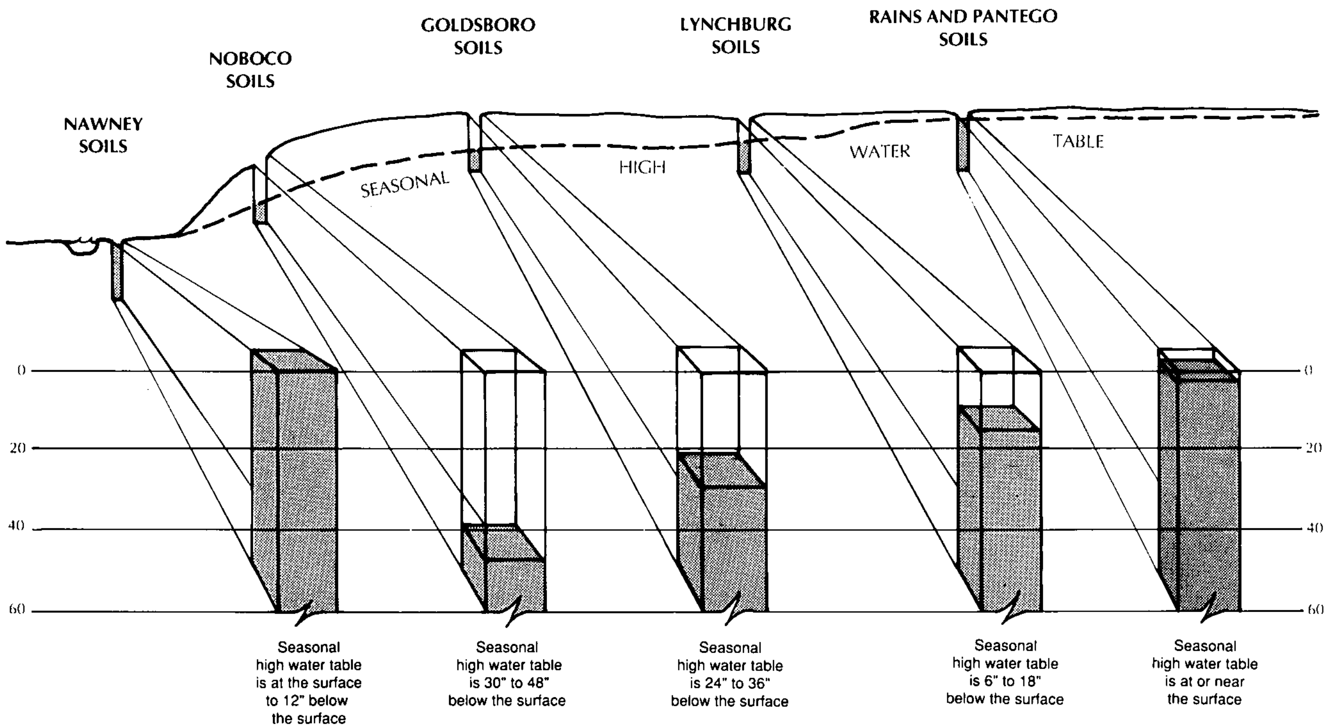

Figure 3.—A representative landscape showing the location of some important soils in Gates County and depth to the seasonal high water table.

with a segment of the landscape. By observing the soils and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. This model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

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

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

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

For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

Soil boundaries are drawn on aerial photographs and each delineation is identified as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in accurately locating boundaries.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called minor soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are identified in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

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

General Soil Map Units

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

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

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

Well Drained to Very Poorly Drained Soils on Uplands

The soils in these four general soil map units make up about 63 percent of Gates County. These soils are used as both cropland and woodland. The main limitation is a seasonal high water table. The clayey soils also are limited by slow permeability.

1. Bladen-Craven-Lenoir

Nearly level to strongly sloping, poorly drained to moderately well drained soils that have a loamy surface layer and a clayey subsoil; on uplands

The major soils in this map unit are on broad flats and in depressions and on smooth to slightly rounded ridges and side slopes along drainageways. Most areas of this map unit are throughout the county.

This map unit makes up 36 percent of the county. It is 61 percent Bladen soils, 22 percent Craven soils, 8 percent Lenoir soils, and 9 percent soils of minor extent. The minor soils include Rains, Exum, Goldsboro, Ballahack, Bonneau, Chowan, Icaria, Nawney, Noboco, Winton, and Lynchburg soils.

The nearly level Bladen soils are poorly drained. The surface layer is dark grayish brown loam. The subsoil is grayish brown clay loam in the upper part, dark gray and grayish brown clay in the next part, and light gray clay loam in the lower part.

The nearly level to strongly sloping Craven soils are moderately well drained. The surface layer is pale brown fine sandy loam. The subsoil is yellowish brown clay loam in the upper part, yellowish brown clay in the next part, and light gray clay loam in the lower part.

The nearly level Lenoir soils are somewhat poorly drained. The surface layer is grayish brown loam. The subsoil is light olive brown clay loam in the upper part, gray clay in the next part, and light brownish gray clay in the lower part.

The Craven and Lenoir soils are used mainly as cropland. The Bladen soils are used mainly as woodland.

Wetness is the main limitation affecting agricultural uses. Erosion is a hazard in some areas of the Craven soils.

Wetness is the main limitation affecting woodland management in areas of the Craven and Lenoir soils. Erosion is a hazard in some areas of the Craven soils. Wetness and the seedling mortality rate are management concerns in areas of the Bladen soils.

Wetness, low strength, and slow permeability are the main limitations affecting most urban and recreational uses. Erosion is a hazard in some areas of the Craven soils.

2. Icaria-Tomahawk-Valhalla

Nearly level and gently sloping, well drained to very poorly drained soils that have a loamy or sandy surface layer and a loamy subsoil; on the Suffolk Scarp

The soils in this map unit are in depressions and on flats and smooth to slightly rounded ridges along the Suffolk Scarp.

This map unit makes up 3 percent of the county. It is 52 percent Icaria soils, 30 percent Tomahawk soils, 16 percent Valhalla soils, and 2 percent soils of minor extent. The minor soils are dominantly Leon soils.

The nearly level Icaria soils are very poorly drained. The surface layer is fine sandy loam. The upper part is black, and the lower part is very dark gray. The subsoil is dark grayish brown sandy clay loam. The underlying material is sand. It is light gray in the upper part and brown in the lower part.

The nearly level Tomahawk soils are moderately well drained and somewhat poorly drained. The surface layer is very dark grayish brown fine sand. The subsurface layer is light yellowish brown loamy fine sand. The subsoil is light yellowish brown fine sandy loam. The underlying material is brown and white fine sand in the upper part, dark brown sand in the next part, and dark reddish brown and black sand in the lower part.

The nearly level and gently sloping Valhalla soils are well drained. The surface layer is dark grayish brown fine sand. The subsurface layer is brownish yellow fine sand. The subsoil is strong brown fine sandy loam in the upper part and yellowish brown loamy fine sand in the lower part. The underlying material is fine sand. It is brownish yellow and yellowish brown in the upper part, dark brown in the next part, and light brownish gray in the lower part.

The major soils in this map unit are used mainly as cropland and to a lesser extent as pasture or woodland.

Droughtiness, soil blowing, and the leaching of plant nutrients are limitations affecting agricultural uses in areas of the Valhalla soils. The main limitation in areas of the Tomahawk and Icaria soils is wetness.

Low available water capacity is the main limitation affecting woodland management in areas of the Valhalla soils. The main limitation in areas of the Tomahawk and Icaria soils is wetness.

The main limitations affecting urban and recreational uses in areas of the Valhalla soils are soil blowing and droughtiness. The main limitation in areas of the Tomahawk and Icaria soils is wetness.

3. Goldsboro-Noboco-Bonneau

Nearly level and gently sloping, well drained and moderately well drained soils that have a loamy or sandy surface layer and a loamy subsoil; on uplands

The major soils in this map unit are on broad ridges and side slopes adjacent to terraces and flood plains. These soils are throughout the county.

This map unit makes up 15 percent of the county. It is 49 percent Goldsboro soils, 18 percent Noboco soils, 10 percent Bonneau soils, and 23 percent soils of minor extent. The minor soils include Exum, Craven, Ballahack, Bladen, Chowan, Lenoir, Nawney, Pantego, Rains, Winton, and Lynchburg soils.

The nearly level Goldsboro soils are moderately well drained. The surface layer is grayish brown fine sandy loam. The subsoil is yellowish brown loam in the upper part, light yellowish brown sandy clay loam and clay loam in the next part, and strong brown and gray sandy clay loam in the lower part.

The nearly level and gently sloping Noboco soils are well drained. The surface layer is grayish brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is sandy clay loam. The upper part is yellowish brown, the next part is strong brown, and the lower part is mottled brownish yellow, yellowish red, and light gray.

The nearly level and gently sloping Bonneau soils are well drained. The surface layer is dark grayish brown loamy fine sand. The subsurface layer is light yellowish brown loamy fine sand. The subsoil is sandy clay loam. It is yellowish brown in the upper part and strong brown in the lower part.

The major soils in this unit are used mainly as cropland. In a few areas they are used as pasture or woodland.

The Noboco soils have few limitations affecting agricultural uses, though erosion is a hazard in some areas. The Goldsboro soils are limited by wetness. The Bonneau soils are limited by droughtiness, soil blowing, and the leaching of plant nutrients.

The Noboco and Bonneau soils have few limitations affecting woodland management, but some areas of the Noboco soils are limited by the hazard of erosion. The Goldsboro soils are limited by wetness.

The Noboco soils have few limitations affecting most urban and recreational uses, though in some areas they are limited by the hazard of erosion. The Goldsboro soils are limited by wetness. The Bonneau soils are limited by the sandy surface layer.

4. Rains-Pantego

Nearly level, poorly drained and very poorly drained, loamy soils; on broad upland flats

The soils in this map unit are on broad upland flats and in depressions.

This map unit makes up 9 percent of the county. It is 57 percent Rains soils, 32 percent Pantego soils, and 11 percent soils of minor extent. The minor soils include Lynchburg and Bladen soils.

The Rains soils are poorly drained. The surface layer is dark grayish brown fine sandy loam. The subsoil is light brownish gray sandy clay loam in the upper part, gray sandy clay loam in the next part, and gray clay loam in the lower part.

The Pantego soils are very poorly drained. The surface layer is black fine sandy loam in the upper part and black loam in the lower part. The subsoil is dark grayish brown and grayish brown loam in the upper part, light brownish gray clay loam in the next part, and light brownish gray sandy clay in the lower part.

The Rains soils are used mainly as cropland. The Pantego soils are used mainly as woodland. Wetness is the main limitation affecting agricultural, woodland, and urban and recreational uses.

Somewhat Excessively Drained to Very Poorly Drained Soils on the Chowan River Terrace and the Pamlico Surface

The soils in these four general soil map units make up about 24 percent of Gates County. The mineral soils are used as cropland and woodland, while the organic soils are used almost exclusively as woodland. The main limitation in the mineral soils is a seasonal high water table. The clayey soils also are limited by slow permeability. In some areas of the sandy soils, droughtiness is a limitation. The organic soils are limited by wetness, low strength, and the content of logs, stumps, and roots.

5. Pungo-Belhaven

Nearly level, very poorly drained soils that are deep muck or have a muck surface layer and loamy underlying mineral soil; on broad flats

This map unit is dominantly on broad flats in the eastern part of the county in the Great Dismal Swamp.

This map unit makes up 8 percent of the county. It is 74 percent Pungo soils, 25 percent Belhaven soils, and 1 percent soils of minor extent. The minor soils include Cape Fear soils.

The surface layer of the Pungo soils is black muck. Below this are layers of black muck.

The surface layer of the Belhaven soils is dark reddish brown muck. The underlying mineral soil is very dark brown mucky loam in the upper part, dark grayish brown sandy clay loam and dark gray clay loam in the next part, and gray sandy loam in the lower part.

The major soils in this unit are used almost exclusively as woodland and wildlife habitat. Wetness, low strength, and the content of logs, stumps, and roots are the main limitations affecting use and management.

The main limitations affecting agricultural use are wetness and the high percentage of logs, stumps, and roots in the organic layers. The main limitations affecting urban and recreational uses are wetness, excess humus, seepage, and low strength.

6. Alaga-Pactolus-Leon

Nearly level and gently sloping, somewhat excessively drained to poorly drained, sandy soils; on river and stream terraces

The major soils in this map unit are on terraces along the Chowan River and its tributaries.

This map unit makes up 8 percent of the county. It is 43 percent Alaga soils, 25 percent Pactolus soils, 8 percent Leon soils, and 24 percent soils of minor extent. The minor soils include Altavista, Conetoe, Dorovan, Icaria, Nawney, and Ballahack soils.

The nearly level and gently sloping Alaga soils are somewhat excessively drained and well drained. The surface layer is dark grayish brown sand. The underlying material is sand. The upper part is brownish yellow, the next part is strong brown, and the lower part is yellow.

The nearly level Pactolus soils are moderately well drained and somewhat poorly drained. The surface layer is very dark grayish brown sand. The underlying material is light yellowish brown sand in the upper part, very pale brown fine sand in the next part, and light gray sand in the lower part.

The nearly level Leon soils are poorly drained. The surface layer is very dark gray sand. The subsurface layer is light brownish gray sand. The subsoil is black sand. The underlying material is sand. It is very pale brown in the upper part and light gray in the lower part.

The major soils in this unit are used mainly as woodland. In a few areas they are used as cropland or pasture.

The main limitations affecting agricultural and woodland uses in areas of the Alaga soils are low available water capacity and soil blowing. The Pactolus and Leon soils are limited by wetness and soil blowing during dry periods.

The major limitations affecting urban and recreational uses in areas of the Alaga soils are seepage, soil blowing, and droughtiness. The Pactolus and Leon soils are limited by wetness and seepage.

7. Conetoe-Altavista-State

Nearly level and gently sloping, well drained and moderately well drained soils that have a sandy or loamy surface layer and a loamy subsoil; on river and stream terraces

The soils in this map unit are on ridges and flats along streams that flow into the Chowan River. This unit is mainly in the southwestern part of the county.

This map unit makes up 5 percent of the county. It is 47 percent Conetoe soils, 24 percent Altavista soils, 9 percent State soils, and 20 percent soils of minor extent. The minor soils include Alaga, Dorovan, Icaria, Nawney, Pactolus, Roanoke, Tomahawk, and Tomotley soils.

The nearly level and gently sloping Conetoe soils are well drained. The surface layer is dark grayish brown fine sand. The subsurface layer is yellowish brown loamy fine sand. The subsoil is sandy loam. It is yellowish brown in the upper part and strong brown in the lower part. The underlying material is fine sand. It is reddish yellow in the upper part and very pale brown in the lower part.

The nearly level Altavista soils are moderately well drained. The surface layer is dark brown fine sandy loam. The subsoil is light yellowish brown loam in the upper part, gray sandy clay loam in the next part, and light gray sandy loam in the lower part. The underlying material is light gray sand.

The nearly level and gently sloping State soils are well drained. The surface layer is dark grayish brown fine sandy loam. The subsoil is yellowish brown fine sandy loam and sandy clay loam in the upper part and reddish yellow sandy clay loam in the lower part. The underlying material is yellow loamy sand in the upper part and very pale brown sand in the lower part.

The soils in this map unit are used mainly as cropland and to a lesser extent as pasture or woodland.

The Conetoe soils are limited for agricultural uses by droughtiness, soil blowing, and the leaching of plant nutrients. The Altavista soils are limited by wetness. The State soils have no major limitations, though in some areas they are limited by the hazard of erosion.

The main limitation affecting woodland management in areas of the Conetoe soils is the low available water capacity. The Altavista soils are limited by wetness. The State soils have no major limitations affecting woodland management, though in some areas they are limited by the hazard of erosion.

The Conetoe and State soils have no major limitations affecting urban and recreational uses. In some areas, the State soils are limited by the hazard of erosion. The Altavista soils are limited by wetness.

8. Cape Fear-Roanoke-Tomotley

Nearly level, poorly drained and very poorly drained soils that have a loamy surface layer and a loamy or clayey subsoil; on broad, flat terraces

The soils in this map unit are on broad flats and in depressions on river and stream terraces and at the base of the Suffolk Scarp.

This map unit makes up 3 percent of the county. It is 40 percent Cape Fear soils, 35 percent Roanoke soils, 18 percent Tomotley soils, and 7 percent soils of minor extent. The minor soils include Belhaven soils.

The Cape Fear soils are very poorly drained. The surface layer is black loam. The subsoil is dark grayish brown clay loam in the upper part and light gray clay in the lower part. The underlying material is sandy loam. It is grayish brown in the upper part and light brownish gray in the lower part.

The Roanoke soils are poorly drained. The surface layer is very dark grayish brown loam. The subsoil is light brownish gray loam and clay in the upper part, grayish brown clay in the next part, and light gray loam in the lower part. The underlying material is white fine sandy loam in the upper part and white loamy fine sand in the lower part.

The Tomotley soils are poorly drained. The surface layer is very dark grayish brown fine sandy loam. The subsoil is light gray loam in the upper part, light brownish gray and grayish brown sandy clay loam in the next part, and light brownish gray loam in the lower part. The underlying material is light gray sandy loam.

The soils in this map unit are used mainly as woodland and to a lesser extent as cropland or pasture. Wetness is the main limitation affecting these uses.

The main limitations affecting most urban and recreational uses in areas of the Roanoke and Cape Fear soils are wetness and slow permeability. The main limitation in areas of the Tomotley soils is wetness.

Poorly Drained and Very Poorly Drained Soils on Flood Plains

The soils in this general soil map unit make up about 13 percent of Gates County. These soils are used almost exclusively as woodland. The main management concerns are a seasonal high water table and the frequent flooding.

9. Dorovan-Nawney-Chowan

Nearly level, very poorly drained and poorly drained soils that are mucky or loamy throughout or are loamy in the upper part and underlain by mucky material; on flood plains

The major soils in this map unit are on flood plains throughout the county.

This map unit makes up 13 percent of the county. It is 61 percent Dorovan soils, 23 percent Nawney soils, 10 percent Chowan soils, and 6 percent soils of minor extent. The minor soils include Ballahack and Pungo soils.

The Dorovan soils are very poorly drained. The surface layer is very dark brown mucky peat covered by partly decomposed leaves, twigs, and stems. Below this is dark reddish brown muck.

The Nawney soils are poorly drained. The surface layer is dark grayish brown loam. The underlying material is grayish brown and light brownish gray loam in the upper part, light gray sandy clay loam and clay loam in the next part, and gray sand in the lower part.

The Chowan soils are poorly drained. The surface layer is very dark grayish brown loam. The underlying material is loam. It is dark gray in the upper part and very dark grayish brown in the lower part. Below this is dark reddish brown muck.

The major soils are used almost exclusively as woodland. The main management concerns affecting agricultural, woodland, and urban and recreational uses are wetness and flooding.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under the heading "Use and Management of the Soils."

The map units on the detailed soil maps represent areas on the landscape and consist mainly of one or more soils for which the units are named.

Symbols identifying the soil precede the map unit names in the soil descriptions. The descriptions include general facts about the soils and give the principal hazards and limitations to be considered in planning for specific uses.

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Noboco fine sandy loam, 0 to 2 percent slopes, is a phase of the Noboco series.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and suitabilities for many uses. The Glossary defines many of the terms used in describing the soils.

AaB—Alaga sand, 0 to 5 percent slopes. This soil is nearly level and gently sloping and is well drained or somewhat excessively drained. It is on ridges and terraces along the Chowan River and its tributaries. Individual areas are irregular in shape and range from 10 to 400 acres in size.

Typically, the surface layer is dark grayish brown sand 5 inches thick. The underlying material to a depth of 99 inches is sand. It is brownish yellow in the upper part, strong brown in the next part, and yellow in the lower part.

Included with this soil in mapping are small areas of Pactolus, Leon, and Nawney soils. Pactolus soils are moderately well drained or somewhat poorly drained and are in slight depressions. Leon and Nawney soils are poorly drained and are near the outer edge of the map unit. Included soils make up 10 percent of the map unit.

Permeability is rapid in the Alaga soil. Available water capacity is low. Reaction ranges from extremely acid to moderately acid, except where the surface layer has been limed. The seasonal high water table is at a depth of more than 6 feet.

Most of the acreage is used as woodland. The rest is used mainly as cropland or pasture.

The major crops are corn and peanuts. Some areas are planted to soybeans or small grain. This soil does not have sufficient moisture for most crops during the growing season. The leaching of plant nutrients, soil blowing, and the low available water capacity are the main limitations. Windblown sand can damage young plants. Minimum tillage, crop residue management, windbreaks, and a cropping system that includes close-growing grasses and legumes help to control soil blowing and conserve moisture. Fertilizer, particularly nitrogen, should be added in split applications. The soil can be used for pasture species, such as hybrid bermudagrass and bahiagrass.

The dominant native trees are loblolly pine, sweetgum, southern red oak, blackjack oak, white oak, and post oak. The understory is mainly dogwood, sassafras, American holly, blueberry, and waxmyrtle. The main limitation affecting woodland management is the low available water capacity. Inadequate moisture in the soil can cause a high seedling mortality rate in the summer.

The major limitations affecting urban uses are seepage and the sandy surface layer. The thick, sandy material provides a good support base for most structures. If unprotected, however, the sandy surface layer is subject to soil blowing, and it is droughty when the amount of rainfall is limited. Seepage from septic tank absorption fields can result in pollution of the ground water.

The main limitation affecting recreational uses is the sandy surface layer.

The capability subclass is IIIs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8S.

AtA—Altavista fine sandy loam, 0 to 3 percent slopes. This soil is moderately well drained. It is on smooth ridges on stream terraces. Individual areas are irregular in shape. They are typically 5 to 20 acres in size but range to 100 acres.

Typically, the surface layer is dark brown fine sandy loam 9 inches thick. The subsoil is 31 inches thick. It is light yellowish brown loam in the upper part, gray sandy clay loam in the next part, and light gray sandy loam in the lower part. The underlying material to a depth of 72 inches is light gray sand.

Included with this soil in mapping are small areas of State, Conetoe, and Tomotley soils. State and Conetoe soils are well drained and are on knolls at the slightly higher elevations. Tomotley soils are poorly drained and are in slight depressions. Included soils make up 10 percent of the map unit.

Permeability is moderate in the Altavista soil. Available water capacity also is moderate. Reaction is extremely acid to moderately acid, except where the surface layer has been limed. The seasonal high water table is 1.5 to 2.5 feet below the surface.

Most of the acreage is used as cropland (fig. 4). The rest is used mainly as pasture or woodland.

The major crops are corn, soybeans, peanuts, and small grain. The seasonal wetness is the main limitation affecting cropland management. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are blackgum, yellow-poplar, sweetgum, hickory, red maple, American beech, willow oak, white oak, post oak, southern red oak, water oak, and loblolly pine. The understory is mainly dogwood, sweetbay, sourwood, American holly, waxmyrtle, and sassafras. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is moist results in the formation of ruts and in surface compaction. Puddling can occur when the soil is wet. Using low-pressure ground equipment minimizes damage to the soil and helps to maintain productivity.

Wetness is the main limitation affecting urban and recreational uses. It can be reduced by providing a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

BaA—Ballahack loam, 0 to 2 percent slopes, occasionally flooded. This soil is nearly level and very poorly drained. It is on flood plains throughout the county. During late winter and early spring, it is occasionally flooded for brief periods. Individual areas are narrow and elongated and range from 50 to 200 acres in size.

Typically, the surface layer is black loam 35 inches thick. The underlying material to a depth of 70 inches is dark grayish brown sandy clay loam in the upper part and dark grayish brown sand in the lower part.

Included with this soil in mapping are small areas of Nawney, Chowan, and Dorovan soils. Nawney soils are on the outer edge of the map unit. Chowan soils are poorly drained, and Dorovan soils are very poorly drained. They are commonly on the downstream edge of the map unit. Also included are soils that have a clayey subsoil and soils that have a thinner surface layer than that of the Ballahack soil. These soils generally are in scattered areas throughout the map unit. Included soils make up 15 percent of the map unit.

Permeability is moderate or moderately rapid in the Ballahack soil. Available water capacity is moderate. Reaction is very strongly acid or strongly acid throughout, except where the surface layer has been limed. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is used as woodland. The rest is used mainly as pasture.

This soil is not normally used for crops. Wetness and flooding are the main management concerns.

The dominant native trees are green ash, baldcypress, sweetgum, water tupelo, and red maple. The understory is mainly sweetbay, greenbrier, waxmyrtle, American holly, sourwood, and giant cane. Wetness, flooding, and poor trafficability are the main

Figure 4.—Grain sorghum in an area of Altavista fine sandy loam, 0 to 3 percent slopes.

management concerns. Harvesting is limited to dry periods, usually in midsummer or early fall.

The main limitations affecting urban and recreational uses are wetness and flooding.

The capability subclass is VIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7W.

BeA—Belhaven muck, 0 to 2 percent slopes. This soil is nearly level and very poorly drained. It is on broad flats in the Great Dismal Swamp. Individual areas are irregular in shape and range from 50 to 300 acres in size.

Typically, the surface layer is dark reddish brown muck 20 inches thick. The underlying material extends to a depth of 72 inches. It is very dark brown mucky loam in the upper part, dark grayish brown sandy clay loam and dark gray clay loam in the next part, and gray sandy loam in the lower part.

Included with this soil in mapping are small areas of Pungo soils, which are organic to a depth of more than 51 inches. Also included are soils that have an organic surface layer that is 8 to 16 inches thick. Included soils are in scattered areas throughout the map unit. They make up 15 percent of the map unit.

The surface layer of the Belhaven soil is highly decomposed organic material. Permeability is moderately slow to moderately rapid. Available water capacity is high. The organic material is extremely acid, except where the surface layer has been limed. The underlying mineral layers range from extremely acid to slightly acid. Logs, roots, and stumps are common throughout the organic layers in most areas. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is used as woodland. Some areas are used as cropland.

The major crops are corn, small grain, and soybeans. Applications of copper and other micronutrients and large amounts of lime are necessary when the soil is prepared for agricultural uses. The common logs, roots, and stumps in the organic layers should be removed before cultivation (fig. 5). Subsidence exposes buried wood. As a result, root raking is needed every few years to permit the use of equipment. A drainage system is necessary to maintain optimum yields. Spring tillage and fall harvest may be delayed because of wetness. During spring planting, soil blowing can occur. It can be minimized by minimum tillage, field borders, and windbreaks.

The dominant native trees are red maple, Atlantic white-cedar, pond pine, sweetgum, and baldcypress. The understory is mainly inkberry, fetterbush lyonia, sweet pepperbush, redbay, sweetbay, huckleberry, greenbrier, waxmyrtle, and giant cane. Wetness, low strength, and the seeding mortality rate are the main limitations. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of damage to the soil caused by forestry activities. The soil has a poor load-supporting capacity. Using low-pressure ground equipment minimizes damage to the soil and helps to maintain productivity.

The main limitations affecting urban uses are wetness, excess humus, and low strength. Septic tank absorption fields function poorly because of the organic layers and the wetness. Pilings help to overcome low strength.

The main limitations affecting recreational uses are wetness and excess humus.

The capability subclass is IVw in drained areas and VIIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6W.

BnA—Bladen loam, 0 to 2 percent slopes. This soil is nearly level and poorly drained. It is on broad flats and in depressions. Large areas of this soil are in the central part of the county. Individual areas are irregular in shape and range from 5 to 500 acres in size.

Typically, the surface layer is dark grayish brown loam 9 inches thick. The subsoil extends to a depth of 90 inches. It is grayish brown clay loam in the upper part, dark gray and grayish brown clay in the next part, and light olive gray and light gray clay loam in the lower part.

Included with this soil in mapping are small areas of Lenoir and Rains soils. Lenoir soils are somewhat poorly drained and are on the slightly elevated ridges. Rains soils have less clay in the subsoil than the Bladen soil and are in scattered areas of the map unit. Included soils make up 10 percent of the map unit.

Permeability is slow in the Bladen soil. The shrink-swell potential is moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are corn, soybeans, cotton, and small grain. Wetness is the main limitation. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes help to maintain tilth and productivity. Spring tillage and fall harvest may be delayed because of the wetness. Slow permeability is a limitation affecting the installation of drainage systems.

The dominant native trees are loblolly pine, red maple, hickory, sweetgum, water oak, and willow oak. The understory is mainly American holly, blueberry, sweetbay, sourwood, and reeds. Wetness and the seedling mortality rate are the main limitations affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees (fig. 6). A drainage system facilitates the use of equipment and reduces the extent of damage to the soil caused by forestry activities. A drainage system also increases plant growth.

Figure 5.—Exposed roots and stumps in an area of Belhaven muck, 0 to 2 percent slopes.

The main limitations affecting most urban uses are wetness, low strength, and slow permeability. The wetness and the slow permeability severely restrict the use of septic tank absorption fields in this soil.

Wetness is the main limitation affecting recreational uses. It can be reduced by the use of land shaping and the installation of ditches to remove surface water.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

BoB—Bonneau loamy fine sand, 0 to 6 percent slopes. This soil is well drained. It is mainly in the north-central part of the county on slightly rounded ridges and side slopes in the uplands. Individual areas are irregular in shape and range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown loamy fine sand 2 inches thick. The subsurface layer is light yellowish brown loamy fine sand 25 inches thick. The subsoil to a depth of 72 inches is sandy clay loam. It is yellowish brown in the upper part and strong brown in the lower part.

Figure 6.—A wooded area of Bladen loam, 0 to 2 percent slopes. Wetness affects woodland management.

Included with this soil in mapping are small areas of Goldsboro, Winton, and Noboco soils, in which the combined thickness of the surface layer and subsurface layer is 20 inches or less. Goldsboro and Winton soils are moderately well drained. Goldsboro soils are in slight depressions. Winton and Noboco soils are near the outer edge of the map unit. Included soils make up 10 percent of the map unit.

Permeability is moderate in the Bonneau soil. Available water capacity is low to moderate. Reaction is extremely acid to slightly acid in the surface layer and subsurface layer, except where the surface layer has been limed. It is extremely acid to moderately acid in the subsoil. The seasonal high water table is 3.5 to 5.0 feet below the surface.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are peanuts, corn, tobacco, and soybeans. This soil is easily worked throughout a wide range of moisture conditions. The main limitations are the leaching of plant nutrients, soil blowing, and droughtiness. Soil blowing can damage young plants. Cover crops, minimum tillage, and crop residue management help to maintain the content of organic matter, conserve moisture, and help to control soil blowing and erosion of the surface layer. Minimum tillage, windbreaks, and a cropping sequence that includes close-growing crops conserve soil and water. Fertilizer, particularly nitrogen, should be added in split applications. Pasture species, such as hybrid bermudagrass and bahiagrass, are grown on this soil.

The dominant native trees are loblolly pine, southern red oak, white oak, red maple, American beech, sweetgum, and hickory. The understory is mainly dogwood, sourwood, American holly, and sassafras. Few limitations affect woodland management.

The main limitation affecting urban uses is the sandy surface layer. If unprotected, the sandy surface layer is subject to soil blowing, and it is droughty when the amount of rainfall is limited.

No major limitations affect recreational uses.

The capability subclass is IIs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9S.

CfA—Cape Fear loam, 0 to 2 percent slopes. This soil is nearly level and very poorly drained. It is dominantly in the eastern part of the county, along the western edge of the Great Dismal Swamp at the toe of the Suffolk Scarp. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is black loam 13 inches thick. The subsoil is 28 inches thick. It is dark grayish brown clay loam in the upper part and light gray clay in the lower part. The underlying material to a depth of 72 inches is sandy loam. It is grayish brown in the upper part and light brownish gray in the lower part.

Included with this soil in mapping are small areas of Roanoke and Belhaven soils. Roanoke soils are poorly drained. Belhaven soils are organic. The included soils are near the outer edge of the map unit. They make up 10 percent of the map unit.

Permeability is slow in the Cape Fear soil. Available water capacity is high. The shrink-swell potential is moderate. Reaction is extremely acid to moderately acid, except where the surface layer has been limed. The seasonal high water table is within a depth of 1.5 feet.

Most of the acreage is used as woodland. Some areas are used as cropland.

The major crops are corn and soybeans. Wetness is the main limitation. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes help to maintain tilth and productivity. Spring tillage and fall harvest may be delayed because of wetness. A lack of suitable outlets and slow permeability limit the installation of a drainage system. Pasture species, such as fescue and ladino clover, are grown on this soil.

The dominant native trees are loblolly pine, red maple, green ash, hickory, sweetgum, water tupelo, water oak, willow oak, and swamp white oak. The understory is mainly American holly, sweetbay, sourwood, reeds, and waxmyrtle. Wetness is the main limitation affecting woodland management. A drainage system and bedding of rows help to overcome the limitations caused by excessive wetness. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees. The use of equipment should be limited to the dry periods from midsummer through early fall, when the water table is lowest.

The main limitations affecting urban uses are wetness, low strength, shrinking and swelling, and the slow permeability.

Wetness is the main limitation affecting recreational uses. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both. In some areas, a lack of suitable outlets limits the installation of a drainage system.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 11W.

ChA—Chowan loam, 0 to 2 percent slopes, frequently flooded. This soil is nearly level and poorly drained. It is on flood plains along small creeks that flow into the Chowan River and the Great Dismal Swamp. The flood plains are throughout the county. During late winter and spring, the soil is frequently flooded for very long periods. Individual areas are oblong and are as much as 300 acres in size.

Typically, the surface layer is very dark grayish brown loam 6 inches thick. The next layer is loam 29 inches thick. This layer is dark gray in the upper part and very dark grayish brown in the lower part. The underlying material to a depth of 72 inches is dark reddish brown muck.

Included with this soil in mapping are small areas of Dorovan soils. These soils are very poorly drained and are commonly on the downstream edge of the map unit. They do not have an overlying mineral surface layer. Also included are areas where the overlying mineral material is less than 20 inches thick or more than 40 inches thick. Included soils make up 10 to 20 percent of the map unit.

Permeability is moderately slow in the mineral layers in the Chowan soil and moderately rapid to moderately slow in the underlying organic layers. Available water capacity is high. Reaction is extremely acid to moderately acid in the mineral layers and extremely acid or very strongly acid in the organic layers. The seasonal high water table is within a depth of 0.5 foot.

Most of the acreage is used as woodland. The rest is used mainly as pasture.

This soil is not normally used for crops. Wetness and flooding are the main management concerns.

The dominant native trees are green ash, baldcypress, sweetgum, Atlantic white-cedar, water tupelo, and red maple. The understory is mainly sweetbay, greenbrier, and giant cane. Wetness, flooding, and poor trafficability are the main management concerns. Harvesting is limited to dry periods, usually in midsummer or early fall.

The main limitations affecting urban and recreational uses are wetness and flooding.

The capability subclass is VIIw. Based on water tupelo as the indicator species, the woodland ordination symbol is 9W.

CoB—Conetoe fine sand, 0 to 5 percent slopes. This soil is well drained. It is on stream terraces along drainageways that drain into the Chowan River. Individual areas are irregular in shape and range from 5 to 300 acres in size.

Typically, the surface layer is dark grayish brown fine sand 7 inches thick. The subsurface layer is yellowish brown loamy fine sand 15 inches thick. The subsoil is sandy loam 19 inches thick. It is yellowish brown in the upper part and strong brown in the lower part. The underlying material to a depth of 72 inches is fine sand. It is reddish yellow in the upper part and very pale brown in the lower part.

Included with this soil in mapping are small areas of State and Altavista soils. State soils are in scattered areas throughout the map unit. Altavista soils are moderately well drained and are in slight depressions. Also included are soils in which the depth of the sandy surface layer is more than 40 inches. Included soils make up 15 percent of the map unit.

Permeability is moderately rapid in the Conetoe soil. Available water capacity is low. Reaction is very strongly acid to moderately acid, except where the surface layer has been limed. The seasonal high water table is below a depth of 6 feet.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

Peanuts, tobacco, watermelons (fig. 7), cotton, corn, and soybeans are the major crops. The main limitations affecting cropland management are the leaching of plant nutrients, soil blowing, and droughtiness. Windblown sand can damage young plants. Alternate planting of rows of small grain can help to prevent the damage of young tender plants, such as watermelons. Winter cover crops, minimum tillage, and crop residue management help to maintain the content of organic matter and conserve moisture. Minimum tillage, windbreaks, and a cropping sequence that includes close-growing crops conserve soil and water. Fertilizer, particularly nitrogen, should be added in split applications. Pasture species, such as hybrid bermudagrass and bahiagrass, are grown on this soil.

The dominant native trees are loblolly pine, red maple, hickory, sweetgum, southern red oak, white oak, and post oak. The understory is mainly dogwood, sassafras, American holly, and sourwood. The low available water capacity is the main limitation affecting woodland management.

No major limitations affect most urban and recreational uses. The thick, sandy material provides a good support base for most structures. If unprotected, however, the sandy surface layer is subject to soil blowing, and it is droughty when the amount of rainfall is limited.

The capability subclass is IIs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8S.

CrA—Craven fine sandy loam, 0 to 1 percent slopes. This soil is moderately well drained. It is on smooth ridges and upland flats. Individual areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is pale brown fine sandy loam 8 inches thick. The subsoil is 43 inches thick. It is yellowish brown clay loam in the upper part, yellowish brown clay in the next part, and light gray clay loam in the lower part. The underlying material to a depth of 72 inches is light brownish gray loam in the upper part and brownish yellow sandy loam in the lower part.

Included with this soil in mapping are small areas of Lenoir, Exum, and Goldsboro soils. Lenoir soils are somewhat poorly drained and are in slight depressions and drainageways throughout the map unit. Exum and Goldsboro soils are near the outer edge of the map unit. Included soils make up 10 percent of the map unit.

Permeability is slow in the Craven soil. Available water capacity and the shrink-swell potential are moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is 2 to 3 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn, cotton, soybeans, tobacco, and peanuts. The seasonal wetness is a limitation affecting tobacco and peanuts. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-

Figure 7.—Watermelons in an area of Conetoe fine sand, 0 to 5 percent slopes.

growing crops conserve soil and water. The slow permeability in the subsoil is a limitation to the installation of drainage systems.

The dominant native trees are yellow-poplar, sweetgum, hickory, red maple, American beech, willow oak, white oak, southern red oak, and loblolly pine. The understory is mainly dogwood, sourwood, American holly, and sassafras. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is moist results in the formation of ruts and in surface compaction. Using low-pressure ground equipment minimizes damage to the soil and to tree roots.

The main limitations affecting urban uses are wetness, low strength, shrinking and swelling, and slow permeability.

The main limitations affecting recreational uses are wetness and slow permeability. The wetness can be minimized by surface water management measures, such as land grading and catch basins that have underground outlets.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9C.

CrB—Craven fine sandy loam, 1 to 4 percent slopes. This soil is moderately well drained. It is on slightly rounded ridges and on side slopes along drainageways in the uplands. Individual areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is pale brown fine sandy loam 8 inches thick. The subsoil is 43 inches thick. It is yellowish brown clay loam in the upper part, yellowish brown clay in the next part, and light gray clay loam in the lower part. The underlying material to a depth of 72 inches is light brownish gray loam in the upper part and brownish yellow sandy loam in the lower part.

Included with this soil in mapping are small areas of Lenoir, Exum, and Goldsboro soils. Lenoir soils are somewhat poorly drained and are in slight depressions throughout the map unit. Exum and Goldsboro soils are near the outer edge of the map unit. Included soils make up 10 percent of the map unit.

Permeability is slow in the Craven soil. Available water capacity and the shrink-swell potential are moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is 2 to 3 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn, tobacco, peanuts, cotton, and soybeans. The seasonal wetness is a limitation affecting tobacco and peanuts. A moderate hazard of erosion in the gently sloping areas results in the need for additional conservation measures in areas used for row crops. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water. The slow permeability in the subsoil is a limitation to the installation of drainage systems.

The dominant native trees are yellow-poplar, sweetgum, hickory, red maple, American beech, willow oak, white oak, southern red oak, and loblolly pine. The understory is mainly dogwood, sourwood, American holly, and sassafras. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment when the soil is moist results in the formation of ruts and in surface compaction. Using low-pressure ground equipment minimizes damage to the soil and to tree roots.

The main limitations affecting urban uses are wetness, low strength, and slow permeability.

The main limitations affecting recreational uses are wetness and slow permeability. The wetness can be minimized by surface water management measures, such as land grading and catch basins that have underground outlets.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9C.

CrC—Craven fine sandy loam, 4 to 8 percent slopes. This soil is moderately well drained. It is on side slopes along drainageways on uplands. Individual areas are long and narrow and range from 5 to 60 acres in size.

Typically, the surface layer is pale brown fine sandy loam 8 inches thick. The subsoil is 43 inches thick. It is yellowish brown clay loam in the upper part, yellowish brown clay in the next part, and light gray clay loam in the lower part. The underlying material to a depth of 72 inches is light brownish gray loam in the upper part and brownish yellow sandy loam in the lower part.

Included with this soil in mapping are small areas of Winton, Ballahack, and Nawney soils. Winton soils have slopes of more than 8 percent. The very poorly drained Ballahack and poorly drained Nawney soils are in narrow drainageways. Also included are areas of soils that have less clay in the subsoil than the Craven soil. Included soils make up 15 percent of the map unit.

Permeability is slow in the Craven soil. Available water capacity and the shrink-swell potential are moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is 2 to 3 feet below the surface.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are corn, soybeans, tobacco, and peanuts. The slope and the rapid runoff are limitations. Contour cultivation and crops that provide close ground cover are needed to control erosion.

The dominant native trees are loblolly pine, southern red oak, white oak, red maple, American beech, sweetgum, and hickory. The understory is mainly dogwood, sourwood, American holly, and sassafras.

Wetness and the slope are the main limitations affecting woodland management. Using standard wheeled and tracked equipment when the soil is moist results in the formation of ruts and in surface compaction. Using low-pressure ground equipment minimizes damage to the soil and to tree roots. Rills and gullies can form on skid trails and firebreaks unless adequate water bars, a plant cover, or both are provided.

The main limitations affecting urban uses are wetness, low strength, and slow permeability.

The main limitations affecting recreational uses are the slope, slow permeability, and wetness.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9C.

DoA—Dorovan mucky peat, 0 to 2 percent slopes, frequently flooded. This soil is nearly level and very poorly drained. It is on flood plains along the Chowan River and major streams. This soil is frequently flooded for very long periods. Individual areas are oblong and range from 50 to 500 acres in size.

Typically, the surface layer is very dark brown mucky peat that is covered by 2 inches of partly decomposed leaves, twigs, and stems. Below this, to a depth of 72 inches, is dark reddish brown muck.

Included with this soil in mapping are small areas of the poorly drained Chowan and Nawney soils on the upstream edge of the map unit. Also included are areas where the muck is less than 51 inches thick. Included soils make up 10 to 15 percent of the map unit.

The Dorovan soil is highly decomposed organic material. Permeability is moderate. Available water capacity is high. Reaction is extremely acid in the organic layers and very strongly acid or strongly acid in the mineral layers. The seasonal high water table is within a depth of 0.5 foot.

Most of the acreage is used as native woodland that is well adapted to extreme wetness.

This soil is not generally used for agriculture. The main management concerns affecting cropland and pasture are wetness and flooding.

The dominant native trees are green ash, baldcypress, swamp tupelo, water tupelo, and red maple. The understory is mainly redbay, blueberry, greenbrier, and waxmyrtle. Wetness, flooding, and poor trafficability are the main management concerns.

The main limitations affecting urban uses are flooding, excess humus, and subsidence.

The main limitations affecting recreational uses are flooding and excess humus.

The capability subclass is VIIw. Based on blackgum as the indicator species, the woodland ordination symbol is 7W.

ExA—Exum silt loam, 0 to 2 percent slopes. This soil is moderately well drained. It is on smooth ridges and flats on uplands. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is brown silt loam 9 inches thick. The subsoil is more than 72 inches thick. It is brownish yellow silt loam and yellowish brown silty clay loam in the upper part, grayish brown clay loam and sandy clay loam in the next part, and light brownish gray and light yellowish brown sandy clay loam in the lower part.

Included with this soil in mapping are small areas of Goldsboro, Craven, and Lynchburg soils. Lynchburg soils are somewhat poorly drained and are in slight depressions throughout the map unit. Craven and Goldsboro soils are near the outer edge of the map unit. Included soils make up about 10 percent of the map unit.

Permeability is moderately slow in the Exum soil. Available water capacity is high. Reaction is extremely acid to moderately acid in the A horizon, except where the surface layer has been limed, and extremely acid to strongly acid in the B horizon. The seasonal high water table is 2 to 3 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are tobacco, peanuts (fig. 8), cotton, corn, and soybeans. The seasonal wetness is a limitation affecting some specialty crops, such as peanuts and tobacco. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are yellow-poplar, sweetgum, hickory, red maple, willow oak, white oak, southern red oak, and loblolly pine. The understory is mainly dogwood, sourwood, American holly, and sassafras. The wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees.

Wetness is the main limitation affecting urban and recreational uses. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

GoA—Goldsboro fine sandy loam, 0 to 3 percent slopes. This soil is moderately well drained. It is on smooth ridges and flats on uplands. Individual areas are

Figure 8.—Peanuts in an area of Exum silt loam, 0 to 2 percent slopes.

irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is grayish brown fine sandy loam 8 inches thick. The subsoil extends to a depth of 72 inches. It is yellowish brown loam in the upper part, light yellowish brown sandy clay loam and clay loam in the next part, and strong brown and gray sandy clay loam in the lower part.

Included with this soil in mapping are small areas of Noboco, Exum, Bonneau, Craven, and Lynchburg soils. Lynchburg soils are somewhat poorly drained and are in slight depressions. Craven and Exum soils are near the outer edge of the map unit. Noboco and Bonneau soils are well drained and are on knolls throughout the map unit. Included soils make up 10 percent of the map unit.

Permeability is moderate in the Goldsboro soil. Available water capacity also is moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is at a depth of 2 to 3 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are tobacco, peanuts, corn, cotton (fig. 9), and soybeans. The seasonal wetness is a limitation affecting some specialty crops, such as peanuts and tobacco. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are yellow-poplar, sweetgum, American beech, hickory, red maple, water oak, willow oak, white oak, southern red oak, and loblolly pine. The understory is mainly dogwood, sourwood, American holly, and sassafras. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees.

Wetness is the main limitation affecting urban and recreational uses. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

IcA—Icaria fine sandy loam, 0 to 2 percent slopes. This soil is nearly level and very poorly drained. It is on flats and in depressions throughout the southern half of the county. Individual areas are irregular in shape and range from 3 to 100 acres in size.

Figure 9.—Cotton in an area of Goldsboro fine sandy loam, 0 to 3 percent slopes.

Typically, the surface layer to a depth of 14 inches is fine sandy loam. It is black in the upper part and very dark gray in the lower part. The subsoil is dark grayish brown sandy clay loam 22 inches thick. The next layer to a depth of 62 inches is sand. It is light gray in the upper part and brown in the lower part.

Included with this soil in mapping are small areas of Leon and Tomahawk soils near the outer edge of the map unit. Leon soils are poorly drained, and Tomahawk soils are moderately well drained or somewhat poorly drained. Included soils make up 10 to 15 percent of the map unit.

Permeability is moderate in the Icaria soil. Available water capacity also is moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are corn and soybeans. Wetness is the main limitation. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes help to maintain tilth and productivity. Tillage may be delayed in the spring because of the wetness. Pasture species, such as fescue and ladino clover, are grown on this soil.

The dominant native trees are loblolly pine, sweetgum, red maple, water oak, and willow oak. The understory is mainly American holly, waxmyrtle, sweetbay, greenbrier, and giant cane. Wetness is the main limitation affecting woodland management. A drainage system and bedding of rows help to overcome this limitation.

The main limitations affecting urban uses are wetness and seepage. The wetness can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both. In some areas, a lack of suitable outlets limits the installation of a drainage system.

The main limitation affecting recreational uses is wetness. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both. In some areas, a lack of suitable outlets limits the installation of a drainage system.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

LeA—Lenoir loam, 0 to 2 percent slopes. This soil is somewhat poorly drained. It is on low ridges in the uplands. Individual areas are irregular in shape and range from 5 to 40 acres in size.

Typically, the surface layer is grayish brown loam 7 inches thick. The subsoil extends to a depth of 72 inches. It is light olive brown clay loam in the upper part, gray clay in the next part, and light brownish gray clay in the lower part.

Included with this soil in mapping are small areas of Craven and Bladen soils. Craven soils are moderately well drained. They are in the slightly elevated areas throughout the map unit and on the edge of drainageways. Bladen soils are poorly drained and are in slight depressions throughout the map unit. Included soils make up 10 percent of the map unit.

Permeability is slow in the Lenoir soil. Available water capacity and the shrink-swell potential are moderate. Reaction ranges from extremely acid to moderately acid, except where the surface layer has been limed. The seasonal high water table is 1.0 to 2.5 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn and soybeans. Wetness is the main limitation. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes help to maintain tilth and productivity. Spring tillage and fall harvest may be delayed because of the wetness. Slow permeability is the main limitation affecting the installation of drainage systems.

The dominant trees are loblolly pine, sweetgum, southern red oak, water oak, white oak, red maple, blackgum, and yellow-poplar. The understory includes inkberry, sourwood, giant cane, redbay, American holly, and greenbrier. Using standard wheeled and tracked equipment when the soil is moist results in the formation of ruts and in surface compaction. Using low-pressure ground equipment minimizes damage to the soil and to tree roots.

The main limitations affecting urban uses are wetness and slow permeability. These limitations severely restrict the use of septic tank absorption fields in this soil.

The main limitations affecting recreational uses are wetness and slow permeability. The wetness can be minimized by surface water management measures, such as land grading and catch basins that have underground outlets.

The capability subclass is IIIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

LoA—Leon sand, 0 to 2 percent slopes. This soil is nearly level and poorly drained. It is mainly in the northwestern part of the county on flats and in depressions. Individual areas are irregular in shape and range from 5 to 20 acres in size.

Typically, the surface layer is very dark gray sand 6 inches thick. The subsurface layer is light brownish gray sand 5 inches thick. The subsoil is black sand 3 inches thick. The underlying material to a depth of 80 inches is sand. It is very pale brown in the upper part and light gray in the lower part.

Included with soil in mapping are small areas of Icaria and Pactolus soils. Icaria soils are very poorly drained and are near the outer edge of the map unit. Pactolus soils are moderately well drained or somewhat poorly drained and are on the slightly elevated knolls. Included soils make up 10 percent of the map unit.

Permeability is rapid in the surface and underlying material in the Leon soil and is moderate to moderately rapid in the subsoil. Available water capacity is very low. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are corn and soybeans. Wetness is the main limitation. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes help to maintain tilth and productivity. Spring tillage and fall harvest can be delayed because of the wetness.

The dominant native trees are pond pine, loblolly pine, red maple, sweetgum, yellow-poplar, and water oak. The understory species are mainly American holly, sweetbay, giant cane, and waxmyrtle. Wetness is the main limitation. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of damage to the soil caused by forestry activities.

The main limitations affecting urban uses are wetness, seepage, and the sandy surface layer and subsurface layer. The wetness can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The main limitations affecting recreational uses are wetness and the sandy surface layer. The wetness can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IVw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7W.

LyA—Lynchburg fine sandy loam, 0 to 2 percent slopes. This soil is nearly level and somewhat poorly drained. It is on low, smooth ridges and in shallow depressions. Individual areas are irregular in shape and range from 5 to 30 acres in size.

Typically, the surface layer is dark brown fine sandy loam 8 inches thick. The subsoil extends to a depth of 72 inches. It is yellowish brown sandy clay loam in the upper part, light brownish gray and light gray sandy clay loam in the next part, and light gray clay in the lower part.

Included with this soil in mapping are small areas of Goldsboro, Rains, Exum, and Lenoir soils. Rains soils are poorly drained and are in slight depressions. Goldsboro soils are moderately well drained and are on the slightly elevated knolls. Lenoir soils have more clay in the subsoil than the Lynchburg soil and are in scattered areas throughout the map unit. Exum soils are moderately well drained. They have more silt and less sand in the subsoil than the Lynchburg soil and are near the outer edge of the unit. Included soils make up 10 to 15 percent of the map unit.

Permeability is moderate in the Lynchburg soil. Available water capacity also is moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is 0.5 foot to 1.5 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn, soybeans, tobacco, and peanuts. Wetness is the main limitation affecting cultivation. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, southern red oak, white oak, and American sycamore. The understory is mainly dogwood, sourwood, sassafras, giant cane, and a variety of briers. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees. A drainage system facilitates the use of equipment, reduces the extent of damage to the soil caused by forestry activities, and increases plant growth.

Wetness is the main limitation affecting urban and recreational uses. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

NaA—Nawney loam, 0 to 2 percent slopes, frequently flooded. This soil is nearly level and poorly drained. It is on flood plains throughout the county. This soil is frequently flooded for very long periods. Individual areas are narrow and elongated and range from 50 to 200 acres in size.

Typically, the surface layer is dark grayish brown loam 1 inch thick. The underlying material extends to a depth of 62 inches. It is grayish brown and light brownish gray loam in the upper part, light gray sandy clay loam and clay loam in the next part, and gray sand in the lower part.

Included with this soil in mapping are small areas of Chowan and Dorovan soils, which are commonly on the downstream edge of the map unit. Dorovan soils are very poorly drained. Also included are soils that have a clayey subsoil and soils that have a thicker surface layer than that of the Nawney soil. These soils are in scattered areas throughout the map unit. Included soils make up 15 percent of the map unit.

Permeability is moderate in the Nawney soil. Available water capacity also is moderate. Reaction is extremely acid to strongly acid to a depth of about 40 inches, except where the surface layer has been limed. Below this depth, it is extremely acid to slightly acid. The seasonal high water table is within a depth of 0.5 foot.

Most of the acreage is used as native woodland that is well adapted to extreme wetness.

This soil is not normally used for crops. Wetness and flooding are the main management concerns.

The dominant native trees are green ash, baldcypress, sweetgum, water tupelo, and red maple. The understory is mainly sweetbay, greenbrier, waxmyrtle, American holly, sourwood, and giant cane. Wetness, flooding, and poor trafficability are the main management concerns. Harvesting is limited to dry periods, usually in midsummer or early fall.

The main management concerns affecting urban and recreational uses are wetness and flooding.

The capability subclass is VIIw. Based on sweetgum as the indicator species, the woodland ordination symbol is 8W.

NoA—Noboco fine sandy loam, 0 to 2 percent slopes. This soil is well drained. It is in broad, smooth areas on uplands. Individual areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is grayish brown fine sandy loam 6 inches thick. The subsurface layer is light yellowish brown fine sandy loam 5 inches thick. The subsoil to a depth of 72 inches is sandy clay loam. The upper part is yellowish brown, the next part is strong brown, and the lower part is mottled brownish yellow, yellowish red, and light gray.

Included with this soil in mapping are small areas of Goldsboro and Bonneau soils. Goldsboro soils are moderately well drained and are in slight depressions. Bonneau soils are near the outer edge of the map unit. Their surface layer and subsurface layer have a combined thickness of 20 inches or more. Included soils make up 10 percent of the map unit.

Permeability is moderate in the Noboco soil. Available water capacity also is moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is 2.5 to 4.0 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are tobacco, corn, cotton, peanuts, and soybeans. No major limitations affect crops on this soil. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and content of organic matter. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, southern red oak, white oak, red maple, American beech, sweetgum, and hickory. The understory is mainly dogwood, sourwood, American holly, and sassafras. Few limitations affect woodland management.

Wetness is the main limitation affecting urban uses. Little or no modification is necessary, however, for when a septic tank absorption field is installed.

No major limitations affect recreational uses.

The capability class is I. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

NoB—Noboco fine sandy loam, 2 to 6 percent slopes. This soil is well drained. It is on slightly rounded ridges and side slopes in the uplands. Individual areas are elongated or irregular in shape and range from 5 to more than 60 acres in size.

Typically, the surface layer is grayish brown fine sandy loam 6 inches thick. The subsurface layer is light yellowish brown fine sandy loam 5 inches thick. The subsoil to a depth of 72 inches is sandy clay loam. The upper part is yellowish brown, the next part is strong brown, and the lower part is mottled brownish yellow, yellowish red, and light gray.

Included with this soil in mapping are small areas of Winton, Bonneau, and Goldsboro soils. Winton soils are moderately well drained. Bonneau soils are near the outer edge of the map unit. Their surface layer and subsurface layer have a combined thickness of 20 inches or more. Goldsboro soils are moderately well drained and are in depressions. Included soils make up 10 percent of the map unit.

Permeability is moderate in the Noboco soil. Available water capacity also is moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is 2.5 to 4.0 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn, tobacco, cotton, peanuts, and soybeans. Surface runoff, the slope, and the hazard of erosion are the main management concerns. Winter cover crops, minimum tillage, and crop residue management help to control runoff and erosion and maintain tilth and productivity. Stripcropping, terraces, no-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, southern red oak, white oak, red maple, American beech, sweetgum, and hickory. The understory is mainly dogwood, sourwood, American holly, and sassafras. Few limitations affect woodland management.

Wetness is the main limitation affecting urban uses. Little or no modification is necessary, however, for when a septic tank absorption field is installed.

The slope is the main limitation affecting recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

PaA—Pactolus sand, 0 to 3 percent slopes. This soil is nearly level and is moderately well drained or somewhat poorly drained. It is most common in the northwestern part of the county on ridges and flats along the Chowan River and its tributaries. Individual areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown sand 5 inches thick. The underlying material extends to a depth of 80 inches. It is light yellowish brown sand in the upper part, very pale brown fine sand in the next part, and light gray sand in the lower part.

Included with this soil in mapping are small areas of Leon and Alaga soils. Leon soils are poorly drained and are in slight depressions. Alaga soils are well drained or somewhat excessively drained and are on the slightly higher knolls throughout the map unit. Included soils make up 10 percent of the map unit.

Permeability is rapid in the Pactolus soil. Available water capacity is low. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is 1.5 to 3.0 feet below the surface.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are peanuts, corn, and soybeans. Wetness and soil blowing are the main limitations. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, willow oak, water oak, and American beech. The understory includes dogwood, sourwood, sweetbay, sassafras, waxmyrtle, blueberry, gallberry, American holly, giant cane, and a variety of briers. The main limitation affecting timber management is the sandy surface layer.

The main limitations affecting urban uses are wetness, the instability of cutbanks, seepage, and the sandy surface layer. The wetness can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both. Open ditches are not stable because of the instability of cutbanks.

The main limitations affecting recreational uses are wetness and the sandy surface layer. The wetness can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIIs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9S.

PnA—Pantego fine sandy loam, 0 to 2 percent slopes. This nearly level, very poorly drained soil is in shallow depressions and on broad flats in the uplands. Individual areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is 21 inches thick. It is black fine sandy loam in the upper part and black loam in the lower part. The subsoil extends to a depth of 74 inches. It is dark grayish brown and grayish brown loam in the upper part, light brownish gray clay loam in the next part, and light brownish gray sandy clay in the lower part.

Included with this soil in mapping are small areas of Lynchburg, Rains, and Bladen soils. Rains soils are poorly drained and are in scattered areas throughout the map unit. Lynchburg soils are somewhat poorly drained and are on the slightly elevated knolls. Bladen soils are poorly drained and are near the outer edge of the map unit. Included soils make up 10 to 15 percent of the map unit.

The content of organic matter is medium in the Pantego soil. Permeability and available water capacity are moderate. Reaction is extremely acid to strongly acid, except where the surface layer has been limed. The seasonal high water table is within a depth of 1.5 feet.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are corn, small grain, and soybeans. Wetness is the main limitation affecting cultivation. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, willow oak, water oak, and black cherry. The major understory includes dogwood, waxmyrtle, sourwood, sweetbay, sassafras, giant cane, and a variety of briers. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees. A drainage system facilitates the use of equipment, reduces the extent of damage to the soil caused by forestry activities, and increases plant growth.

Wetness is the main limitation affecting urban and recreational uses. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIIw in drained areas and VIw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9W.

PuA—Pungo muck, 0 to 2 percent slopes. This soil is nearly level and very poorly drained. It is mainly in the eastern part of the county on broad flats in the Great Dismal Swamp. Individual areas are irregular in shape and are as much as several thousand acres in size.

Typically, this soil is 72 inches of black muck.

Included with this soil in mapping are small areas of Dorovan and Belhaven soils. Belhaven soils are in scattered areas throughout the map unit and have an organic layer that is less than 51 inches thick. Dorovan soils are at the outer edge of the map unit and are frequently flooded. Included soils make up 10 percent of this map unit.

The surface layer of the Pungo soil is highly decomposed organic material that is more than 51 inches thick. Permeability is moderate or moderately rapid. Available water capacity is very high. Reaction is extremely acid in the organic material, except where the surface layer has been limed. Logs, roots, and stumps are present throughout the soil. The seasonal high water table is within a depth of 1 foot in undrained areas.

Most of the acreage is used as woodland.

The main limitations affecting agricultural uses are the high percentage of logs, stumps, and roots in the organic layers and the depth of the organic matter. The colloidal, pastelike consistency of the organic layers is also a limitation. If these horizons are "over-drained" or otherwise dried, they often harden irreversibly, restricting root penetration and water movement.

The dominant native trees are pond pine, Atlantic white-cedar, red maple, baldcypress, and sweetbay. The understory is mainly inkberry, fetterbush lyonia, greenbrier, and huckleberry. Wetness and low strength are the main limitations affecting woodland management. The soil has a poor load-supporting capacity. Use of low-pressure ground equipment reduces the extent of damage to the soil. The use of equipment should be limited to the dry periods from midsummer through early fall, when the water table is lowest.

The main limitations affecting urban uses are wetness, excess humus, seepage, and low strength. The wetness may be reduced by the installation of a drainage system. Pilings help to overcome low strength.

The main limitations affecting recreational uses are wetness and excess humus. The wetness may be reduced by the installation of a drainage system.

The capability subclass is IVw in drained areas and VIIw in undrained areas. Based on pond pine as the indicator species, the woodland ordination symbol is 5W.

RaA—Rains fine sandy loam, 0 to 2 percent slopes. This soil is nearly level and poorly drained. It is in shallow depressions and on low, smooth ridges in the uplands. Individual areas are irregular in shape and range from 5 to 300 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 6 inches thick. The subsoil extends to a depth of 72 inches. It is light brownish gray sandy clay loam in the upper part, gray sandy clay loam in the next part, and gray clay loam in the lower part.

Included with this soil in mapping are small areas of Lynchburg, Pantego, and Bladen soils. Pantego soils are very poorly drained and are in depressions. Lynchburg soils are somewhat poorly drained and are on the slightly elevated ridges. Bladen soils have more clay in the subsoil than the Rains soil and are near the outer edge of the map unit. Included soils make up 10 to 15 percent of the map unit.

Permeability is moderate in the Rains soil. Available water capacity also is moderate. Reaction is extremely acid to slightly acid in the surface layer and subsurface layer and extremely acid to strongly acid in the subsoil. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn, small grain, and soybeans. Wetness is the main limitation affecting cultivation. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, willow oak, water oak, black cherry, and American beech. The major understory includes dogwood, waxmyrtle, sourwood, sweetbay, sassafras, giant cane, and a variety of briers. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees. A drainage system facilitates the use of equipment, reduces the extent of damage to the soil caused by forestry activities, and increases plant growth.

Wetness is the main limitation affecting urban and recreational uses. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10W.

RoA—Roanoke loam, 0 to 2 percent slopes. This soil is nearly level and poorly drained. It is on broad flats and in slightly depressed drainageways on stream terraces. Individual areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is very dark grayish brown loam 6 inches thick. The subsoil is 42 inches thick. It is light brownish gray loam and clay in the upper part, grayish brown clay in the next part, and light gray loam in the lower part. The underlying material extends to a depth of 72 inches. It is white fine sandy loam in the upper part and white loamy fine sand in the lower part.

Included with this soil in mapping are small areas of Tomotley and Cape Fear soils. Tomotley soils have less clay in the subsoil than the Roanoke soil. Cape Fear soils are very poorly drained and have a thicker surface layer than that of the Roanoke soil. Included soils are in scattered areas throughout the map unit. They make up 10 percent of the map unit.

Permeability is slow in the Roanoke soil. Available water capacity and the shrink-swell potential are moderate. Reaction ranges from extremely acid to strongly acid in the surface layer, subsurface layer, and subsoil, except where the surface layer has been limed. It ranges from extremely acid to slightly acid in the underlying material. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn and soybeans. Wetness is the main limitation affecting cultivation. Minimum tillage, cover crops, and a cropping system that includes grasses and legumes can help to maintain tilth and productivity. Tillage may be delayed in spring because of the wetness. A lack of suitable outlets and slow permeability limit the installation of a drainage system.

The dominant native trees are loblolly pine, red maple, sweetgum, pond pine, water tupelo, green ash, and water oak. The understory is mainly sourwood, giant cane, American holly, blueberry, and waxmyrtle. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees. A drainage system improves tree growth, facilitates the use of equipment, and reduces the extent of damage to the soil caused by forestry activities.

The main limitations affecting urban and recreational uses are wetness and slow permeability. The wetness can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIIw in drained areas and IVw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10W.

StA—State fine sandy loam, 0 to 2 percent slopes. This soil is well drained. It is on low ridges near small streams that flow into the Chowan River. Individual areas are irregular in shape and range from 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 9 inches thick. The subsurface layer is yellowish brown fine sandy loam 9 inches thick. The subsoil is sandy clay loam 30 inches thick. It is yellowish brown in the upper part and reddish yellow in the lower part. The underlying material extends to a depth of 72 inches. It is yellow loamy sand in the upper part and very pale brown sand in the lower part.

Included with this soil in mapping are small areas of Altavista and Conetoe soils. Altavista soils are moderately well drained and are in shallow depressions. Conetoe soils have a sandy surface layer and subsurface layer that have a combined thickness of 20 inches or more. These soils are near the outer edge of the map unit. Included soils make up 10 to 15 percent of the map unit.

Permeability is moderate in the State soil. Available water capacity also is moderate. Reaction ranges from extremely acid to strongly acid in the surface layer and the upper part of the subsoil, except where the surface layer has been limed. It ranges from extremely acid to slightly acid in the lower part of the subsoil and in the underlying material. The seasonal high water table is 4 to 6 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn, soybeans, peanuts, tobacco, and small grain. Winter cover crops, minimum tillage, and crop residue management help to control runoff and erosion and maintain tilth. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, red maple, hickory, yellow-poplar, black tupelo, American beech, southern red oak, water oak, and white oak. The understory is mainly dogwood, sassafras, sourwood, and waxmyrtle. No major limitations affect woodland management.

No major limitations affect urban or recreational uses.

The capability class is I. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10A.

StB—State fine sandy loam, 2 to 6 percent slopes. This soil is well drained. It is on slightly rounded ridges near streams that flow into the Chowan River. Individual areas are irregular in shape and range from 5 to 60 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 9 inches thick. The subsurface layer is yellowish brown fine sandy loam 9 inches thick. The subsoil is sandy clay loam 30 inches thick. It is yellowish brown in the upper part and reddish yellow in the lower part. The underlying material extends to a depth of 72 inches. It is yellow loamy sand in the upper part and very pale brown sand in the lower part.

Included with this soil in mapping are small areas of Altavista and Conetoe soils. Altavista soils are moderately well drained and are in slight depressions. Conetoe soils have a surface layer and subsurface layer that have a combined thickness of 20 inches or more. These soils are near the outer edge of the map unit. Also included, along the edge of small streams, are soils that have slopes of more than 6 percent. Included soils make up 15 percent of the map unit.

Permeability is moderate in the State soil. Available water capacity also is moderate. Reaction ranges from extremely acid to strongly acid in the surface layer and the upper part of the subsoil, except where the surface layer has been limed. It ranges from extremely acid to slightly acid in the lower part of the subsoil and in the underlying material. The seasonal high water table is 4 to 6 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are corn, soybeans, peanuts, and small grain. The hazard of erosion is the main management concern. Winter cover crops, minimum tillage, and crop residue management help to control runoff and erosion and maintain tilth. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water. The soil also is used for pasture species.

The dominant native trees are loblolly pine, red maple, hickory, yellow-poplar, black tupelo, American beech, southern red oak, water oak, and white oak. The understory is mainly dogwood, sassafras, sourwood, and waxmyrtle. Few limitations affect woodland management.

No major limitations affect urban uses.

The slope is the main limitation affecting recreational uses.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10A.

TaA—Tomahawk fine sand, 0 to 3 percent slopes. This soil is nearly level and is moderately well drained or somewhat poorly drained. It is on smooth ridges along the Suffolk Scarp. Individual areas are irregular in shape and range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown fine sand 8 inches thick. The subsurface layer is light yellowish brown loamy fine sand 8 inches thick. The subsoil is light yellowish brown fine sandy loam 12 inches thick. The next layer extends to a depth of 72 inches. It is brown and white fine sand in the upper part, dark brown sand in the next part, and dark reddish brown and black sand in the lower part.

Included with this soil in mapping are small areas of Valhalla and Icaria soils. Valhalla soils are well drained and are on the slightly elevated knolls or ridges. Icaria soils are very poorly drained and are in slight depressions. Included soils make up 10 percent of the map unit.

Permeability is moderate in the Tomahawk soil. Available water capacity is low. Reaction is very strongly acid or strongly acid in the surface layer and in the upper part of the subsoil, except where the surface layer has been limed. It is extremely acid to slightly acid in the lower part of the subsoil. The seasonal high water table is 1.5 to 3.0 feet below the surface.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are peanuts, corn, and soybeans. Wetness is the main limitation affecting cropland management. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water. Pasture species, such as hybrid bermudagrass and bahiagrass, are grown on this soil.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, willow oak, water oak, black cherry, and American beech. The major understory includes dogwood, sourwood, sweetbay, sassafras, waxmyrtle, and American holly. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts and in surface compaction. Using low-pressure ground equipment reduces the extent of damage to the soil and helps to maintain productivity.

Wetness is the main limitation affecting urban uses. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The main limitations affecting recreational uses are wetness and the sandy surface layer. The wetness can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10W.

ToA—Tomotley fine sandy loam, 0 to 2 percent slopes. This soil is nearly level and poorly drained. It is on flats and in slight depressions. Individual areas are irregular in shape and range from 10 to 50 acres in size.

Typically, the surface layer is very dark grayish brown fine sandy loam 7 inches thick. The subsoil is 48 inches thick. It is light gray loam in the upper part, light brownish gray and grayish brown sandy clay loam in the next part, and light brownish gray loam in the lower part. The underlying material to a depth of 74 inches is light gray and light brownish gray sandy loam.

Included with this soil in mapping are small areas of Roanoke soils, which have more clay in the subsoil than the Tomotley soil. Also included are soils that have less clay in the subsoil than the Tomotley soil. Included soils make up about 10 percent of this map unit.

Permeability is moderate or moderately slow in the Tomotley soil. Available water capacity is moderate or high. Reaction ranges from extremely acid to strongly acid to a depth of about 50 inches. Below this depth, it ranges from extremely acid to moderately acid. The seasonal high water table is within a depth of 1 foot.

Most of the acreage is used as woodland. The rest is used mainly as cropland.

The major crops are corn, soybeans, potatoes, and small grain. Wetness is the main limitation affecting cultivation. A drainage system in cultivated areas is necessary to maintain optimum yields. Winter cover crops, minimum tillage, and crop residue management help to maintain tilth and productivity. No-till planting, field borders, and a cropping sequence that includes close-growing crops conserve soil and water.

The dominant native trees are loblolly pine, sweetgum, red maple, yellow-poplar, willow oak, and water oak. The major understory includes dogwood, sourwood, sweetbay, sassafras, giant cane, and a variety of briers. Wetness is the main limitation affecting woodland management. Using standard wheeled and tracked equipment during wet periods results in the formation of ruts, compacts the soil, and damages the roots of trees. A drainage system facilitates the use of equipment, reduces the extent of damage to the soil caused by forestry activities, and improves tree growth.

Wetness is the main limitation affecting urban and recreational uses. It can be reduced by a drainage system consisting of perforated drainage tile, ditches, or both.

The capability subclass is IIIw in drained areas and IVw in undrained areas. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10W.

Ud—Udorthents, loamy. This map unit consists of areas where the natural soil has either been altered or covered by grading and digging. Borrow pits, dredge and fill areas, and landfills are the three distinct types of altered areas that are identified. They are mapped as a single map unit because most of the areas are loamy and are capable of supporting plants.

Typically, the borrow pits are excavated areas from which the soil material has been removed for use as fill material for construction sites. The cuts are 3 to 15 feet deep. The bottoms of the pits, or the base slopes, are level and gently sloping. Most cuts have two or more short, nearly vertical side slopes. The exposed surface layer consists mainly of loamy marine deposits. The borrow pits range from 2 to about 10 acres in size.

Some of the borrow pits have been reclaimed and seeded to grass. A few areas have naturally reseeded to wild grasses, weeds, and pine. These areas are poorly suited to plant growth because of the physical properties and the low natural fertility of the soil.

Typically, dredge and fill areas are where soil material is used to improve construction sites for more intensive uses, such as building sites. In some areas, borrow material is used to improve the quality of low, wet sites.

Typically, landfills are areas where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered with a thin layer of soil. When the trench is full, it is covered by a final cover of soil material.

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

VaB—Valhalla fine sand, 0 to 6 percent slopes. This soil is well drained. It is on smooth to slightly rounded ridges along the Suffolk Scarp. Individual areas are oblong and irregular in width and range from 10 to 100 acres in size.

Typically, the surface layer is dark grayish brown fine sand 7 inches thick. The subsurface layer is brownish yellow fine sand 14 inches thick. The subsoil is 15 inches thick. It is strong brown fine sandy loam in the upper part and yellowish brown loamy fine sand in the lower part. The next layer to a depth of 82 inches is fine sand. This layer is brownish yellow and yellowish brown in the upper part, dark brown in the next part, and light brownish gray in the lower part.

Included with this soil in mapping are small areas of Tomahawk and Icaria soils in slight depressions throughout the map unit. Tomahawk soils are moderately well drained or somewhat poorly drained, and Icaria soils are very poorly drained. Included soils make up 10 to 15 percent of the map unit.

Permeability is moderately rapid in the Valhalla soil. Available water capacity is low. Reaction is extremely acid to moderately acid, except where the surface layer has been limed. The seasonal high water table is below a depth of 4 feet.

Most of the acreage is used as cropland. The rest is used mainly as woodland.

The major crops are peanuts, corn, and soybeans. The main limitations are the leaching of plant nutrients, soil blowing, and droughtiness. Windblown sand can damage young plants. Alternate planting of rows of small grain can help to prevent damage to young tender plants, such as watermelons. Winter cover crops, minimum tillage, and crop residue management conserve moisture. No-till planting, windbreaks, and a cropping sequence that includes close-growing crops conserve soil and water. Fertilizer, particularly nitrogen, should be added in split applications. Pasture species, such as hybrid bermudagrass and bahiagrass, also are grown on this soil.

The dominant native trees are loblolly pine, red maple, hickory, sweetgum, black tupelo, southern red oak, white oak, and post oak. The understory is mainly dogwood, sassafras, American holly, and sourwood. The low available water capacity is the main limitation affecting woodland management.

The main limitations affecting urban uses are seepage, droughtiness, and the sandy surface layer. The sandy surface layer is subject to soil blowing, and it is droughty when the amount of rainfall is limited.

The main limitation affecting recreational uses is the sandy surface layer.

The capability subclass is IIIs. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8S.

WnD—Winton fine sandy loam, 8 to 15 percent slopes. This soil is moderately well drained. It is on side slopes. Individual areas are long and narrow and range from 5 to 50 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 3 inches thick. The subsurface layer is light yellowish brown fine sandy loam 12 inches thick. The subsoil is 50 inches thick. It is yellowish brown sandy clay loam in the upper part, brownish yellow and strong brown sandy clay loam in the next part, and yellowish brown sandy loam in the lower part. The underlying material to a depth of 70 inches is brownish yellow loamy sand.

Included with this soil in mapping are small areas of the poorly drained Nawney and Chowan soils in narrow drainageways. Also included are soils at the base of the side slopes in which the combined thickness of the surface layer and subsurface layer is 20 inches or more and soils that have slopes of less than 8 percent or more than 15 percent. Included soils make up 20 percent of the map unit.

Permeability is moderate in the Winton soil. Available water capacity also is moderate. Seepage results in wetness. Reaction is extremely acid to moderately acid, except where the surface layer has been limed. The seasonal high water table is 2 to 4 feet below the surface.

Most of the acreage is used as woodland. The rest is used mainly as pasture.

This soil is generally not used as cropland. The slope and rapid runoff are limitations. Contour farming and close-growing cover crops are needed to control erosion.

The dominant native trees are southern red oak, sweetgum, American beech, red maple, and loblolly pine. The understory is mainly dogwood, American holly, and sourwood. The main management concern is the slope, which limits harvesting. Rills and gullies can form on steep skid trails and firebreaks unless adequate water bars, a plant cover, or both are provided.

The main limitations affecting urban and recreational uses are the slope and wetness.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10A.

WnE—Winton fine sandy loam, 15 to 30 percent slopes. This soil is moderately steep and moderately well drained. Large areas of this soil are along Bennetts Creek and Merchants Mill Pond on side slopes. Individual areas are long and narrow and range from 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 3 inches thick. The subsurface layer is light yellowish brown fine sandy loam 12 inches thick. The subsoil is 50 inches thick. It is yellowish brown sandy clay loam in the upper part, brownish yellow and strong brown sandy clay loam in the next part, and yellowish brown sandy loam in the lower part. The underlying material to a depth of 70 inches is brownish yellow loamy sand.

Included with this soil in mapping are small areas of the poorly drained Nawney and Chowan soils in narrow drainageways. Also included are soils at the base of side slopes in which the combined thickness of the surface layer and subsurface layer is 20 inches or more and soils that have slopes of less than 15 percent or more than 30 percent. Included soils make up 20 percent of the map unit.

Permeability is moderate in the Winton soil. Available water capacity also is moderate. Seepage results in wetness. Reaction is extremely acid to moderately acid, except where the surface layer has been limed. The seasonal high water table is 2 to 4 feet below the surface.

Most of the acreage is used as woodland. The rest is used mainly as pasture.

This soil is not generally used as cropland. The slope and rapid runoff are limitations.

The dominant native trees are southern red oak, sweetgum, American beech, red maple, and loblolly pine. The understory is mainly dogwood, American holly, and sourwood. The main management concerns are the slope, the hazard of erosion, and an equipment limitation. Rills and gullies can form on steep landings, skid trails, and firebreaks unless adequate water bars, a plant cover, or both are provided.

The slope is the main limitation affecting urban and recreational uses.

The capability subclass is VIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 10R.

Prime Farmland

In this section, prime farmland is defined and the soils in Gates County that are considered prime farmland are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 8 percent.

The following map units are considered prime farmland in Gates County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Some soils that have a high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. If applicable, the need for these measures is indicated in parentheses after the map unit name in the following list. Onsite evaluation is necessary to determine whether or not limitations have been overcome by corrective measures.

The soils identified as prime farmland in Gates County are:

AtA	Altavista fine sandy loam, 0 to 3 percent slopes
CrA	Craven fine sandy loam, 0 to 1 percent slopes
CrB	Craven fine sandy loam, 1 to 4 percent slopes
CrC	Craven fine sandy loam, 4 to 8 percent slopes
ExA	Exum silt loam, 0 to 2 percent slopes
GoA	Goldsboro fine sandy loam, 0 to 3 percent slopes
IcA	Icaria fine sandy loam, 0 to 2 percent slopes (where drained)
LyA	Lynchburg fine sandy loam, 0 to 2 percent slopes (where drained)
NoA	Noboco fine sandy loam, 0 to 2 percent slopes
NoB	Noboco fine sandy loam, 2 to 6 percent slopes
PnA	Pantego fine sandy loam, 0 to 2 percent slopes (where drained)
RaA	Rains fine sandy loam, 0 to 2 percent slopes (where drained)

StA State fine sandy loam, 0 to 2 percent slopes
StB State fine sandy loam, 2 to 6 percent slopes
ToA Tomotley fine sandy loam, 0 to 2 percent slopes (where drained)

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Generally, the soils in Gates County that are well suited to crops also are well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Bobby Brock, conservation agronomist, and Paul Boone, district conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Natural Resources Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension Service.

The acreage available for crop production in Gates County has decreased in the last 10 years. An increase in the acreage of pine plantations has accounted for most of the change in the acreage used as cropland.

In 1987, Gates County had about 39,172 acres of cropland and 650 acres of pasture and hayland. Corn was grown on 15,592 acres; tobacco on 95 acres; peanuts on 6,973 acres; soybeans on 12,682 acres; cotton on 2,204 acres; and small grain on 933 acres. All other crops make up the remaining 693 acres. The pasture and hayland is planted almost entirely to tall fescue *(9)*.

Erosion

Erosion is a management concern affecting some areas of cropland in the county. It is most serious in areas of the Craven soils that have a slope of more than 2 percent. Other soils on which slope affects erosion are Noboco, State, and Winton soils. Bonneau, Alaga, Pactolus, Tomahawk, Valhalla, and Conetoe soils are subject to soil blowing.

Erosion is costly for various reasons. As the surface layer is washed away, productivity decreases and tilth deteriorates. Costly and potentially harmful herbicides, fertilizers, and lime are carried out of the field along with valuable topsoil and organic matter. Social and environmental costs increase if the eroded materials are deposited into streams, rivers, and lakes. Effectively controlling erosion increases agricultural productivity and minimizes the cost of maintaining water quality.

An erosion control system provides protective surface cover, helps to control runoff, and increases infiltration. A cropping system that maintains a plant cover for an extended period can keep losses due to erosion to amounts that do not reduce the productive capacity of the soil.

Establishing parallel terraces and contour tillage systems in areas of the sloping soils, such as Craven and State soils, are difficult because of the short, irregular slopes. The larger equipment used by producers presents problems. On these soils, conservation tillage effectively controls erosion; therefore, a conservation cropping system that leaves a substantial plant cover should be used. Grassed waterways, generally planted to tall fescue, provide safe disposal of surface water runoff. Field borders of fescue help filter sediments from runoff water.

A compacted traffic pan has formed between the surface layer and subsoil in several of the soils in the county. A traffic pan is common in Bonneau, Noboco, Goldsboro, Conetoe, State, Altavista, Valhalla, Tomahawk, and Craven soils. It reduces infiltration, root penetration, and permeability. It increases the hazard of erosion on sloping soils. A conservation tillage system that uses rippers, subsoilers, and chisels is effective in reducing the occurrence of a traffic pan. The formation of a traffic pan increases with the number of trips across the field and the wetness of the field during tillage.

Soil blowing is commonly a problem in areas of soils that have a surface layer of sand or loamy sand. In the county, many tons of topsoil are lost from Bonneau, Alaga, Pactolus, Tomahawk, Valhalla, and Conetoe soils each year, often generally during March, April, and May. Damage from soil blowing can be greatly reduced by using a conservation cropping system that includes cover crops and crop residue management. Wind damage to young seedlings can occur in any given year. Tall growing small grain used as a windbreak reduces the damage to young seedlings. A windbreak consisting of pine, shrub, and understory species reduces soil blowing in large, open areas.

Information on the design and applicability of wind and water erosion control measures for each kind of soil can be obtained from the local office of the Natural Resources Conservation Service.

Drainage

Excessive wetness is a problem on a large part of the cropland in Gates County. The very poorly drained, poorly drained, and somewhat poorly drained soils require an extensive drainage system of open ditches, subsurface drainage, and land smoothing, which are needed for the successful production of crops, such as corn, soybeans, and small grain. Examples of such soils are Pantego, Rains, Lynchburg, Bladen, Cape Fear, Lenoir, Tomotley, Roanoke, and Icaria soils. Peanuts and tobacco can be grown in areas of the moderately well drained Goldsboro, Exum, and Craven soils that have an adequate system of surface and subsurface drainage.

Most of the wet soils could be used for crop production if a drainage system is installed. The clayey Roanoke, Bladen, Lenoir, and Craven soils respond more slowly than the other wet soils. A subsurface drainage system is generally not recommended for these soils.

Tilth is a very important factor affecting crop production. Seed germination and water infiltration are highly influenced by tilth. Soils that have good tilth have a granular, porous surface layer, have a reasonable organic matter content, do not crust or seal readily, are easily worked, and allow free movement of water and air through the root bed. Soils that have a surface layer of loamy fine sand or fine sandy loam generally have better tilth than soils that have a surface layer of loam or silt loam. Examples of soils that have a surface layer of loam or silt loam are Bladen, Craven, Exum, Rains, and Lenoir soils. These soils are subject to crusting after rainfall. The use of conservation tillage and cover crops or the addition of crop residue, manure, and mulch reduces crusting and improves tilth. The poorly drained and somewhat poorly drained soils, such as Bladen, Tomotley, Rains, Lynchburg, and Lenoir soils, generally have poor tilth if they are worked during wet periods. If these soils are plowed during wet periods, clods form when they dry. The clods make seedbed preparation difficult.

Chemical Weed Control

The use of herbicides for weed control is a common practice on the cropland in Gates County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates of both of these properties were determined for the soils in the county. Table 14 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 13.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter determinations.

Soil Fertility

The soils in Gates County generally are low in natural fertility. They are naturally acid. Additions of lime and fertilizer are needed for the production of most kinds of crops.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for peanuts and clover, in some rotations of soybeans, or for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. They are needed because phosphorus and potassium tend to build up in the soil.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of about 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by a crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans or peanuts, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

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

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

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or of the North Carolina Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland *(15)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of each map unit component is given in the section "Detailed Soil Map Units" and in table 5.

Woodland Management and Productivity

James H. Ware, forester, Natural Resources Conservation Service, helped prepare this section.

Woodland managers in Gates County are faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand; propagating the more productive species and genetic varieties; providing short rotations and complete fiber utilization; controlling insects, diseases, and weeds; and improving tree growth by applications of fertilizer and the installation of a drainage system. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture. This goal is to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover more than 145,500 acres, or about 67 percent of the land area in Gates County *(14).* Commercial forest is land that is producing or is capable of producing crops of industrial wood and that has not been withdrawn from timber production. Loblolly pine is the most important timber species in the county because it grows fast, is adapted to the soil and climate, brings the highest average sale value per acre, and is easy to establish and manage.

For purposes of forest inventory, the four commercial forest types identified in Gates County are described in the following paragraphs *(14).*

Loblolly-shortleaf pine. This forest type covers 52,954 acres. It is more than 50 percent loblolly pine or shortleaf pine. The common associated species include red oak, white oak, gum, hickory, and yellow-poplar.

Oak-pine. This forest type covers 9,659 acres. It is more than 50 percent hardwoods, but pines make up 25 to 50 percent. The common associated species include upland oaks, gum, hickory, and yellow-poplar.

Oak-hickory. This forest type covers 24,155 acres. It is more than 50 percent upland oaks and hickory. The common associated species include elm, maple, yellow-poplar, and black walnut.

Oak-gum-cypress. This forest type covers 58,755 acres. Tupelo, blackgum, sweetgum (fig. 10), oak, or cypress make up most of the stocking. The common associated species include cottonwood, willow, ash, elm, hackberry, and red maple.

Figure 10.—A sweetgum plantation in an area of Bladen loam, 0 to 2 percent slopes.

One of the first steps in planning intensive woodland management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valued trees are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. The common forest understory plants also are listed. Table 6 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

Table 6 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On the steepest slopes, even tracked equipment cannot be operated and more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. Plant competition is more severe on the more productive soils, on poorly drained soils, and on soils having a restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants hinders adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants hinders natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A moderate or severe rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers should plan site preparation measures to ensure timely reforestation.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. Common trees are listed in the order of their observed general occurrence. The table lists four to six trees for each applicable map unit. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey is mainly based on loblolly pine, water tupelo, blackgum, and sweetgum *(4, 6, 17)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Productivity of a site can be improved through management practices, such as bedding, ditching, managing water, applying fertilizer, and planting genetically improved species.

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation.

Recreation

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, 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 campsites.

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

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

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

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

John P. Edwards, biologist, Natural Resources Conservation Service, helped prepare this section.

Habitat for wildlife in Gates County ranges from bottom land hardwoods to upland hardwoods. The county contains an abundance of excellent wildlife and fisheries habitat. The wildlife habitat is a combination of agricultural land, woodland, stream courses, and riparian wetlands. Wildlife species reflect this habitat diversity, with an abundance of deer, rabbits, squirrels, quail, dove, and ducks throughout the area.

Important soils on uplands used as wildlife habitat are Altavista, Conetoe, State, Tomahawk, Valhalla, Goldsboro, Noboco, Lynchburg, Craven, Bonneau, and Exum soils. Agricultural production on these soils is good. The primary crops are soybeans, cotton, peanuts, corn, and wheat. Such wildlife species as quail, rabbits, and doves readily adapt to this land use if all their habitat requirements are present. Also, deer have readily adapted to these agricultural land uses, and their populations in the farmed area are moderate to high where farmland is interspersed with woodland. An abundance of edge habitat in the county also favors most resident wildlife species.

Wetland wildlife habitat in the county is primarily in wooded swamps and bog areas. The dominant trees in the wooded swamps are baldcypress, water tupelo, gum, swamp blackgum, and willow oak. Chowan, Dorovan, Ballahack, and Nawney soils are in the wooded swamps. Pond pine, sphagnum moss, titi, redbay, Atlantic white-cedar, red maple, sweetgum, sweetbay, and gallberry are dominant in the bog areas. Cape Fear, Dorovan, Pungo, and Belhaven soils are in these areas.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in the table are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

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

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and wheatgrass.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, cypress, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wild rice, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail rabbit, and gray fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, white-tailed deer, and black bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

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

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. The depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Gates Soil and Water Conservation District or the local office of the North Carolina Cooperative Extension Service.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfill. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation should be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. These soils have layers of suitable material, but the material is less than 3 feet thick.

Sand is a natural aggregate suitable for commercial use with a minimum of processing. It is used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Small coarse fragments of soft bedrock, such as shale, siltstone, and weathered granite saprolite, are not considered to be sand.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, and terraces and diversions.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability in the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the soil maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, mica, or salts or sodium. The depth to a high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability in the aquifer. The depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, susceptibility to flooding, subsidence of organic layers, and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock. The performance of a system is affected by the availability of suitable irrigation water, the depth of the root zone, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. Maintenance of terraces and diversions is adversely affected by a restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 16.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 16.

Rock fragments from 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

The shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low,* a change of less than 3 percent; *moderate,* 3 to 6 percent; and *high,* more than 6 percent. *Very high,* more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

If a soil listed in table 15 is assigned to two hydrologic groups, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent*; and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that it is within a depth of 6 feet for less than a month.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 15 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors. Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 16 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the North Carolina Department of Transportation and Highway Safety, Materials and Test Unit, Raleigh, North Carolina.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 4318 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(16)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Ochraquults (*Ochr*, meaning presence of an ochric epipedon, plus *aquic*, the suborder of the Ultisols that has an aquic moisture regime).

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

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

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

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described, and coordinates generally are identified by the State plane grid system. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(18)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(16)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alaga Series

The Alaga series consists of well drained and somewhat excessively drained soils that formed in sandy fluvial and marine sediments. Slopes range from

0 to 5 percent. These soils are thermic, coated Typic Quartzipsamments.

Alaga soils are commonly adjacent to Pactolus, Leon, and Nawney soils. Pactolus soils are moderately well drained and somewhat poorly drained. Leon and Nawney soils are poorly drained. Leon soils have a spodic horizon. Nawney soils are on flood plains.

Typical pedon of Alaga sand, 0 to 5 percent slopes; about 2.9 miles northwest of Storys, 70 feet southwest of the intersection of Secondary Roads 1201 and 1200 (State plane coordinates 2,607,100 feet E., 996,100 feet N.):

A—0 to 5 inches; dark grayish brown (10YR 4/2) sand; single grained; loose; common fine and medium roots; extremely acid; clear smooth boundary.

C1—5 to 65 inches; brownish yellow (10YR 6/8) sand; single grained; loose; few opaque minerals; extremely acid; clear smooth boundary.

C2—65 to 75 inches; strong brown (7.5YR 5/8) sand; single grained; loose; few opaque minerals; extremely acid; clear smooth boundary.

C3—75 to 99 inches; yellow (10YR 7/8) sand; single grained; loose; few opaque minerals; extremely acid.

The sandy material is more than 80 inches thick. Reaction ranges from extremely acid to moderately acid throughout, except where the surface layer has been limed.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 or 3.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 3 to 8. It is sand, fine sand, loamy sand, or loamy fine sand.

Altavista Series

The Altavista series consists of moderately well drained soils that formed in loamy fluvial and marine sediments. Slopes range from 0 to 3 percent. These soils are fine-loamy, mixed, thermic Aquic Hapludults.

Altavista soils are commonly adjacent to Conetoe, State, Tomotley, and Roanoke soils. Conetoe soils are arenic. Conetoe and State soils are well drained. Tomotley and Roanoke soils are poorly drained. Roanoke soils have a clayey particle-size class.

Typical pedon of Altavista fine sandy loam, 0 to 3 percent slopes; about 3.9 miles northwest of Gatesville, about 1.5 miles southwest of the intersection of Secondary Road 1116 and U.S. Highway 158, about 360 feet north of Secondary Road 1116, in a cultivated field (State plane coordinates 2,650,800 feet E., 980,200 feet N.):

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

Bt1—9 to 16 inches; light yellowish brown (2.5Y 6/4) loam; few fine distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—16 to 25 inches; light yellowish brown (2.5Y 6/4) loam; common fine distinct brownish yellow (10YR 6/6) and few fine faint light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg1—25 to 32 inches; gray (10YR 6/1) sandy clay loam; common medium faint light yellowish brown (10YR 6/4) and common medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg2—32 to 40 inches; light gray (10YR 7/2) sandy loam; few medium faint light yellowish brown (10YR 6/4) and few fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; extremely acid; clear smooth boundary.

Cg1—40 to 55 inches; light gray (10YR 7/1) sand; single grained; loose; few fine flakes of mica; few fine opaque minerals; extremely acid; clear smooth boundary.

Cg2—55 to 72 inches; light gray (2.5Y 7/2) sand; common coarse faint pale yellow (2.5Y 7/4) and few medium distinct strong brown (7.5YR 5/8) mottles; single grained; loose; few fine flakes of mica; few fine opaque minerals; extremely acid.

The thickness of the solum ranges from 30 to more than 60 inches. Reaction ranges from extremely acid to moderately acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. In some pedons the lower part has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. Mottles are in shades of red, brown, yellow, or gray. It is loam, sandy clay loam, clay loam, or sandy loam.

The BC horizon, if it occurs, has the same colors as those of the Bt horizon, or has a gray matrix, or is mottled. It is sandy loam, fine sandy loam, loam, sandy clay loam, loamy fine sand, or loamy sand.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 5 to 7. Mottles are in shades of red, brown, yellow, or gray. The texture is similar to that of the Bt horizon.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 8, or it is mottled. It is sandy or loamy material. In some pedons, this horizon has thin strata of clay.

Ballahack Series

The Ballahack series consists of very poorly drained soils that formed in loamy fluvial and marine sediments. Slopes range from 0 to 2 percent. These soils are fine-loamy, mixed, acid, thermic Cumulic Humaquepts.

Ballahack soils are commonly adjacent to Chowan, Nawney, and Dorovan soils. Chowan soils have a buried organic horizon. Nawney soils are poorly drained. Dorovan soils are organic throughout the profile.

Typical pedon of Ballahack loam, 0 to 2 percent slopes, occasionally flooded; about 0.6 mile southeast of Storys, about 0.3 mile southwest of the intersection of North Carolina Highway 137 and Secondary Road 1128, about 100 feet east of Secondary Road 1128 (State plane coordinates 2,622,800 feet E., 980,500 feet N.):

A—0 to 35 inches; black (10YR 2/1) loam; weak medium granular structure; friable; common fine roots; very strongly acid; clear smooth boundary.

Cg1—35 to 55 inches; dark grayish brown (2.5Y 4/2) sandy clay loam; massive; friable; few fine roots; very strongly acid; clear smooth boundary.

Cg2—55 to 70 inches; dark grayish brown (2.5Y 4/2) sand; massive; single grained; loose; very strongly acid.

The loamy material ranges from 40 to more than 60 inches thick. Reaction is very strongly acid or strongly acid throughout, except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2.

The Cg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It ranges from sand to sandy clay and is commonly sandy clay loam, sandy loam, or sand.

Belhaven Series

The Belhaven series consists of very poorly drained soils that formed in organic material over loamy marine and fluvial sediments. Slopes range from 0 to 2 percent. These soils are loamy, mixed, dysic, thermic Terric Medisaprists.

Belhaven soils are commonly adjacent to Pungo and Cape Fear soils. Pungo soils are organic to a depth of more than 51 inches. Cape Fear soils have a clayey particle-size class.

Typical pedon of Belhaven muck, 0 to 2 percent slopes; about 2.8 miles northeast of Corapeake, about 1.0 mile north of the intersection of Secondary Roads 1332 and 1333, about 1.0 mile east of the intersection of Secondary Road 1333 and the Corapeake entrance to the Great Dismal Swamp National Wildlife Refuge, about 50 feet south of the entrance road, in a wooded area (State plane coordinates 2,722,650 feet E., 1,027,400 feet N.):

Oa—0 to 20 inches; muck, dark reddish brown (5YR 2/2) broken face and rubbed; about 15 percent fibers, less than 1 percent rubbed; about 20 percent mineral material; weak medium granular structure; friable, slightly sticky; many fine roots and stems; about 20 percent wood fragments; extremely acid; clear smooth boundary.

A—20 to 24 inches; very dark brown (10YR 2/2) mucky loam; massive; friable, slightly sticky; extremely acid; clear smooth boundary.

Cg1—24 to 40 inches; dark grayish brown (10YR 4/2) sandy clay loam; massive; slightly sticky; extremely acid; clear smooth boundary.

Cg2—40 to 65 inches; dark gray (N 4/0) clay loam; massive; slightly sticky; very strongly acid; clear smooth boundary.

Cg3—65 to 72 inches; gray (10YR 5/1) sandy loam; massive; friable; very strongly acid.

The organic material typically is 16 to 30 inches thick. In some pedons, however, it is as much as 51 inches thick. The organic horizons are extremely acid, except where the surface layer has been limed. The underlying mineral horizons are extremely acid to slightly acid. The content of logs, stumps, and wood fragments ranges from 5 to 35 percent in the organic horizons.

The surface layer has hue of 5YR to 5Y, value of 2 or 3, and chroma of 1 or 2. The lower tier of organic material has hue of 2.5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. It has hue of 5YR or 2.5YR in 10 inches or more. The content of fiber throughout the organic material is 15 to 45 percent before rubbing and less than 10 percent after rubbing. In undrained areas the lower tier is pastelike; has a greasy, colloidal consistence; and is massive. In drained areas, the structure of the organic material evolves because of aeration. Excessive drying causes shrinkage and the formation of hard, subangular blocky peds. These peds dry irreversibly.

The A horizon has hue of 2.5YR to 5Y, value of 2 or 3, and chroma of 1 or 2. It is loam, fine sandy loam, sandy loam, or mucky loam.

The Cg horizon has hue of 2.5YR to 5Y, value of 3 to 7, and chroma of 1 to 3, or it is neutral in hue and has value of 3 to 7. It is loamy in the upper part and sandy or loamy in the lower part.

Bladen Series

The Bladen series consists of poorly drained soils that formed in clayey marine sediments. Slopes range from 0 to 2 percent. These soils are clayey, mixed, thermic Typic Albaquults.

Bladen soils are commonly adjacent to Rains, Pantego, Lenoir, Craven, Goldsboro, and Exum soils. Rains soils have a fine-loamy particle-size class. Pantego soils are very poorly drained and have a fine-loamy particle size class. Lenoir soils are somewhat poorly drained. Craven, Goldsboro, and Exum soils are moderately well drained. Goldsboro soils have a fine-loamy particle-size class. Exum soils have a fine-silty particle-size class.

Typical pedon of Bladen loam, 0 to 2 percent slopes; about 1.8 miles northeast of Eure, about 0.25 mile west of the intersection of Secondary Roads 1118 and 1113, about 0.3 mile northwest of Secondary Road 1113 on a logging path, 30 feet northeast of the logging path (State plane coordinates 2,640,700 feet E., 987,200 feet N.):

A—0 to 9 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; common fine and medium roots; few fine vesicular pores; extremely acid; clear smooth boundary.

Btg1—9 to 12 inches; grayish brown (10YR 5/2) clay loam; few medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm, slightly sticky and slightly plastic; common fine and few medium and coarse roots; few fine vesicular pores; extremely acid; clear smooth boundary.

Btg2—12 to 37 inches; dark gray (10YR 4/1) clay; common medium distinct brownish yellow (10YR 6/8) mottles; strong coarse prismatic structure parting to coarse angular and subangular blocky; firm, sticky and plastic; few fine roots; few fine vesicular pores; many distinct dark gray (10YR 4/1) clay films on faces of peds; extremely acid; clear smooth boundary.

Btg3—37 to 53 inches; grayish brown (10YR 5/2) clay; common medium distinct brownish yellow (10YR 6/8) and light gray (10YR 7/2) mottles; moderate coarse subangular blocky structure; firm, sticky and plastic; many distinct gray (10YR 5/1) clay films on faces of peds; extremely acid; clear wavy boundary.

Btg4—53 to 64 inches; light olive gray (5Y 6/2) clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; moderate fine subangular blocky structure; firm, slightly sticky and slightly plastic; few distinct grayish brown (10YR 5/2) clay films on faces of peds; extremely acid; clear wavy boundary.

BCg—64 to 90 inches; light gray (10YR 7/2) clay loam; few fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct gray (10YR 6/1) clay films on faces of peds; extremely acid.

The solum is more than 60 inches thick. Reaction ranges from extremely acid to strongly acid throughout the profile, except where the surface layer has been limed.

The A or Ap horizon has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. The E horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is fine sandy loam, loam, or silt loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. Mottles are in shades of red, brown, gray, or yellow. It is clay, silty clay loam, sandy clay, or clay loam.

The BCg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. It is sandy clay loam, clay loam, or clay.

Some pedons have a Cg horizon below a depth of 60 inches. It has colors similar to those of the BCg horizon. The Cg horizon varies in texture or is stratified with sandy to clayey material.

Bonneau Series

The Bonneau series consists of well drained soils that formed in loamy marine sediments. Slopes range from 0 to 6 percent. These soils are loamy, siliceous, thermic Arenic Paleudults.

Bonneau soils are commonly adjacent to Noboco, Goldsboro, Craven, and Winton soils. Noboco and Goldsboro soils do not have a sandy surface layer that is 20 to 40 inches thick. Goldsboro, Craven, and Winton soils are moderately well drained. Craven soils have a clayey particle-size class. Winton soils are on slopes of more than 6 percent.

Typical pedon of Bonneau loamy fine sand, 0 to 6 percent slopes; about 1.6 miles north of Reynoldson, about 0.6 mile north of the intersection of Secondary Roads 1213 and 1214, about 0.8 mile west of

Secondary Road 1213 on a logging path, 0.3 mile south on a second logging path, 30 feet east of the second logging path, in a wooded area (State plane coordinates 2,647,800 feet E., 1,024,300 feet N.):

A—0 to 2 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable; many fine and very fine roots; extremely acid; clear smooth boundary.

E—2 to 27 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak fine granular structure; very friable; few fine and medium roots; extremely acid; clear smooth boundary.

Bt1—27 to 51 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few medium roots; sand grains coated and bridged with clay; extremely acid; clear wavy boundary.

Bt2—51 to 62 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium distinct light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable; few medium roots; few faint clay films on faces of peds; extremely acid; clear wavy boundary.

Bt3—62 to 72 inches; strong brown (7.5YR 5/6) sandy clay loam; few fine prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; extremely acid.

The thickness of the solum ranges from 60 to 80 inches. Reaction ranges from extremely acid to slightly acid in the A and E horizons, except where the surface layer has been limed. It ranges from extremely acid to moderately acid in the B horizon.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 to 4, or it is neutral in hue and has value of 3 to 5.

The E horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 2 to 6. It is loamy sand, loamy fine sand, fine sand, or sand.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. The lower part has mottles in shades of gray, brown, red, or yellow. Mottles that have chroma of 2 or less are within a depth of 60 inches. The texture is fine sandy loam, sandy loam, or sandy clay loam. In some pedons it is sandy clay.

Cape Fear Series

The Cape Fear series consists of very poorly drained soils that formed in clayey and loamy fluvial and marine sediments. Slope ranges from 0 to 2 percent. These soils are clayey, mixed, thermic Typic Umbraquults.

Cape Fear soils are commonly adjacent to Belhaven and Roanoke soils. Belhaven soils have an organic horizon. Roanoke soils are poorly drained.

Typical pedon of Cape Fear loam, 0 to 2 percent slopes; about 2.0 miles northeast of Holly Grove, about 1.3 miles southeast of the intersection of Secondary Roads 1332 and 1318, about 1,600 feet east of Secondary Road 1332, in a wooded area (State plane coordinates 2,722,700 feet E., 1,019,900 feet N.):

A—0 to 13 inches; black (10YR 2/1) loam; weak medium granular structure; friable; common fine and medium roots; extremely acid; abrupt smooth boundary.

Btg1—13 to 30 inches; dark grayish brown (10YR 4/2) clay loam; fine medium distinct yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; firm, sticky and plastic; few fine and medium roots; common distinct dark gray (10YR 4/1) clay films on faces of peds; few fine flakes of mica; black (10YR 2/1) A material in root channels; extremely acid; clear smooth boundary.

Btg2—30 to 41 inches; light gray (10YR 7/1) clay; common medium distinct strong brown (7.5YR 5/8) and grayish brown (10YR 5/2) mottles; weak fine subangular blocky structure; firm, sticky and plastic; few fine and medium roots; few distinct gray (10YR 6/1) clay films on faces of peds; few fine flakes of mica; few fine opaque minerals; extremely acid; clear smooth boundary.

Cg1—41 to 50 inches; grayish brown (10YR 5/2) sandy loam; massive; friable; common fine flakes of mica; few fine opaque minerals; pockets of sandy clay loam; moderately acid; gradual smooth boundary.

Cg2—50 to 72 inches; light brownish gray (10YR 6/2) sandy loam; massive; friable; few fine flakes of mica; few fine opaque minerals; moderately acid.

The thickness of the solum ranges from 30 to more than 60 inches. Reaction ranges from extremely acid to moderately acid throughout the profile, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. In some pedons it has few or common higher chroma mottles. It is clay, sandy clay, clay loam, loam, or sandy clay loam.

The Cg or 2Cg horizon has hue of 10YR to 5Y or 5GY to 5BG, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. It is sandy loam, loam, loamy sand, or sand.

Chowan Series

The Chowan series consists of poorly drained mineral horizons over highly decomposed organic material. Slopes range from 0 to 2 percent. These soils are fine-silty, mixed, nonacid, thermic Thapto-Histic Fluvaquents.

Chowan soils are commonly adjacent to Nawney and Dorovan soils. Nawney soils are mineral throughout the profile. Dorovan soils are organic throughout the profile.

Typical pedon of Chowan loam, 0 to 2 percent slopes, frequently flooded; about 0.4 mile south of Corapeake on North Carolina Highway 32, about 100 feet east of North Carolina Highway 32 (State plane coordinates 2,565,100 feet E., 1,015,800 feet N.):

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

Cg1—6 to 30 inches; dark gray (10YR 4/1) loam; massive; friable, slightly sticky and slightly plastic; many fine and very fine roots; strongly acid; clear smooth boundary.

Cg2—30 to 35 inches; very dark grayish brown (10YR 3/2) loam; massive; friable, sticky and slightly plastic; extremely acid; clear smooth boundary.

2Oa—35 to 72 inches; dark reddish brown (5YR 3/2) muck; about 25 percent fibers, less than 2 percent rubbed; massive; sticky; common logs and stumps; extremely acid.

The surface mineral horizon is 16 to 40 inches thick. The underlying horizons range from 16 to more than 80 inches thick. Reaction ranges from extremely acid to moderately acid in the mineral horizons. It is extremely acid or very strongly acid in the organic horizons.

The A horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. In pedons where the value is less than 3.5, the horizon is less than 10 inches thick.

The Cg horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. It is loam, silt loam, silty clay loam, or mucky silt loam.

The 2Oa horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3. It is 16 inches to several feet thick. In most pedons it has common stumps and logs.

The 2Cg horizon, if it occurs, has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. It is dominantly loam.

Conetoe Series

The Conetoe series consists of well drained soils that formed in loamy and sandy fluvial and marine sediments. Slopes range from 0 to 5 percent. These soils are loamy, mixed, thermic Arenic Hapludults.

Conetoe soils are commonly adjacent to State, Altavista, and Icaria soils. State soils do not have a sandy surface layer that is 20 to 40 inches thick. Altavista soils are moderately well drained. Icaria soils are very poorly drained.

Typical pedon of Conetoe fine sand, 0 to 5 percent slopes; at Carter, about 60 feet northeast of the intersection of Secondary Roads 1100 and 1104, in a cultivated field (State plane coordinates 2,681,800 feet E., 956,900 feet N.):

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; very friable; few fine and medium roots; strongly acid; clear smooth boundary.

E—7 to 22 inches; yellowish brown (10YR 5/4) loamy fine sand; weak fine granular structure; very friable; very strongly acid; clear smooth boundary.

Bt1—22 to 30 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; very friable; sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

Bt2—30 to 41 inches; strong brown (7.5YR 5/6) sandy loam; weak fine subangular blocky structure; very friable; sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

C1—41 to 49 inches; reddish yellow (7.5YR 6/8) fine sand; single grained; loose; very strongly acid; gradual wavy boundary.

C2—49 to 72 inches; very pale brown (10YR 7/4) fine sand; single grained; loose; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Reaction ranges from very strongly acid to moderately acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 3. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. It is loamy sand, fine sand, loamy fine sand, or sand.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8. It is typically sandy loam or fine sandy loam, but some pedons have thin layers of loamy sand or sandy clay loam.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon. It is loamy sand or loamy fine sand.

The C horizon has hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8. It is loamy sand, loamy fine sand, fine sand, or sand.

Craven Series

The Craven series consists of moderately well drained soils that formed in clayey marine sediments. Slopes range from 0 to 8 percent. These soils are clayey, mixed, thermic Aquic Hapludults.

Craven soils are commonly adjacent to Lenoir, Bladen, Goldsboro, Exum, and Winton soils. Lenoir soils are somewhat poorly drained. Bladen soils are poorly drained. Goldsboro soils have a fine-loamy particle-size class. Exum soils have a fine-silty particle-size class. Winton soils have a fine-loamy particle-size class and have slopes of more than 8 percent.

Typical pedon of Craven fine sandy loam, 0 to 1 percent slopes; about 0.9 mile south of Easons Crossroads, about 0.2 mile north of the intersection of Secondary Roads 1400 and 1403, about 30 feet east of Secondary Road 1403, in a cultivated field (State plane coordinates 2,676,200 feet E., 985,600 feet N.):

Ap—0 to 8 inches; pale brown (10YR 6/3) fine sandy loam; weak medium granular structure; friable; common fine roots; very strongly acid; clear smooth boundary.

Bt1—8 to 13 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; extremely acid; clear smooth boundary.

Bt2—13 to 21 inches; yellowish brown (10YR 5/4) clay; few fine distinct gray (10YR 5/1) and common fine distinct reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct yellowish brown (10YR 5/4) clay films on faces of peds; few fine flakes of mica; extremely acid; clear wavy boundary.

Bt3—21 to 32 inches; yellowish brown (10YR 5/6) clay; common medium distinct gray (10YR 6/1), many medium distinct reddish yellow (7.5YR 6/8), and few medium prominent red (2.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; many distinct grayish brown (2.5Y 5/2) clay films on faces of peds; few fine flakes of mica; extremely acid; clear wavy boundary.

Bt4—32 to 37 inches; yellowish brown (10YR 5/6) clay; many medium distinct light gray (10YR 7/2) and common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; many distinct light yellowish brown (2.5Y 6/4) clay films on faces of peds; few fine flakes of mica; extremely acid; gradual wavy boundary.

Btg—37 to 51 inches; light gray (10YR 7/2) clay loam; common distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; firm, sticky and plastic; few distinct grayish brown (2.5Y 5/2) clay films on faces of peds; few fine flakes of mica; extremely acid; gradual wavy boundary.

Cg—51 to 61 inches; light brownish gray (10YR 6/2) loam; few medium distinct brownish yellow (10YR 6/8) and few fine distinct reddish yellow (7.5YR 6/8) mottles; massive; firm; lenses of clay loam between peds; few fine flakes of mica; extremely acid; gradual wavy boundary.

C—61 to 72 inches; brownish yellow (10YR 6/6) sandy loam; few fine distinct gray (10YR 6/1) and strong brown (7.5YR 5/8) mottles; massive; very friable; lenses of sandy clay loam between peds; few fine flakes of mica; extremely acid.

The thickness of the solum ranges from 40 to more than 60 inches. Reaction is extremely acid to strongly acid throughout, except where the surface layer has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 3. The E horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 4. It is fine sandy loam or loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. Mottles are in shades of yellow, brown, gray, or red. It is dominantly clay, clay loam, or silty clay, but some pedons have thin layers of sandy clay loam or loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2 and has mottles in shades of red, yellow, or brown. It is clay, clay loam, or silty clay.

The BC horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or more and mottles that have chroma of 2 or less. It is silty clay loam, clay loam, silty clay, clay, sandy clay, or sandy clay loam.

The C or Cg horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 6. It is loam, sandy clay loam, sandy loam, or loamy sand.

Dorovan Series

The Dorovan series consists of very poorly drained organic soils. The organic layers are more than 51 inches thick over unconsolidated fluvial sediments. Slopes range from 0 to 2 percent. These soils are dysic, thermic Typic Medisaprists.

Dorovan soils are commonly adjacent to Nawney and Chowan soils. Nawney soils are mineral throughout the profile. Chowan soils have a buried muck horizon.

Typical pedon of Dorovan mucky peat, 0 to 2 percent slopes, frequently flooded; about 3.2 miles southeast of Storys, about 0.5 mile south of the intersection of Secondary Roads 1120 and 1118, about 15 feet west of

Secondary Road 1120 (State plane coordinates 2,633,400 feet E., 972,000 feet N.):

Oe—0 to 2 inches; very dark brown (10YR 2/2) mucky peat consisting of partly decomposed leaves, twigs, and stems; about 50 percent fiber after rubbing; very friable; extremely acid; clear wavy boundary.

Oa—2 to 72 inches; dark reddish brown (5YR 3/2) muck; about 12 percent fiber unrubbed, less than 2 percent rubbed; massive; friable; many fine and coarse roots; extremely acid.

The organic material ranges from 51 to more than 80 inches thick. Reaction is extremely acid in the organic layers and very strongly acid or strongly acid in the Cg horizon.

The Oe horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. It has 40 to 90 percent fiber, unrubbed, and 20 to 60 percent, rubbed.

The Oa horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3. It has 10 to 40 percent fiber, unrubbed, and less than ⅙ of the volume when rubbed.

The Cg horizon, if it occurs, has hue of 10YR to 5Y, value of 3 to 5, and chroma of 1 or 2. It is sand, fine sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, or clay.

Exum Series

The Exum series consists of moderately well drained soils that formed in loamy marine sediments. Slopes range from 0 to 2 percent. These soils are fine-silty, siliceous, thermic Aquic Paleudults.

Exum soils are commonly adjacent to Goldsboro, Craven, Lynchburg, Bladen, and Rains soils. Goldsboro soils have a fine-loamy particle-size class. Craven soils have a clayey particle-size class. Lynchburg soils have a fine-loamy particle-size class and are somewhat poorly drained. Bladen and Rains soils are poorly drained. Bladen soils have a clayey particle-size class. Rains soils have a fine-loamy particle-size class.

Typical pedon of Exum silt loam, 0 to 2 percent slopes; about 3.0 miles southeast of Sunbury, about 0.9 mile east of the intersection of Secondary Road 1428 and North Carolina Highway 32, about 50 feet north of Secondary Road 1428, in a cultivated field (State plane coordinates 2,709,250 feet E., 976,400 feet N.):

Ap—0 to 9 inches; brown (10YR 5/3) silt loam; weak fine granular structure; very friable; few fine roots; strongly acid; clear smooth boundary.

Bt1—9 to 19 inches; brownish yellow (10YR 6/6) silt loam; moderate medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—19 to 30 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and few medium prominent red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg1—30 to 38 inches; grayish brown (10YR 5/2) clay loam; common medium distinct yellowish brown (10YR 5/4) and few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg2—38 to 55 inches; grayish brown (2.5Y 5/2) sandy clay loam; many medium distinct brownish yellow (10YR 6/6) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; few fine flakes of mica; extremely acid; clear smooth boundary.

Btg3—55 to 63 inches; light brownish gray (2.5Y 6/2) sandy clay loam; many medium prominent strong brown (7.5YR 5/8) and common medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine flakes of mica; extremely acid; clear smooth boundary.

BC—63 to 72 inches; light yellowish brown (2.5Y 6/4) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) and light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky; few thin lenses of sandy loam; few fine flakes of mica; extremely acid.

The thickness of the solum ranges from 60 to 90 inches. Reaction is extremely acid to moderately acid in the A and E horizons, except where the surface layer has been limed. It is extremely acid to strongly acid in the B horizon.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 1 to 3. Where the value is 3, the horizon is less than 7 inches thick.

The E horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 4. It is silt loam, loam, or very fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. Mottles that have chroma of 2 or less are within 30 inches of the surface, but they are not in the upper 10 inches of the argillic horizon. Mottles in shades of red, yellow, or brown are in the middle and lower parts. The lower part has a gray matrix in some pedons. The texture is dominantly loam, silt loam, clay loam, silty clay loam, or sandy clay loam, but the lower part of some pedons is silty clay or clay.

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

The C horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 7. It varies in texture and ranges from sandy to clayey.

Goldsboro Series

The Goldsboro series consists of moderately well drained soils that formed in loamy marine sediments. Slopes range from 0 to 3 percent. These soils are fine-loamy, siliceous, thermic Aquic Paleudults.

Goldsboro soils are commonly adjacent to Noboco, Lynchburg, Rains, Exum, Bonneau, Craven, and Bladen soils. Noboco soils are well drained. Lynchburg soils are somewhat poorly drained. Rains soils are poorly drained. Exum soils have a fine-silty particle-size class. Bonneau soils are well drained and are arenic. Craven and Bladen soils have a clayey particle-size class. Bladen soils are poorly drained.

Typical pedon of Goldsboro fine sandy loam, 0 to 3 percent slopes; about 1.6 miles east of Drum Hill, about 1.1 miles east of the intersection of Secondary Roads 1311 and 1308, about 50 feet north of Secondary Road 1308 (State plane coordinates 2,676,550 feet E., 1,023,900 feet N.):

Ap—0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; very friable; few fine roots; moderately acid; abrupt smooth boundary.

Bt1—8 to 13 inches; yellowish brown (10YR 5/4) loam; weak fine subangular blocky structure; friable; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—13 to 20 inches; yellowish brown (10YR 5/4) loam; common medium faint yellowish brown (10YR 5/8) mottles; weak fine subangular blocky structure; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt3—20 to 27 inches; yellowish brown (10YR 5/4) loam; many medium faint strong brown (7.5YR 5/8) and few fine faint light gray (10YR 7/1) mottles; weak fine subangular blocky structure; friable; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt4—27 to 35 inches; light yellowish brown (10YR 6/4) sandy clay loam; many medium distinct strong brown (7.5YR 5/8) and few medium distinct light gray (10YR 7/1) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt5—35 to 46 inches; light yellowish brown (10YR 6/4) clay loam; many medium distinct strong brown (7.5YR 5/8) and common medium distinct light gray (10YR 7/1) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few thin lenses of sandy loam; sand grains coated and bridged with clay; few fine flakes of mica; extremely acid; clear smooth boundary.

Bt6—46 to 57 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct light gray (10YR 7/1), common medium faint strong brown (7.5YR 5/8), and few medium distinct yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few distinct gray (10YR 6/1) clay films on faces of peds; few thin lenses of sandy loam; few fine flakes of mica; extremely acid; gradual smooth boundary.

Btg—57 to 72 inches; gray (10YR 6/1) sandy clay loam; common medium distinct strong brown (7.5YR 5/8) and yellowish red (5YR 4/8) and few medium distinct light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few distinct gray (10YR 6/1) clay films on faces of peds; few thin lenses of sandy loam; few fine flakes of mica; extremely acid.

The thickness of the solum ranges from 60 to 90 inches. Reaction is extremely acid to strongly acid throughout, except where the surface layer has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 to 6, and chroma of 1 to 4. Where the value is 3 or less, the horizon is less than 6 inches thick.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 6. It is sandy loam or fine sandy loam.

The upper part of the Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. The lower part has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 8 and has mottles in shades of these colors. Low-chroma mottles indicative of wetness are within 18 to 30 inches of the surface. The Bt horizon is dominantly sandy clay loam, loam, or clay loam but in some pedons has thin layers of sandy loam, clay, or sandy clay.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2 and has contrasting mottles. The texture is similar to that of the Bt horizon.

The C horizon, if it occurs, has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2. It is stratified sandy, loamy, or clayey sediments.

Icaria Series

The Icaria series consists of very poorly drained soils that formed in loamy marine sediments. Slopes range from 0 to 2 percent. These soils are fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Umbraquults.

Icaria soils are commonly adjacent to Valhalla, Tomahawk, and Conetoe soils. Conetoe and Valhalla soils are well drained and are arenic. Tomahawk soils are somewhat poorly drained and moderately well drained.

Typical pedon of Icaria fine sandy loam, 0 to 2 percent slopes; about 0.8 mile west of Sandy Cross, about 0.8 mile west of the intersection of Secondary Roads 1413 and 1002, about 200 feet south of Secondary Road 1413 (State plane coordinates 2,716,100 feet E., 961,500 feet N.):

Ap—0 to 10 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; very friable; few fine roots; extremely acid; clear smooth boundary.

A—10 to 14 inches; very dark gray (10YR 3/1) fine sandy loam; weak medium granular structure; friable; few fine roots; extremely acid; clear smooth boundary.

Btg—14 to 36 inches; dark grayish brown (10YR 4/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; extremely acid; clear wavy boundary.

2Eb—36 to 55 inches; light gray (10YR 7/2) sand; single grained; loose; common dark opaque minerals; very strongly acid; clear wavy boundary.

2Bhb—55 to 62 inches; brown (7.5YR 4/2) sand; massive; very friable; very strongly acid.

The upper sequum of these soils, which includes the argillic horizon, ranges from 20 to 40 inches in thickness. The lower sequum consists of spodic horizons that commonly extend to a depth of more than 60 inches. In some pedons spodic horizons are separated by thin albic horizons. Reaction ranges from extremely acid to strongly acid throughout, except where the surface layer has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3.

The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. It is fine sandy loam or loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has chroma of 4 to 7. High-chroma mottles are present in some pedons. The Btg horizon commonly is sandy clay loam, loam, or clay loam. Thin layers of sandy loam or fine sandy loam are present in some pedons.

The 2Eb horizon has hue of 10YR to 5Y, value of 4 to 8, and chroma of 1 to 3. It is sand, fine sand, loamy fine sand, or loamy sand.

The 2Bhb horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3. It is sand, fine sand, or sandy loam.

The 2C horizon, if it occurs, has hue of 10YR to 5Y, value of 5 or 6, and chroma of 2 or 3. It is sand, fine sand, loamy sand, or loamy fine sand.

Lenoir Series

The Lenoir series consists of somewhat poorly drained soils that formed in clayey marine and fluvial sediments. Slopes range from 0 to 2 percent. These soils are clayey, mixed, thermic Aeric Paleaquults.

Lenoir soils are commonly adjacent to Craven, Bladen, Goldsboro, and Rains soils. Craven soils are moderately well drained. Bladen soils are poorly drained. Goldsboro soils are moderately well drained, and Rains soils are poorly drained. Goldsboro and Rains soils have a fine-loamy particle-size class.

Typical pedon of Lenoir loam, 0 to 2 percent slopes; about 1.5 miles south of Wiggins Crossroads, about 0.3 mile south of the intersection of Secondary Roads 1325 and 1305, about 30 feet east of Secondary Road 1305 (State plane coordinates 2,693,000 feet E., 1,003,700 feet N.):

Ap—0 to 7 inches; grayish brown (10YR 5/2) loam; weak medium granular structure; friable; common very fine and fine roots; common medium continuous vertical vesicular pores; moderately acid; clear smooth boundary.

Bt—7 to 13 inches; light olive brown (2.5Y 5/4) clay loam; few fine distinct grayish brown (10YR 5/2) and strong brown (7.5YR 5/8) and common medium distinct brownish yellow (10YR 6/6) mottles; coarse medium angular blocky structure; firm, sticky and plastic; common very fine and fine roots; common medium continuous vertical vesicular pores; many distinct brown (10YR 5/3) clay films on faces of peds; extremely acid; clear smooth boundary.

Btg1—13 to 36 inches; gray (10YR 6/1) clay; common fine distinct strong brown (7.5YR 5/8) and few fine prominent red (2.5YR 4/6) mottles; coarse medium angular blocky structure; firm, sticky and plastic; few very fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; extremely acid; clear smooth boundary.

Btg2—36 to 72 inches; light brownish gray (2.5Y 6/2) clay; common fine distinct strong brown (7.5YR 5/8) and few fine distinct brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; firm, sticky and plastic; few distinct light yellowish brown (2.5Y 6/4) clay films on faces of peds; extremely acid.

The thickness of the solum ranges from 60 to 90 inches. Reaction ranges from extremely acid to moderately acid throughout, except where the surface layer has been limed.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 or 2. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. It is loam, silt loam, or fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. Mottles are in shades of yellow, brown, gray, or red. It is clay, clay loam, or silty clay. The content of clay in the upper 20 inches of the argillic horizon ranges from 35 to 60 percent, and the content of silt is more than 30 percent.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. Mottles are in shades of yellow, brown, and red. It is clay, clay loam, or silty clay.

Leon Series

The Leon series consists of poorly drained soils that formed in sandy marine sediments. Slopes range from 0 to 2 percent. These soils are sandy, siliceous, thermic Aeric Haplaquods.

Leon soils are commonly adjacent to Alaga, Pactolus, Nawney, Icaria, and Conetoe soils. Alaga soils are well drained and somewhat excessively drained. Pactolus soils are moderately well drained and somewhat poorly drained. Alaga and Pactolus soils do not have a spodic horizon. Nawney soils are frequently flooded and have a fine-loamy particle-size class. Icaria soils are very poorly drained and have a fine-loamy over sandy or sandy-skeletal particle-size class. Conetoe soils are well drained and have a loamy particle-size class.

Typical pedon of Leon sand, 0 to 2 percent slopes; about 3.4 miles northwest of Storys, about 0.5 mile north of the intersection of Secondary Roads 1200 and 1201, about 200 feet west of Secondary Road 1200 on a timber company road, 30 feet south of the timber company road (State plane coordinates 2,613,800 feet E., 998,700 feet N.):

A—0 to 6 inches; very dark gray (10YR 3/1) sand; single grained; loose; common fine and medium roots; many clean sand grains, resulting in a salt-and-pepper appearance; extremely acid; clear smooth boundary.

E—6 to 11 inches; light brownish gray (10YR 6/2) sand; single grained; loose; few medium roots; extremely acid; clear smooth boundary.

Bh—11 to 14 inches; black (5YR 3/1) sand; few medium faint dark reddish brown (5YR 3/2) mottles; massive; weakly cemented; extremely acid; abrupt smooth boundary.

C—14 to 24 inches; very pale brown (10YR 7/3) sand; single grained; loose; common opaque minerals; extremely acid; clear smooth boundary.

Cg1—24 to 46 inches; light gray (10YR 7/2) sand; few fine faint very pale brown (10YR 7/4) mottles; single grained; loose; common opaque minerals; extremely acid; clear smooth boundary.

Cg2—46 to 80 inches; light gray (10YR 7/2) sand; single grained; loose; few opaque minerals; extremely acid.

The sandy material extends to a depth of 80 inches or more. Reaction ranges from extremely acid to strongly acid.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 or 2. The E horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 or 2. It is sand or fine sand.

The Bh horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3. It is sand, fine sand, loamy sand, or loamy fine sand.

The E′ horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 or 2. It is sand or fine sand.

Some pedons have a B′h horizon below the E′ horizon. The B′h horizon is sand or fine sand.

The C and Cg horizons and the 2Cg horizon, if it occurs, have hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 to 6. They are sand or fine sand.

Lynchburg Series

The Lynchburg series consists of somewhat poorly drained soils that formed in loamy marine sediments. Slopes range from 0 to 2 percent. These soils are fine-loamy, siliceous, thermic Aeric Paleaquults.

Lynchburg soils are commonly adjacent to Noboco, Goldsboro, Rains, Pantego, Craven, and Bladen soils. Noboco soils are well drained. Goldsboro soils are moderately well drained. Rains soils are poorly drained. Pantego soils are very poorly drained. Craven and Bladen soils have a clayey particle-size class. Craven soils are moderately well drained, and Bladen soils are poorly drained.

Typical pedon of Lynchburg fine sandy loam, 0 to 2 percent slopes; about 2.6 miles east of Drum Hill, about

0.4 mile west of the intersection of Secondary Roads 1304 and 1308, about 40 feet south of Secondary Road 1308, in a cultivated field (State plane coordinates 2,682,100 feet E., 1,024,100 feet N.):

Ap—0 to 8 inches; dark brown (10YR 3/3) fine sandy loam; weak fine granular structure; very friable; few fine roots; very strongly acid; clear smooth boundary.

Bt—8 to 16 inches; yellowish brown (10YR 5/4) sandy clay loam; common medium distinct brownish yellow (10YR 6/6) and few fine faint light brownish gray (10YR 6/2) mottles; weak fine subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Btg1—16 to 50 inches; light brownish gray (10YR 6/2) sandy clay loam; many coarse prominent yellowish red (5YR 5/8), common medium distinct strong brown (7.5YR 5/8), and few fine distinct red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg2—50 to 58 inches; light gray (10YR 7/1) sandy clay loam; few fine prominent yellowish red (5YR 5/8) and common medium distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg3—58 to 72 inches; light gray (10YR 7/1) clay; few medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure grading to massive; firm; very strongly acid.

The thickness of the solum is more than 60 inches. Reaction ranges from extremely acid to strongly acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 to 3. The E horizon, if it occurs, has hue of 10YR to 2.5Y, value of 4 to 7, and chroma of 2 to 4. It is sandy loam or fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8. Mottles are in shades of yellow, brown, gray, or red. It is commonly sandy clay loam but ranges to clay loam, loam, sandy loam, fine sandy loam, or clay.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2. High-chroma mottles are present in most pedons. It is commonly sandy clay loam but ranges to clay loam, loam, sandy loam, fine sandy loam, or clay.

Nawney Series

The Nawney series consists of poorly drained soils that formed in loamy fluvial sediments. Slopes range from 0 to 2 percent. These soils are fine-loamy, mixed, acid, thermic Typic Fluvaquents.

Nawney soils are commonly adjacent to Chowan and Dorovan soils. Chowan soils have a buried organic horizon. Dorovan soils are organic throughout the profile.

Typical pedon of Nawney loam, 0 to 2 percent slopes, frequently flooded; about 0.3 mile east of Eure, about 300 feet west of the intersection of North Carolina Highway 137 and Secondary Road 1113, about 50 feet south of North Carolina Highway 137 (State plane coordinates 2,633,400 feet E., 981,000 feet N.):

A—0 to 1 inch; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; common fine and medium roots; strongly acid; abrupt smooth boundary.

Cg1—1 to 8 inches; grayish brown (2.5Y 5/2) loam; few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few fine and medium roots; very strongly acid; clear smooth boundary.

Cg2—8 to 27 inches; light brownish gray (10YR 6/2) loam; few fine distinct white (10YR 8/1) mottles; massive; friable; few medium roots; very strongly acid; clear smooth boundary.

Cg3—27 to 35 inches; light gray (10YR 7/2) sandy clay loam; common medium distinct light yellowish brown (2.5Y 6/4) mottles; massive; friable; very strongly acid; clear smooth boundary.

Cg4—35 to 55 inches; light gray (10YR 7/2) clay loam; common medium distinct light olive brown (2.5Y 5/4) mottles; massive; firm; very strongly acid; clear smooth boundary.

Cg5—55 to 62 inches; gray (10YR 6/1) sand; single grained; loose; very strongly acid.

The loamy material extends to a depth of 40 to 60 inches below the surface. Reaction ranges from extremely acid to strongly acid to a depth of about 40 inches. Below this depth, it ranges from extremely acid to slightly acid.

The A horizon has hue of 10YR to 5Y, value of 2 to 5, and chroma of 1 or 2. In some pedons where the value is 3 or less, the horizon is less than 6 inches thick.

The Cg horizon has hue of 10YR to 5BG, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. The upper part is loam, sandy clay loam, sandy loam, fine sandy loam, or clay loam. The lower part ranges from sand to clay.

Noboco Series

The Noboco series consists of well drained soils that formed in loamy marine sediments. Slopes range from 0 to 6 percent. These soils are fine-loamy, siliceous, thermic Typic Paleudults.

Noboco soils are commonly adjacent to Goldsboro, Lynchburg, Bonneau, Craven, and Winton soils. Goldsboro soils are moderately well drained. Lynchburg soils are somewhat poorly drained. Bonneau soils are arenic. Craven and Winton soils are moderately well drained. Craven soils have a clayey particle-size class. Winton soils have slopes of more than 8 percent.

Typical pedon of Noboco fine sandy loam, 0 to 2 percent slopes; about 1.0 mile west of Drum Hill, about 0.7 mile east of the intersection of Secondary Roads 1300 and 1309, about 150 feet south of Secondary Road 1309 (State plane coordinates 2,664,050 feet E., 1,023,350 feet N.):

Ap—0 to 6 inches; grayish brown (10YR 5/2) fine sandy loam; weak medium granular structure; very friable; few fine roots; moderately acid; abrupt smooth boundary.

E—6 to 11 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak medium granular structure; friable; few fine roots; moderately acid; clear smooth boundary.

Bt1—11 to 20 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; extremely acid; clear wavy boundary.

Bt2—20 to 37 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium distinct brownish yellow (10YR 6/8) and few fine distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct yellowish brown (10YR 5/6) clay films on faces of peds; extremely acid; clear wavy boundary.

Bt3—37 to 47 inches; strong brown (7.5YR 5/6) sandy clay loam; few fine distinct light gray (10YR 7/1) and brownish yellow (10YR 6/8) and common medium prominent red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct yellowish brown (10YR 5/8) clay films on faces of peds; few fine and medium concretions; extremely acid; clear wavy boundary.

Bt4—47 to 57 inches; strong brown (7.5YR 5/6) sandy clay loam; many coarse prominent red (2.5YR 4/8), common coarse distinct yellowish brown (10YR 5/8), and common fine distinct gray (10YR 6/1) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct yellowish brown (10YR 5/4) clay films on faces of peds; extremely acid; clear wavy boundary.

Bt5—57 to 65 inches; mottled brownish yellow (10YR 6/8), yellowish red (5YR 4/8), and light gray (10YR 7/1) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct light brownish gray (10YR 6/2) clay films on faces of peds; extremely acid; clear wavy boundary.

Bt6—65 to 72 inches; mottled light gray (10YR 7/2), yellowish red (5YR 4/8), and brownish yellow (10YR 6/8) sandy clay loam; friable, slightly sticky and slightly plastic; few distinct light brownish gray (10YR 6/2) clay films on faces of peds; thin lenses of clay loam; extremely acid.

The thickness of the solum is 60 inches or more. Reaction ranges from extremely acid to strongly acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 to 4. The E horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 or 4. It is fine sandy loam, sandy loam, loamy fine sand, or loamy sand.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. The lower part has mottles in shades of red, brown, yellow, and gray. The texture is dominantly sandy clay loam, sandy loam, fine sandy loam, or clay loam but in some pedons below a depth of 40 inches has layers of sandy clay or clay.

Pactolus Series

The Pactolus series consists of moderately well drained and somewhat poorly drained soils that formed in sandy marine and fluvial sediments. Slopes range from 0 to 3 percent. These soils are thermic, coated Aquic Quartzipsamments.

Pactolus soils are commonly adjacent to Alaga, Leon, Nawney, and Conetoe soils. Alaga soils are well drained and somewhat excessively drained. Leon soils are poorly drained and have a spodic horizon. Nawney soils are frequently flooded and have a fine-loamy particle-size class. Conetoe soils are well drained and have a loamy particle-size class.

Typical pedon of Pactolus sand, 0 to 3 percent slopes; about 2.9 miles northwest of Storys, about 0.8 mile east of the intersection of Secondary Roads 1200 and 1201 on a private road, 50 feet north of the road (State plane coordinates 2,608,900 feet E., 997,000 feet N.):

A—0 to 5 inches; very dark grayish brown (10YR 3/2) sand; weak fine granular structure; very friable; few fine and medium roots; extremely acid; abrupt smooth boundary.

C1—5 to 25 inches; light yellowish brown (10YR 6/4) sand; single grained; loose; few medium roots; common opaque minerals; extremely acid; clear smooth boundary.

C2—25 to 32 inches; very pale brown (10YR 7/4) fine sand; few medium faint light gray (10YR 7/2) and light yellowish brown (10YR 6/4) mottles; single grained; loose; common opaque minerals; extremely acid; clear smooth boundary.

Cg1—32 to 45 inches; light gray (2.5Y 7/2) sand; few medium distinct yellow (10YR 7/8) mottles; single grained; loose; common opaque minerals; extremely acid; clear smooth boundary.

Cg2—45 to 80 inches; light gray (2.5Y 7/2) sand; single grained; loose; common opaque minerals; extremely acid.

The sandy material extends to a depth of more than 80 inches. Reaction ranges from extremely acid to strongly acid throughout, except where the surface layer has been limed.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 or 3.

The C horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 to 8. Mottles that have chroma of 2 or less are within a depth of 40 inches and may occur within a depth of 20 inches. The texture is sand, fine sand, loamy sand, or loamy fine sand.

The Cg horizon has hue of 10YR or 2.5Y, value of 5 to 8, and chroma of 1 or 2. It is fine sand, sand, or loamy fine sand.

Pantego Series

The Pantego series consists of very poorly drained soils that formed in loamy marine sediments. Slopes range from 0 to 2 percent. These soils are fine-loamy, siliceous, thermic Umbric Paleaquults.

Pantego soils are commonly adjacent to Rains, Bladen, and Lynchburg soils. Rains soils are poorly drained. Lynchburg soils are somewhat poorly drained. Bladen soils are poorly drained and have a clayey particle-size class.

Typical pedon of Pantego fine sandy loam, 0 to 2 percent slopes; about 3.0 miles southeast of Wiggins Crossroads, about 0.15 mile east of the intersection of Secondary Roads 1320 and 1305, about 0.9 mile north-northeast of Secondary Road 1320 on a farm path, 50 feet east of the farm path (State plane coordinates 2,699,400 feet E., 1,002,700 feet N.):

Ap—0 to 6 inches; black (10YR 2/1) fine sandy loam; weak medium granular structure; friable; few very fine and fine roots; very strongly acid; clear smooth boundary.

A—6 to 21 inches; black (10YR 2/1) loam; weak fine subangular blocky structure; friable; few fine roots; strongly acid; gradual smooth boundary.

Btg1—21 to 30 inches; dark grayish brown (10YR 4/2) loam; few medium distinct strong brown (7.5YR 4/6) mottles in root channels; weak fine subangular blocky structure; friable, slightly sticky; extremely acid; clear smooth boundary.

Btg2—30 to 40 inches; grayish brown (10YR 5/2) loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg3—40 to 50 inches; light brownish gray (10YR 4/2) clay loam; common medium distinct yellowish brown (10YR 5/6) and few medium distinct yellowish red (5YR 5/8) mottles; weak medium blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg4—50 to 74 inches; light brownish gray (10YR 6/2) sandy clay; many medium distinct yellowish brown (10YR 5/6) and many fine prominent yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid.

The thickness of the solum is more than 60 inches. Reaction ranges from extremely acid to strongly acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 or 2.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. Most pedons have high-chroma mottles. The texture is sandy clay loam, loam, clay loam, sandy loam, or sandy clay.

Pungo Series

The Pungo series consists of very poorly drained organic soils. The organic layers are more than 51 inches thick over loamy marine and fluvial sediments. Slopes range from 0 to 2 percent. These soils are dysic, thermic Typic Medisaprists.

Pungo soils are similar to Dorovan soils and are commonly adjacent to Belhaven soils. Dorovan soils are on flood plains. Belhaven soils have organic horizons less than 51 inches thick.

Typical pedon of Pungo muck, 0 to 2 percent slopes; about 1.6 miles east of Acorn Hill, about 1.6 miles east of the intersection of U.S. Highway 158 and Secondary Road 1002, about 50 feet south of U.S. Highway 158, in a wooded area (State plane coordinates 2,729,700 feet E., 987,600 feet N.):

Oa1—0 to 12 inches; muck, black (10YR 2/1) broken face and rubbed; about 5 percent fibers, less than 1 percent rubbed; weak medium and coarse granular structure; very friable; few medium roots; few logs and stumps; extremely acid; clear smooth boundary.

Oa2—12 to 34 inches; muck, black (5YR 2/1) broken face and rubbed; about 5 percent fibers, less than 1 percent rubbed; weak medium granular structure; friable; few logs, stumps, and roots; extremely acid; clear smooth boundary.

Oa3—34 to 72 inches; muck, black (10YR 2/1) broken face and rubbed; about 10 percent fibers, less than 1 percent rubbed; massive; slightly sticky; few logs, stumps, and roots; extremely acid.

The organic material is 51 to more than 90 inches thick. Reaction is extremely acid in the organic horizons, except where the surface layer has been limed. The content of logs, stumps, and roots is as much as 35 percent in the surface layer and subsurface layer. Before rubbing, the content of fiber ranges from 2 to 60 percent throughout the profile. In some pedons, the content of fiber after rubbing is as much as 12 percent in the middle and lower tiers.

The surface layer has hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 or 2. The subsurface layers have hue of 2.5YR to 5Y, value of 2 or 3, and chroma of 1 to 4. They have hue of 5YR or 2.5YR in ten inches or more. The organic material is massive and is pastelike or has a greasy consistence when saturated. If allowed to aerate slowly after drainage and subsidence, the organic material forms weak granular structure. If this material dries over a short period of time, it shrinks and dries irreversibly.

The 2C horizon, if it occurs, has hue of 7.5YR to 5Y, value of 3 to 7, and chroma of 1 or 2. It is loam, sandy clay, silty clay, or clay.

Rains Series

The Rains series consists of poorly drained soils that formed in loamy marine sediments. Slopes range from 0 to 2 percent. These soils are fine-loamy, siliceous, thermic Typic Paleaquults.

Rains soils are commonly adjacent to Goldsboro, Lynchburg, Pantego, Exum, and Bladen soils. Goldsboro soils are moderately well drained. Lynchburg soils are somewhat poorly drained. Pantego soils are very poorly drained. Exum soils are moderately well drained and have a fine-silty particle-size class. Bladen soils are poorly drained and have a clayey particle-size class.

Typical pedon of Rains fine sandy loam, 0 to 2 percent slopes; about 0.8 mile southwest of Hazelton, about 0.8 mile southwest of the intersection of Secondary Roads 1304 and 1312, about 50 feet south of Secondary Road 1304, in a cultivated field (State plane coordinates 2,670,000 feet E., 1,011,600 feet N.):

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; few very fine and fine roots; very strongly acid; abrupt smooth boundary.

Btg1—6 to 15 inches; light brownish gray (2.5Y 6/2) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) and brownish yellow (10YR 6/8) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Btg2—15 to 40 inches; light brownish gray (10YR 6/2) sandy clay loam; common medium distinct reddish yellow (7.5YR 6/6) and common fine prominent reddish yellow (5YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg3—40 to 48 inches; gray (10YR 6/1) sandy clay loam; few medium faint light brownish gray (10YR 6/2) and few fine distinct reddish yellow (7.5YR 6/6) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg4—48 to 72 inches; gray (10YR 6/1) clay loam; few medium prominent red (2.5YR 4/8) and few fine distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid.

The thickness of the solum is more than 60 inches. Reaction ranges from extremely acid to slightly acid in the A and E horizons and from extremely acid to strongly acid in the B horizon.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. In pedons where the value is 2 or 3 and the chroma is 1 or 2, the horizon is less than 7 inches thick.

The E horizon, if it occurs, has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 or 2. It is sandy loam or fine sandy loam.

The Btg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. In most pedons it has high-chroma mottles. It is loam, sandy clay loam, clay loam, sandy loam, or sandy clay.

Roanoke Series

The Roanoke series consists of poorly drained soils that formed in fluvial sediments. Slopes range from 0 to 2 percent. These soils are clayey, mixed, thermic Typic Ochraquults.

Roanoke soils are commonly adjacent to Icaria, State, Altavista, and Tomotley soils. Icaria soils have a fine-loamy over sandy or sandy-skeletal particle-size class. State, Altavista, and Tomotley soils have a fine-loamy particle-size class. Icaria soils are very poorly drained. State soils are well drained. Altavista soils are moderately well drained.

Typical pedon of Roanoke loam, 0 to 2 percent slopes; about 3.8 miles northwest of Gatesville, about 0.4 mile east of the intersection of Secondary Roads 1114 and 1116, about 0.1 mile south of Secondary Road 1116 on a farm path, 30 feet east of the path (State plane coordinates 2,649,900 feet E., 978,700 feet N.):

A—0 to 6 inches; very dark grayish brown (10YR 3/2) loam; weak medium granular structure; friable; common fine roots; very strongly acid; abrupt smooth boundary.

Btg1—6 to 12 inches; light brownish gray (2.5Y 6/2) loam; common medium distinct light yellowish brown (10YR 6/4) and few medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; very strongly acid; abrupt smooth boundary.

Btg2—12 to 28 inches; light brownish gray (2.5Y 6/2) clay; common medium distinct yellowish brown (10YR 5/8) and common fine prominent red (2.5Y 4/8) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few medium roots; few fine vesicular pores; common distinct grayish brown (2.5Y 5/2) clay films on faces of peds; extremely acid; gradual wavy boundary.

Btg3—28 to 35 inches; grayish brown (2.5Y 5/2) clay; common fine prominent yellowish red (5YR 5/8) and few medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; firm, sticky and plastic; common distinct light brownish gray (2.5Y 6/2) clay films on faces of peds; extremely acid; gradual wavy boundary.

Btg4—35 to 48 inches; light gray (2.5Y 7/2) loam; few fine distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; few faint clay films on faces of peds; few fine flakes of mica; extremely acid; clear smooth boundary.

Cg1—48 to 60 inches; white (10YR 8/1) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; few fine flakes of mica; extremely acid; clear smooth boundary.

Cg2—60 to 72 inches; white (10YR 8/1) loamy fine sand; massive; friable; few fine flakes of mica; extremely acid.

The thickness of the solum ranges from 40 to 60 inches. Reaction ranges from extremely acid to strongly acid in the A, E, and B horizons, except where the surface layer has been limed. It ranges from extremely acid to slightly acid in the C horizon.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 5, and chroma of 1 or 2. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It is fine sandy loam or loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. High-chroma mottles are present in most pedons. The texture is dominantly clay, clay loam, or silty clay, but it can have thin layers of silty clay loam, sandy clay loam, or loam.

The Cg horizon varies in color. It is commonly stratified and ranges from sand to clay.

State Series

The State series consists of well drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 6 percent. These soils are fine-loamy, mixed, thermic Typic Hapludults.

State soils are commonly adjacent to Altavista, Tomotley, and Conetoe soils. Altavista soils are moderately well drained. Tomotley soils are poorly drained. Conetoe soils are arenic and have a loamy particle-size class.

Typical pedon of State fine sandy loam, 0 to 2 percent slopes; about 0.6 mile west of Gatesville, about 0.1 mile east of the intersection of Secondary Road 1134 and North Carolina Highway 137, about 150 feet north of North Carolina Highway 137 (State plane coordinates 2,658,200 feet E., 966,100 feet N.):

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; very friable; few very fine roots; strongly acid; abrupt smooth boundary.

E—9 to 18 inches; yellowish brown (10YR 5/4) fine sandy loam; weak medium granular structure; very friable; strongly acid; clear smooth boundary.

Bt1—18 to 28 inches; yellowish brown (10YR 5/8) sandy clay loam; few medium faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2—28 to 37 inches; reddish yellow (7.5YR 6/8) sandy clay loam; few medium faint reddish yellow (7.5YR 6/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; clear smooth boundary.

Bt3—37 to 48 inches; reddish yellow (7.5YR 6/8) sandy clay loam; few medium faint strong brown (7.5YR 5/8) and pinkish gray (7.5YR 7/2) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; extremely acid; gradual smooth boundary.

C1—48 to 65 inches; yellow (10YR 7/6) loamy sand; few medium faint yellowish brown (10YR 5/8) and light gray (10YR 7/2) mottles; single grained; loose; few fine flakes of mica; extremely acid; gradual smooth boundary.

C2—65 to 72 inches; very pale brown (10YR 7/3) sand; single grained; loose; few fine flakes of mica; few very fine opaque minerals; extremely acid.

The thickness of the solum ranges from 30 to 60 inches. Reaction is extremely acid to strongly acid in the A and E horizons and the upper part of the B horizon, except where the surface layer has been limed. It is extremely acid to slightly acid in the lower part of the B horizon and in the C horizon.

The Ap or A horizon has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 6. The E horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. It is loamy fine sand, loamy sand, sandy loam, or fine sandy loam.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8. It is typically sandy clay loam or clay loam, but some pedons have thin layers of fine sandy loam or sandy loam.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8. It is fine sand, sand, loamy sand, or sandy loam.

Tomahawk Series

The Tomahawk series consists of somewhat poorly drained and moderately well drained soils that formed in loamy marine sediments and eolian sands on the lower Coastal Plain. Slopes range from 0 to 3 percent. These soils are loamy, siliceous, thermic Arenic Hapludults.

Tomahawk soils are commonly adjacent to Valhalla and Icaria soils. Valhalla soils are well drained, and Icaria soils are very poorly drained.

Typical pedon of Tomahawk fine sand, 0 to 3 percent slopes; at Joppa, about 50 feet northeast of the intersection of Secondary Roads 1002 and 1426 (State plane coordinates 2,718,600 feet E., 957,100 feet N.):

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) fine sand; weak medium granular structure; very friable; few fine roots; strongly acid; abrupt smooth boundary.

E—8 to 16 inches; light yellowish brown (10YR 6/4) loamy fine sand; weak medium granular structure; very friable; very strongly acid; clear smooth boundary.

Bt1—16 to 22 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; very friable; very strongly acid; clear smooth boundary.

Bt2—22 to 28 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and common fine distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; very friable; extremely acid; clear smooth boundary.

E′1—28 to 36 inches; brown (10YR 5/3) fine sand; common medium distinct white (10YR 8/1) mottles; massive; very friable; extremely acid; clear smooth boundary.

E′2—36 to 46 inches; white (10YR 8/1) fine sand; few fine distinct brownish yellow (10YR 6/8) mottles; massive; very friable; few fine opaque minerals; extremely acid; gradual smooth boundary.

2Bhb1—46 to 52 inches; dark brown (7.5YR 4/2) sand; common medium distinct dark reddish brown (5YR 3/2) mottles; massive; friable; very strongly acid; clear smooth boundary.

2Bhb2—52 to 66 inches; dark reddish brown (5YR 3/2) sand; massive; friable; very strongly acid; clear smooth boundary.

2Bhb3—66 to 72 inches; black (5YR 2/1) sand; massive; friable; very strongly acid.

The upper sequum ranges from a depth of 40 to 60 inches, overlying a lower sequum that has a spodic horizon. Reaction is very strongly acid or strongly acid in the upper sequence of horizons, except where the surface layer has been limed. It is extremely acid to slightly acid in the lower sequence of horizons.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 1 or 2. The E horizon has hue of 10YR or 2.5Y, value of 6 or 7, and chroma of 3 or 4. It is loamy fine sand, loamy sand, or sand.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 6. Mottles are in shades of brown, yellow, or gray. It is typically fine sandy loam but in some pedons has thin layers of loamy sand or loamy fine sand.

The E′ horizon has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 to 3. It is fine sand or sand.

The 2Bhb horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 or 2. It is loamy sand, sand, or fine sand.

The Tomahawk soils in Gates County are taxadjuncts because they have a thinner sandy surface layer and subsurface layer than is typical for the series.

Tomotley Series

The Tomotley series consists of poorly drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 2 percent. These soils are fine-loamy, mixed, thermic Typic Ochraquults.

Tomotley soils are commonly adjacent to State, Altavista, and Roanoke soils. State soils are well drained. Altavista soils are moderately well drained. Roanoke soils have a clayey particle-size class.

Typical pedon of Tomotley fine sandy loam, 0 to 2 percent slopes; about 1.0 mile west of Eure, about 150 feet east of the intersection of Secondary Road 1118 and North Carolina Highway 137, about 0.3 mile north of North Carolina Highway 137 on a logging road, 50 feet east of the logging road, in a pine plantation (State plane coordinates 2,627,500 feet E., 981,050 feet N.):

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak medium granular structure; very friable; few fine roots; slightly acid; clear smooth boundary.

Btg1—7 to 12 inches; light gray (10YR 7/2) loam; few medium distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable; few faint clay films on faces of peds; few fine and medium roots; very strongly acid; clear smooth boundary.

Btg2—12 to 26 inches; light brownish gray (2.5Y 6/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/8) and few fine distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; few fine and medium roots; extremely acid; clear smooth boundary.

Btg3—26 to 42 inches; grayish brown (2.5Y 5/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/8) and few fine distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; few fine and medium roots; extremely acid; gradual smooth boundary.

Btg4—42 to 48 inches; light brownish gray (10YR 6/2) loam; few medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine flakes of mica; common dark opaque minerals; very strongly acid; gradual smooth boundary.

Btg5—48 to 55 inches; light brownish gray (10YR 6/2) loam; few medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; few fine flakes of mica; common dark opaque minerals; very strongly acid; clear smooth boundary.

Cg1—55 to 70 inches; light gray (10YR 7/2) sandy loam; massive; very friable; pockets of sandy clay loam; few fine flakes of mica; common dark opaque minerals; very strongly acid; clear smooth boundary.

Cg2—70 to 74 inches; light brownish gray (2.5Y 6/2) sandy loam; massive; very friable; few fine flakes of mica; common dark opaque minerals; very strongly acid.

The thickness of the solum ranges from 30 to more than 60 inches. Reaction ranges from extremely acid to strongly acid within a depth of about 50 inches, except where the surface layer has been limed. Below this depth, it ranges from extremely acid to moderately acid.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 1 or 2. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It is sandy loam or fine sandy loam.

The Btg horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral in hue and has value of 4 to 7. It is loam, sandy clay loam, or clay loam but in some pedons has thin layers of sandy loam or fine sandy loam.

The Cg horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 to 4, or it is neutral in hue and has value of 5 to 7. It is mottled in shades of red, olive, yellow, brown, or gray. It varies in texture and ranges from sand to clay.

Udorthents

Udorthents consist of areas where the natural soil has been altered or covered by grading and digging. The three distinct types of altered areas are borrow pits, dredge and fill, and landfill. They are mapped as a single map unit because most of these areas are loamy and capable of supporting plants.

A typical pedon is not given for these soils because they vary in origin. Many areas have inclusions of nonsoil material, such as concrete, wood, glass, and asphalt. The soils are very stratified and vary in color and texture.

Udorthents have hue of 7.5YR to 5G, value of 2 to 7, and chroma of 1 to 8. It varies in texture but commonly ranges from sandy loam to clay loam. Reaction ranges from extremely acid to slightly acid.

Valhalla Series

The Valhalla series consists of well drained soils that formed in loamy marine and fluvial sediments. Slopes range from 0 to 6 percent. These soils are loamy, siliceous, thermic Arenic Hapludults.

Valhalla soils are commonly adjacent to Tomahawk and Icaria soils. Tomahawk soils are somewhat poorly drained and moderately well drained. Icaria soils are very poorly drained.

Typical pedon of Valhalla fine sand, 0 to 6 percent slopes; about 0.7 mile south of Sandy Cross, about 0.7 mile south of the intersection of Secondary Roads 1002 and 1413, about 100 feet east of Secondary Road 1002 (State plane coordinates 2,718,900 feet E., 958,200 feet N.):

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; very friable; few fine roots; extremely acid; abrupt wavy boundary.

E—7 to 21 inches; brownish yellow (10YR 6/6) fine sand; weak fine granular structure; very friable; few fine roots; many fine opaque minerals; extremely acid; clear wavy boundary.

Bt1—21 to 27 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine subangular blocky structure; very friable; sand grains coated and bridged with clay; many fine opaque minerals; extremely acid; clear wavy boundary.

Bt2—27 to 36 inches; yellowish brown (10YR 5/6) loamy fine sand; weak fine subangular blocky structure; very friable; many fine opaque minerals; extremely acid; clear wavy boundary.

2Eb1—36 to 50 inches; brownish yellow (10YR 6/6) fine sand; common medium distinct very pale brown (10YR 7/3) mottles; single grained; loose; many fine opaque minerals; extremely acid; gradual wavy boundary.

2Eb2—50 to 60 inches; yellowish brown (10YR 5/4) fine sand; single grained; loose; many fine opaque minerals; extremely acid; gradual wavy boundary.

2Bhb—60 to 66 inches; dark brown (7.5YR 3/2) fine sand; single grained; loose; extremely acid; clear wavy boundary.

2E′b—66 to 82 inches; light brownish gray (10YR 6/2) fine sand; single grained; loose; many fine opaque minerals; extremely acid.

The loamy and sandy horizons are more than 80 inches thick. Reaction ranges from extremely acid to moderately acid throughout, except where the surface layer has been limed.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 3. The E horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 8. It is fine sand, sand, loamy fine sand, or loamy sand.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 4 to 8. The upper part is typically fine sandy loam or sandy loam; however, some pedons have a thin layer of sandy clay loam. The lower part is loamy fine sand or loamy sand.

The 2Eb or 2E′b horizon, if it occurs, has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 to 8. It is sand or fine sand.

The 2Bhb horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 or 2. It is sand or fine sand.

Winton Series

The Winton series consists of moderately well drained soils that formed in loamy marine and fluvial sediments. Slopes range from 8 to 30 percent. These soils are fine-loamy, mixed, thermic Aquic Hapludults.

Winton soils are commonly adjacent to Bonneau, Noboco, Goldsboro, Craven, and Nawney soils. Bonneau and Noboco soils are well drained and are on slopes of less than 8 percent. Goldsboro soils are on slopes of 0 to 3 percent. Craven soils have a clayey particle-size class and are on slopes of less than 8 percent. Nawney soils are poorly drained and frequently flooded and are on nearly level slopes.

Typical pedon of Winton fine sandy loam, 8 to 15 percent slopes; about 1.1 miles south of Easons Crossroads in Merchants Millpond State Park, about 325 yards northeast of the intersection of Secondary Roads 1400 and 1403, on a hiking trail, about 60 feet north of the trail (State plane coordinates 2,676,500 feet E., 985,400 feet N.):

A—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; extremely acid; abrupt smooth boundary.

E—3 to 15 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; extremely acid; clear smooth boundary.

Bt1—15 to 21 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and common fine distinct yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; few fine flakes of mica; extremely acid; clear wavy boundary.

Bt2—21 to 36 inches; brownish yellow (10YR 6/6) sandy clay loam; common medium distinct strong brown (7.5YR 5/6) and light yellowish brown (2.5Y 6/4) and few fine distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; few fine flakes of mica; extremely acid; gradual wavy boundary.

Bt3—36 to 53 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct light yellowish brown (10YR 6/4) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable, slightly sticky; few faint clay films on faces of peds; thin lenses of sandy loam; extremely acid; gradual wavy boundary.

BC—53 to 65 inches; yellowish brown (10YR 5/8) sandy loam; few medium distinct light gray (10YR 7/2) and common medium distinct dark yellowish brown (10YR 4/6) mottles; weak medium subangular blocky structure parting to massive; very friable; thin lenses of sandy clay loam; extremely acid; gradual wavy boundary.

C—65 to 70 inches; brownish yellow (10YR 6/6) loamy sand; common medium distinct light gray (10YR 7/2) mottles; single grained; loose; thin lenses of sandy loam; extremely acid.

The thickness of the solum ranges from 40 to more than 60 inches. Reaction ranges from extremely acid to moderately acid throughout, except where the surface layer has been limed.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 1 to 4. The E horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 6. It is fine sandy loam, sandy loam, loamy sand, or loamy fine sand.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8. In some pedons, the lower part of the Bt horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 or 2. Mottles are in shades of red, brown, gray, or yellow. It is sandy clay loam, sandy loam, fine sandy loam, or clay loam.

The BC horizon has colors similar to those of the Bt horizon or is mottled in shades of these colors. It is fine sandy loam, sandy loam, loamy sand, or loamy fine sand.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 8, and chroma of 1 to 8. It is mottled in some pedons. It is commonly stratified and ranges from sand to clay.

Formation of the Soils

Five factors determine the kind of soil that forms in any given place. They are climate, relief, parent material, plant and animal life, and time *(5)*.

Factors of Soil Formation

Climate

Gates County has a warm, humid climate with long, hot summers and short, mild winters. The abundant heat and moisture favor chemical and biological activity. Therefore, those soils that are not saturated with water have rapid decomposition of organic matter. The abundant rainfall increases the rate of leaching in the soil. This results in soils that are acid, strongly leached, and low in fertility. The abundant rainfall also helps to break down soil particles, translocate clay into the subsoil, and form soil structure.

Relief

The relief in central Gates County largely results from the dissection of parts of the originally nearly level landscape by creeks. Stream dissection is especially evident in the area of Merchants Millpond State Park. The relief in the western part of the county is largely caused by the deposition of sands by the Chowan River and possibly by wind action.

The soils near drainageways and on ridges are generally moderately well drained or well drained. Some of the sandy soils on ridges are somewhat excessively drained. The seasonal high water table in most of these soils generally ranges from 2 to 4 feet below the surface. The largest areas of these soils are in the north-central part of the county and on the sandy ridges along the Chowan River.

The soils in depressions and on nearly level interstream divides are somewhat poorly drained to very poorly drained. The very poorly drained organic soils in the Great Dismal Swamp formed as a result of accumulations of organic matter on the flat, wet mineral substrata. The seasonal high water table in these soils is generally at or near the surface. Large areas of poorly drained mineral soils are in the nearly level central part of the county.

Parent Material

The soils in Gates County formed in sediments of the Pamlico, Talbot, and Wicomico marine and river terraces, in accumulations of organic matter, and in recently deposited material in drainageways (fig. 11). These differences in parent material result in the different makeup of the soils in the county. For example, Noboco, Goldsboro, Lynchburg, Rains, Pantego, State, Altavista, and Tomotley soils formed in moderately fine textured sediments, while Craven, Lenoir, Bladen, and Roanoke soils formed in fine textured sediments.

On the Pamlico Surface, the sand has a mixed mineralogy, while the sand on the older, more weathered Talbot and Wicomico Surfaces has a siliceous mineralogy. The accumulations of organic matter have resulted in the formation of Belhaven and Pungo soils in the Great Dismal Swamp and Dorovan soils on the flood plain along the Chowan River.

Plant and Animal Life

Plants and animals deposit organic matter on the surface, where it is broken down by micro-organisms. In the saturated soils, micro-organisms use the oxygen in the water, which results in anaerobic conditions that may exist for days or even weeks. These conditions make iron compounds more soluble, allowing the iron to leach through the profile and resulting in a gray subsoil in the poorly drained and very poorly drained soils. Saturated conditions in the soil also slow the decomposition of organic matter, which results in the development of organic soils.

Plant roots take up nutrients from the lower horizons and deposit them on the surface layer. They also help to form soil structure and porosity. Plants protect the soil from wind and water erosion. Burrowing animals transfer soil particles from one horizon to another.

Time

The formation of horizons in a soil takes many years. Relief changes with time. Some of the differences in the soils in Gates County reflect differences in age and changes in relief because of natural or geologic erosion.

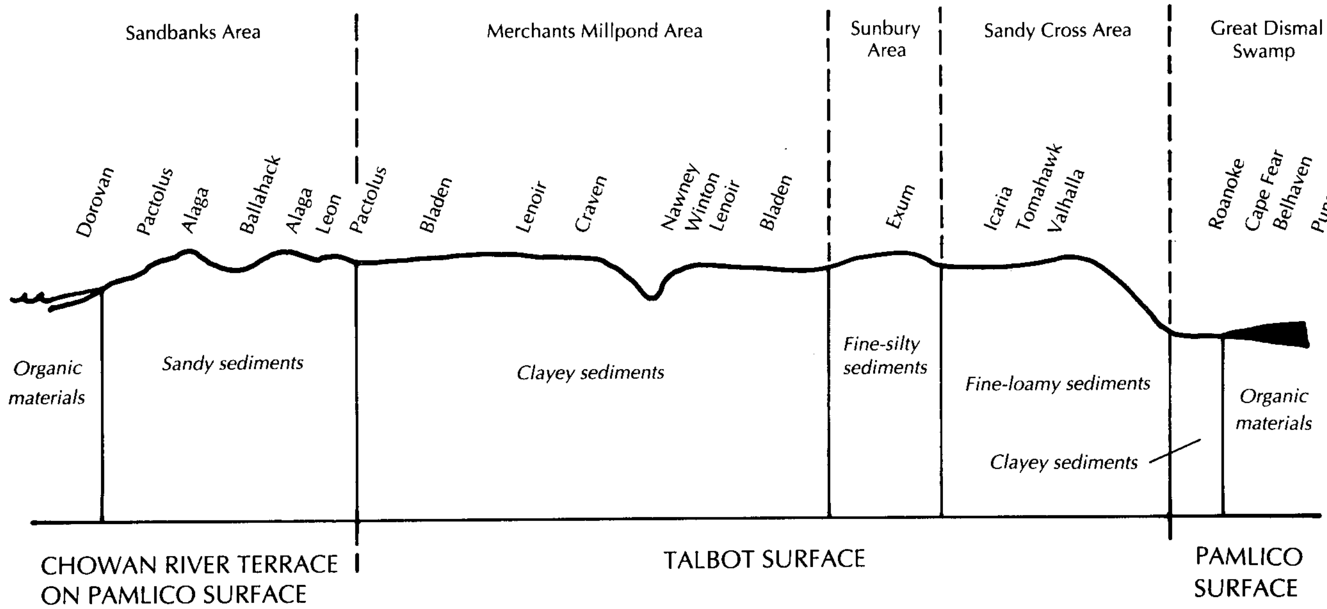

Figure 11.—A west-to-east cross section of the dominant soils and their parent material in Gates County.

The older soils on the Talbot and Wicomico Surfaces, such as Noboco, Goldsboro, Lynchburg, and Rains soils, have well developed horizons and a solum that is more than 60 inches thick. The younger State, Altavista, and Tomotley soils on the lower Pamlico marine terrace also have well developed horizons but generally have a solum that is 40 to 60 inches thick. The soils on the Pamlico Surface contain a higher percentage of weatherable minerals than that of the soils on the older uplands. Nawney, Ballahack, and Chowan soils on flood plains have little or no horizon development and the highest percentage of weatherable minerals. They are the youngest soils in the county.

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Glossary

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

Animal unit month (AUM). The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

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

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

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

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

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

CMAI (cumulative mean annual increment). The age or rotation at which growing stock of a forest produces the greatest annual growth (for that time period). It is the age at which periodic annual growth and mean annual growth are equal.

Coarse textured soil. Sand or loamy sand.

Coastal Plain. The physiographic region of eastern North Carolina that consists of ocean-deposited sediments of sand, silt, and clay. These areas of sediments are level to rolling and vary in thickness.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. 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.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

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

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dbh (diameter at breast height). The diameter of a tree at 4.5 feet above the ground level on the uphill side.

Delineation. The process of drawing or plotting features on a map with lines and symbols.

Denitrification. The biochemical reduction of nitrate or nitrite to gaseous nitrogen either as molecular nitrogen or as an oxide of nitrogen.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

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 they are wet 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.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Engineering test data. Laboratory test and mechanical analysis of selected soils in the county.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:

Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most of the area, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.

Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. Terms describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in tons per acre (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per acre	none
Less than 1 ton per acre	slight
1 to 5 tons per acre	moderate
5 to 10 tons per acre	severe
More than 10 tons per acre	very severe

Evapotranspiration. The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Firebreak. Area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

Flooding. The temporary covering of the surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month).

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; growing or living in streams or ponds; produced by river action, as a fluvial plain.

Forest type. A classification of forest land based on the species forming the majority of live-tree stocking.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Geomorphic surface. A part of the surface of the land that represents an episode of landscape development and consists of one or more landforms. It is a mappable part of the land surface that is defined in terms of morphology (relief, slope, aspect, etc.); origin (erosional, constructional, etc.); age (absolute or relative); and stability of component landforms.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Ground water (geology). Water filling all the unblocked pores of the material below the water table.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have 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 in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Sprinkler.—Water is sprayed over the 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.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Low strength. The soil is not strong enough to support loads.

Marsh. Periodically wet or continually flooded areas with the surface not deeply submerged. These areas are dominantly covered with sedges, cattails, rushes, or other hydrophytic (water-loving) plants. Lowland areas bordering rivers, creeks, and lakes that are flooded with fresh water and dominated by halophobic (salt-intolerant) plants.

Mean annual increment. The average yearly volume of a stand of trees from the year of origin to the age under consideration.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

No-till planting. A method of planting crops in which there is virtually no seedbed preparation. A thin slice of the soil is opened, and the seed is planted at the desired depth.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Overstory. The portion of the trees in a forest stand forming the upper crown cover.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Pocosin. Waterlogged land in large, flat interstream areas that are elevated above the distant flood plains. The soils are typically high in content of organic matter and support plants that are tolerant of wetness.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	below 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
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

Reforestation. The process in which tree seedlings are planted or become naturally established in an area of land that was once forested.

Relief. The elevations or inequalities of a land surface, considered collectively.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Runoff class (surface). Refers to the rate at which water flows away from the soil over the surface without infiltrating. Six classes of rate of runoff are recognized:

Ponded.—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level and nearly level soils in depressions. The water depth may fluctuate greatly.

Very slow.—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very porous.

Slow.—Surface water flows away so slowly that free water stands on the surface for moderate periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

Medium.—Surface water flows away so rapidly that free water stands on the surface for only short periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level or gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

Rapid.—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils mainly are moderately steep or steep and have moderate or slow rates of absorption.

Very rapid.—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

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.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Seasonal high water table. The highest level of a saturated zone (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

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.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

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.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Skidding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most systems involve pulling the trees with wire cables attached to a bulldozer or rubber-tired tractor. Generally, felled trees are skidded or pulled with one end lifted to reduce friction and soil disturbance.

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. In this survey area slope classes are as follows:

Nearly level	0 to 3 percent
Gently sloping	2 to 6 percent
Strongly sloping	6 to 15 percent
Moderately steep	15 to 30 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil compaction. An alteration of soil structure that ultimately can affect the biological and chemical properties of the soil. Compaction decreases the extent of voids and increases bulk density.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey.

They are generally designed to reflect significant differences in use and management.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Soil strength. Load supporting capacity of a soil at specific moisture and density conditions.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stand density. The degree to which an area is covered with living trees. It is usually expressed in units of basal areas per acre, number of trees per acre, or the percentage of ground covered by the tree canopy as viewed from above.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsidence. A pronounced reduction in volume in some drained soils because of the removal of water, shrinkage of organic material, and the oxidation of organic compounds. Generally associated with soils that have a high content of organic matter.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Universal Soil Loss Equation. An equation used to design water erosion control systems. The equation is A=RKLSPC wherein A is the average annual soil loss in tons per acre per year, R is the rainfall factor, K is the soil erodibility factor, L is the length of slope, S is the steepness of slope, P is the conservation practice factor, and C is the cropping and management factor.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Yield (forest land). The volume of wood fiber from harvested trees taken from a certain unit of area. Yield is usually measured in board feet or cubic feet per acre.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1973-86 at Murfreesboro, North Carolina)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average daily	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	48.0	26.9	37.5	75	4	29	4.49	2.63	6.13	7	1.6
February----	52.2	28.9	40.6	82	10	46	4.26	2.23	6.04	7	2.3
March-------	61.8	36.7	49.3	83	19	104	4.71	2.93	6.31	8	1.9
April-------	72.3	45.2	58.8	90	26	273	3.52	1.19	5.42	6	.0
May---------	78.9	53.8	66.4	91	35	508	4.56	2.41	6.44	8	.0
June--------	85.4	61.3	73.4	97	45	702	3.95	2.19	5.50	6	.0
July--------	88.8	65.7	77.3	99	50	846	4.52	1.58	6.94	8	.0
August------	88.3	64.9	76.6	99	48	825	4.85	2.11	7.18	5	.0
September---	82.9	58.4	70.7	96	40	621	4.45	1.56	6.82	6	.0
October-----	72.8	47.3	60.1	89	29	327	3.65	1.18	5.66	5	.0
November----	63.6	39.8	51.7	82	19	150	3.28	1.31	4.93	5	.0
December----	53.8	31.3	42.6	76	10	26	4.15	1.89	6.08	8	.4
Yearly:											
Average---	70.7	46.7	58.8	---	---	---	---	---	---	---	---
Extreme---	---	---	---	101	3	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,457	50.39	41.54	59.93	79	6.2

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1973-86 at Murfreesboro, North Carolina)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 6	Apr. 16	Apr. 20
2 years in 10 later than--	Mar. 29	Apr. 9	Apr. 15
5 years in 10 later than--	Mar. 12	Mar. 25	Apr. 4
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 9	Oct. 23	Oct. 9
2 years in 10 earlier than--	Nov. 15	Oct. 29	Oct. 15
5 years in 10 earlier than--	Nov. 27	Nov. 11	Oct. 25

TABLE 3.--GROWING SEASON

(Recorded in the period 1973-86 at Murfreesboro, North Carolina)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	235	201	184
8 years in 10	243	212	191
5 years in 10	259	232	205
2 years in 10	277	255	221
1 year in 10	293	274	234

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
AaB	Alaga sand, 0 to 5 percent slopes	7,916	3.7
AtA	Altavista fine sandy loam, 0 to 3 percent slopes	2,623	1.2
BaA	Ballahack loam, 0 to 2 percent slopes, occasionally flooded	4,403	2.0
BeA	Belhaven muck, 0 to 2 percent slopes	4,705	2.2
BnA	Bladen loam, 0 to 2 percent slopes	49,239	22.7
BoB	Bonneau loamy fine sand, 0 to 6 percent slopes	3,381	1.5
CfA	Cape Fear loam, 0 to 2 percent slopes	2,855	1.3
ChA	Chowan loam, 0 to 2 percent slopes, frequently flooded	3,001	1.4
CoB	Conetoe fine sand, 0 to 5 percent slopes	5,280	2.4
CrA	Craven fine sandy loam, 0 to 1 percent slopes	10,292	4.8
CrB	Craven fine sandy loam, 1 to 4 percent slopes	6,096	2.8
CrC	Craven fine sandy loam, 4 to 8 percent slopes	1,230	0.6
DoA	Dorovan mucky peat, 0 to 2 percent slopes, frequently flooded	18,478	8.5
ExA	Exum silt loam, 0 to 2 percent slopes	1,733	0.8
GoA	Goldsboro fine sandy loam, 0 to 3 percent slopes	16,576	7.7
IcA	Icaria fine sandy loam, 0 to 2 percent slopes	4,264	2.0
LeA	Lenoir loam, 0 to 2 percent slopes	6,565	3.0
LoA	Leon sand, 0 to 2 percent slopes	1,464	0.7
LyA	Lynchburg fine sandy loam, 0 to 2 percent slopes	3,057	1.4
NaA	Nawney loam, 0 to 2 percent slopes, frequently flooded	9,495	4.4
NoA	Noboco fine sandy loam, 0 to 2 percent slopes	3,461	1.6
NoB	Noboco fine sandy loam, 2 to 6 percent slopes	2,775	1.3
PaA	Pactolus sand, 0 to 3 percent slopes	4,622	2.1
PnA	Pantego fine sandy loam, 0 to 2 percent slopes	6,457	3.0
PuA	Pungo muck, 0 to 2 percent slopes	13,180	6.1
RaA	Rains fine sandy loam, 0 to 2 percent slopes	11,535	5.3
RoA	Roanoke loam, 0 to 2 percent slopes	2,588	1.2
StA	State fine sandy loam, 0 to 2 percent slopes	499	0.2
StB	State fine sandy loam, 2 to 6 percent slopes	582	0.3
TaA	Tomahawk fine sand, 0 to 3 percent slopes	2,100	1.0
ToA	Tomotley fine sandy loam, 0 to 2 percent slopes	1,501	0.7
Ud	Udorthents, loamy	322	0.1
VaB	Valhalla fine sand, 0 to 6 percent slopes	1,025	0.5
WnD	Winton fine sandy loam, 8 to 15 percent slopes	1,802	0.8
WnE	Winton fine sandy loam, 15 to 30 percent slopes	1,035	0.5
	Water areas less than 40 acres in size	343	0.2
	Total	216,480	100.0

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Cotton lint	Improved bermudagrass	Peanuts	Soybeans	Tobacco	Wheat
		Bu	Lbs	AUM*	Lbs	Bu	Lbs	Bu
AaB------------- Alaga	IIIs	60	---	7.5	2,000	---	---	---
AtA------------- Altavista	IIw	125	650	---	3,000	42	3,000	55
BaA------------- Ballahack	VIw	---	---	---	---	---	---	---
BeA**----------- Belhaven	VIIIw	---	---	---	---	---	---	---
BnA**----------- Bladen	VIw	105	500	---	---	35	---	45
BoB------------- Bonneau	IIs	85	700	8.5	2,900	30	2,600	35
CfA**----------- Cape Fear	VIw	---	---	---	---	---	---	---
ChA------------- Chowan	VIIw	---	---	---	---	---	---	---
CoB------------- Conetoe	IIs	75	600	---	3,000	25	2,200	30
CrA------------- Craven	IIw	115	600	---	2,900	40	2,700	55
CrB------------- Craven	IIIe	105	500	---	2,800	35	2,500	50
CrC------------- Craven	IVe	90	400	---	---	30	---	---
DoA------------- Dorovan	VIIw	---	---	---	---	---	---	---
ExA------------- Exum	IIw	150	750	9.0	3,400	50	3,000	60
GoA------------- Goldsboro	IIw	150	700	9.0	3,600	42	3,000	60
IcA**----------- Icaria	VIw	120	---	---	---	35	---	50
LeA------------- Lenoir	IIIw	100	525	---	2,700	40	2,200	45
LoA------------- Leon	IVw	50	---	---	---	---	---	---
LyA------------- Lynchburg	IIw	130	675	---	2,800	45	2,800	60

See footnotes at end of table.

TABLE 5.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Cotton lint	Improved bermudagrass	Peanuts	Soybeans	Tobacco	Wheat
		Bu	Lbs	AUM*	Lbs	Bu	Lbs	Bu
NaA------------- Nawney	VIIw	---	---	---	---	---	---	---
NoA------------- Noboco	I	115	700	9.0	4,000	45	3,000	60
NoB------------- Noboco	IIe	110	700	9.0	3,700	40	2,900	55
PaA------------- Pactolus	IIIs	65	---	7.0	2,200	25	1,800	---
PnA**----------- Pantego	VIw	135	---	---	---	50	---	50
PuA**----------- Pungo	VIIw	---	---	---	---	---	---	---
RaA------------- Rains	IIIw	125	450	---	---	45	2,300	---
RoA**----------- Roanoke	IVw	120	---	---	---	40	---	45
StA------------- State	I	130	650	9.0	3,300	45	3,000	60
StB------------- State	IIe	120	650	9.0	3,000	40	2,700	60
TaA------------- Tomahawk	IIw	75	650	---	---	25	2,400	45
ToA**----------- Tomotley	IVw	130	---	---	---	40	---	45
Ud-------------- Udorthents	VIIe	---	---	---	---	---	---	---
VaB------------- Valhalla	IIIs	70	600	---	2,400	20	2,000	---
WnD------------- Winton	IVe	60	---	---	---	---	---	---
WnE------------- Winton	VIe	---	---	---	---	---	---	---

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** The capability subclasses and yields shown are for undrained conditions. See the map unit description for the capability subclass in drained areas.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordi- nation symbol	Management concerns: Erosion hazard	Management concerns: Equip- ment limita- tion	Management concerns: Seedling mortal- ity	Management concerns: Plant competi- tion	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
AaB------------- Alaga	8S	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	80	110	Loblolly pine.
						Blackjack oak-------	---	---	
						Southern red oak----	---	---	
						Post oak------------	---	---	
						White oak-----------	---	---	
AtA------------- Altavista	9A	Slight	Slight	Slight	Moderate	Loblolly pine-------	91	133	Loblolly pine.
						Longleaf pine-------	87	117	
						White oak-----------	77	59	
						Shortleaf pine------	---	---	
						Sweetgum------------	---	---	
						Red maple-----------	---	---	
						Yellow-poplar-------	---	---	
						Southern red oak----	---	---	
						Water oak-----------	---	---	
						American beech------	---	---	
						Hickory-------------	---	---	
						Willow oak----------	---	---	
						Blackgum------------	---	---	
						Post oak------------	---	---	
BaA------------- Ballahack	7W	Slight	Severe	Severe	Severe	Yellow-poplar-------	94	97	Loblolly pine, sweetgum, water tupelo.
						Loblolly pine-------	96	145	
						Water oak-----------	100	---	
						Sweetgum------------	111	176	
						Pond pine-----------	80	---	
						Baldcypress---------	---	---	
						Swamp tupelo--------	---	---	
						Green ash-----------	---	---	
						Water tupelo--------	---	---	
						Willow oak----------	---	---	
						Swamp chestnut oak--	---	---	
						Water oak-----------	---	---	
						Red maple-----------	---	---	
BeA------------- Belhaven	6W	Slight	Severe	Severe	Severe	Loblolly pine-------	65	85	Loblolly pine.
						Pond pine-----------	60	39	
						Sweetgum------------	---	---	
						Red maple-----------	---	---	
						Blackgum------------	---	---	
						Atlantic white-cedar	---	---	
BnA------------- Bladen	9W	Slight	Severe	Severe	--------	Loblolly pine-------	94	140	Loblolly pine, American sycamore, water oak, Nuttall oak.
						Sweetgum------------	90	106	
						Water oak-----------	---	---	
						Hickory-------------	---	---	
						Willow oak----------	---	---	
						Red maple-----------	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
BoB------------- Bonneau	9S	Slight	Moderate	Moderate	--------	Loblolly pine------- Longleaf pine------- White oak----------- Hickory------------- Sweetgum------------ Southern red oak---- Red maple----------- American beech------	86 75 --- --- --- --- --- ---	129 86 --- --- --- --- --- ---	Loblolly pine, longleaf pine.
CfA------------- Cape Fear	11W	Slight	Severe	Severe	Severe	Loblolly pine------- Sweetgum------------ Willow oak---------- Water oak----------- Water tupelo-------- Baldcypress--------- Red maple----------- Swamp white oak----- Atlantic white-cedar	100 --- 86 --- --- --- --- --- ---	154 --- 81 --- --- --- --- --- ---	Loblolly pine.
ChA------------- Chowan	9W	Slight	Severe	Severe	Severe	Water tupelo-------- Green ash----------- Sweetgum------------ Baldcypress--------- Red maple----------- Pond pine----------- Atlantic white-cedar	84 98 --- --- --- --- ---	125 79 --- --- --- --- ---	Baldcypress, green ash.
CoB------------- Conetoe	8S	Slight	Moderate	Moderate	Slight	Loblolly pine------- Southern red oak---- Post oak------------ White oak----------- Hickory------------- Sweetgum------------	85 --- --- --- --- ---	120 --- --- --- --- ---	Loblolly pine.
CrA, CrB, CrC--- Craven	9C	Slight	Moderate	Slight	Moderate	Loblolly pine------- White oak----------- Willow oak---------- Southern red oak---- Sweetgum------------ Red maple----------- Yellow-poplar------- Hickory-------------	88 90 85 90 --- --- --- ---	127 72 80 72 --- --- --- ---	Loblolly pine.
DoA------------- Dorovan	7W	Slight	Severe	Severe	--------	Blackgum------------ Sweetbay------------ Baldcypress--------- Swamp tupelo-------- Green ash----------- Red maple----------- Water tupelo--------	70 --- --- --- --- --- ---	100 --- --- --- --- --- ---	Baldcypress.
ExA------------- Exum	8A	Slight	Slight	Slight	Severe	Loblolly pine------- Longleaf pine------- Sweetgum------------ Yellow-poplar------- Southern red oak---- White oak-----------	82 --- --- --- --- ---	114 --- --- --- --- ---	Loblolly pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
GoA------------- Goldsboro	9A	Slight	Slight	Slight	Moderate	Loblolly pine-------	88	127	Loblolly pine.
						Longleaf pine-------	66	70	
						Slash pine----------	---	---	
						Sweetgum------------	---	---	
						Southern red oak----	---	---	
						White oak-----------	---	---	
						Water oak-----------	---	---	
						Yellow-poplar-------	---	---	
						Red maple-----------	---	---	
						Hickory-------------	---	---	
						Willow oak----------	---	---	
IcA------------- Icaria	9W	Slight	Moderate	Moderate	Severe	Loblolly pine-------	86	123	Loblolly pine, sweetgum.
						Sweetgum------------	---	---	
						Red maple-----------	---	---	
						Water oak-----------	---	---	
						Sweetbay------------	---	---	
						Redbay--------------	---	---	
LeA------------- Lenoir	9W	Slight	Moderate	Slight	Severe	Loblolly pine-------	87	125	Loblolly pine.
						Water oak-----------	---	---	
						Sweetgum------------	---	---	
						Southern red oak----	---	---	
						White oak-----------	---	---	
						Swamp chestnut oak--	---	---	
						Yellow-poplar-------	---	---	
						Red maple-----------	---	---	
						Blackgum------------	---	---	
LoA------------- Leon	7W	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	76	103	Loblolly pine.
						Sweetgum------------	---	---	
						Red maple-----------	---	---	
						Yellow-poplar-------	---	---	
LyA------------- Lynchburg	9W	Slight	Moderate	Slight	Severe	Loblolly pine-------	86	123	Loblolly pine, American sycamore, sweetgum.
						Longleaf pine-------	74	88	
						Yellow-poplar-------	92	93	
						Sweetgum------------	90	106	
						Southern red oak----	---	---	
						White oak-----------	---	---	
						Blackgum------------	---	---	
						Red maple-----------	---	---	
NaA------------- Nawney	8W	Slight	Severe	Severe	Severe	Sweetgum------------	94	114	Water tupelo.
						Baldcypress---------	---	---	
						Water tupelo--------	---	---	
						Water oak-----------	---	---	
NoA, NoB-------- Noboco	9A	Slight	Slight	Slight	Moderate	Loblolly pine-------	90	131	Loblolly pine, sweetgum.
						Southern red oak----	---	---	
						Sweetgum------------	---	---	
						Red maple-----------	---	---	
						White oak-----------	---	---	
						American beech------	---	---	
						Hickory-------------	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
PaA-------------- Pactolus	9S	Slight	Moderate	Moderate	Slight	Loblolly pine-------	86	123	Loblolly pine.
						Longleaf pine-------	---	---	
						Sweetgum------------	---	---	
						Water oak-----------	---	---	
						Willow oak----------	---	---	
						Red maple-----------	---	---	
						American beech------	---	---	
PnA-------------- Pantego	9W	Slight	Severe	Severe	Severe	Loblolly pine-------	91	133	Loblolly pine, sweetgum.
						Sweetgum------------	91	109	
						Yellow-poplar-------	110	124	
						Pond pine-----------	---	---	
						Water oak-----------	---	---	
						Willow oak----------	---	---	
						Blackgum------------	---	---	
						Red maple-----------	---	---	
						Baldcypress---------	---	---	
						Water tupelo--------	---	---	
PuA-------------- Pungo	5W	Slight	Severe	Severe	Severe	Pond pine-----------	55	33	Pond pine, loblolly pine.
						Loblolly pine-------	60	76	
						Red maple-----------	---	---	
						Sweetbay------------	---	---	
						Baldcypress---------	---	---	
						Swamp tupelo--------	---	---	
						Atlantic white-cedar	---	---	
RaA-------------- Rains	10W	Slight	Severe	Severe	--------	Loblolly pine-------	94	140	Loblolly pine.
						Sweetgum------------	91	106	
						Red maple-----------	---	---	
						Water oak-----------	---	---	
						Yellow-poplar-------	---	---	
						Black cherry--------	---	---	
						Willow oak----------	---	---	
RoA-------------- Roanoke	10W	Slight	Severe	Severe	Severe	Loblolly pine-------	92	136	Loblolly pine, sweetgum, yellow-poplar.
						Willow oak----------	---	---	
						Sweetgum------------	---	---	
						Red maple-----------	---	---	
						Water oak-----------	---	---	
						Green ash-----------	---	---	
						Water tupelo--------	---	---	
StA, StB-------- State	10A	Slight	Slight	Slight	Severe	Loblolly pine-------	96	145	Loblolly pine.
						Southern red oak----	85	72	
						Yellow-poplar-------	100	107	
						Virginia pine-------	85	129	
						Hickory-------------	---	---	
						American beech------	---	---	
						White oak-----------	---	---	
						Red maple-----------	---	---	
						Sweetgum------------	---	---	
TaA-------------- Tomahawk	10W	Slight	Moderate	Moderate	--------	Loblolly pine-------	94	140	Loblolly pine.
						Red maple-----------	---	---	
						Sweetgum------------	---	---	
						Yellow-poplar-------	---	---	
						Water oak-----------	---	---	
						American beech------	---	---	

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Plant competition	Potential productivity: Common trees	Site index	Volume*	Trees to plant
ToA------------- Tomotley	10W	Slight	Moderate	Moderate	Severe	Loblolly pine-------	97	147	Loblolly pine.
						Water oak-----------	78	71	
						Willow oak----------	86	81	
						Sweetgum------------	---	---	
						Yellow-poplar-------	---	---	
						Red maple-----------	---	---	
						Water tupelo--------	---	---	
VaB------------- Valhalla	8S	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	80	110	Loblolly pine.
						Southern red oak----	---	---	
						Post oak------------	---	---	
						Sweetgum------------	---	---	
						Blackjack oak-------	---	---	
						Red maple-----------	---	---	
WnD------------- Winton	10A	Slight	Slight	Slight	Moderate	Loblolly pine-------	93	138	Loblolly pine.
						Southern red oak----	---	---	
						Sweetgum------------	---	---	
						White oak-----------	---	---	
						Water oak-----------	---	---	
						American beech------	---	---	
						Red maple-----------	---	---	
WnE------------- Winton	10R	Moderate	Moderate	Slight	Moderate	Loblolly pine-------	93	138	Loblolly pine.
						Southern red oak----	---	---	
						Sweetgum------------	---	---	
						White oak-----------	---	---	
						Water oak-----------	---	---	
						American beech------	---	---	
						Red maple-----------	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

TABLE 7.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AaB: Alaga	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty, too sandy.
AtA: Altavista	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
BaA: Ballahack	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
BeA: Belhaven	Severe: wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness, too acid.	Severe: wetness, excess humus.	Severe: too acid, wetness, excess humus.
BnA: Bladen	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
BoB: Bonneau	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
CfA: Cape Fear	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
ChA: Chowan	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
CoB: Conetoe	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.
CrA: Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
CrB: Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight	Slight.
CrC: Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Slight	Slight.
DoA: Dorovan	Severe: flooding, excess humus.	Severe: excess humus.	Severe: excess humus, flooding.	Severe: excess humus.	Severe: flooding, excess humus.
ExA: Exum	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
GoA: Goldsboro	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
IcA: Icaria	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LeA: Lenoir	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
LoA: Leon	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.	Severe: wetness, droughty.
LyA: Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NaA: Nawney	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.
NoA: Noboco	Slight	Slight	Slight	Slight	Slight.
NoB: Noboco	Slight	Slight	Moderate: slope.	Slight	Slight.
PaA: Pactolus	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: wetness, droughty, too sandy.
PnA: Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PuA: Pungo	Severe: wetness, excess humus.	Severe: wetness, excess humus, too acid.	Severe: excess humus, wetness, too acid.	Severe: wetness, excess humus.	Severe: wetness, excess humus, too acid.
RaA: Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
RoA: Roanoke	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
StA: State	Slight	Slight	Slight	Slight	Slight.
StB: State	Slight	Slight	Moderate: slope.	Slight	Slight.
TaA: Tomahawk	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: wetness, too sandy.	Moderate: wetness, droughty.
ToA: Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ud: Udorthents	Variable	Variable	Variable	Variable	Variable.
VaB: Valhalla	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Moderate: droughty.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WnD------------------- Winton	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.
WnE------------------- Winton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

TABLE 8.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AaB---------------- Alaga	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
AtA---------------- Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
BaA---------------- Ballahack	Very poor.	Poor	Poor	Poor	Poor	Good	Poor	Poor	Poor	Fair.
BeA---------------- Belhaven	Very poor.	Very poor.	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
BnA---------------- Bladen	Fair	Good	Good	Good	Good	Fair	Good	Good	Good	Fair.
BoB---------------- Bonneau	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
CfA---------------- Cape Fear	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ChA---------------- Chowan	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
CoB---------------- Conetoe	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Fair	Very poor.
CrA---------------- Craven	Good	Good	Good	Good	Good	Poor	Good	Good	Good	Poor.
CrB---------------- Craven	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CrC---------------- Craven	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
DoA---------------- Dorovan	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
ExA---------------- Exum	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
GoA---------------- Goldsboro	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
IcA---------------- Icaria	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.
LeA---------------- Lenoir	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
LoA---------------- Leon	Poor	Fair	Good	Poor	Fair	Fair	Poor	Fair	Fair	Poor.
LyA---------------- Lynchburg	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
NaA: Nawney	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
NoA, NoB: Noboco	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PaA: Pactolus	Fair	Fair	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PnA: Pantego	Fair	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor.
PuA: Pungo	Very poor.	Very poor.	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
RaA: Rains	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
RoA: Roanoke	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.
StA, StB: State	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TaA: Tomahawk	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Good	Poor.
ToA: Tomotley	Fair	Fair	Fair	Good	Good	Good	Good	Fair	Good	Good.
Ud: Udorthents	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
VaB: Valhalla	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WnD: Winton	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WnE: Winton	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

TABLE 9.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaB: Alaga	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty, too sandy.
AtA: Altavista	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, low strength.	Moderate: wetness.
BaA: Ballahack	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness.
BeA: Belhaven	Severe: excess humus, wetness.	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness.	Severe: too acid, wetness, excess humus.
BnA: Bladen	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
BoB: Bonneau	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
CfA: Cape Fear	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
ChA: Chowan	Severe: excess humus, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness, low strength.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
CoB: Conetoe	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
CrA, CrB: Craven	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Slight.
CrC: Craven	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.
DoA: Dorovan	Severe: excess humus.	Severe: subsides, flooding.	Severe: subsides, flooding.	Severe: subsides, flooding.	Severe: subsides, flooding.	Severe: flooding, excess humus.
ExA: Exum	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Slight.
GoA: Goldsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Slight.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
IcA: Icaria	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
LeA: Lenoir	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
LoA: Leon	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
LyA: Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
NaA: Nawney	Severe: cutbanks cave, wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
NoA: Noboco	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Slight	Slight.
NoB: Noboco	Moderate: wetness.	Slight	Moderate: wetness.	Moderate: slope.	Slight	Slight.
PaA: Pactolus	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty, too sandy.
PnA: Pantego	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
PuA: Pungo	Severe: excess humus, wetness.	Severe: subsides, wetness, low strength.	Severe: subsides, wetness.	Severe: subsides, wetness, low strength.	Severe: subsides, wetness, low strength.	Severe: wetness, excess humus, too acid.
RaA: Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
RoA: Roanoke	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
StA: State	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
StB: State	Severe: cutbanks cave.	Slight	Moderate: wetness.	Moderate: slope.	Moderate: low strength.	Slight.
TaA: Tomahawk	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
ToA: Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ud: Udorthents	Variable	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Variable.
VaB: Valhalla	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WnD--------------- Winton	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope.	Moderate: slope.
WnE--------------- Winton	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 10.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaB: Alaga	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
AtA: Altavista	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, too clayey.
BaA: Ballahack	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness.
BeA: Belhaven	Severe: wetness, percs slowly.	Severe: seepage, excess humus, wetness.	Severe: seepage, wetness, too acid.	Severe: seepage, wetness.	Poor: wetness, thin layer.
BnA: Bladen	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
BoB: Bonneau	Severe: wetness.	Severe: seepage.	Severe: wetness.	Severe: seepage.	Good.
CfA: Cape Fear	Severe: wetness, percs slowly.	Severe: seepage.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
ChA: Chowan	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, excess humus.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, excess humus.
CoB: Conetoe	Slight	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
CrA: Craven	Severe: wetness, percs slowly.	Moderate: seepage.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
CrB, CrC: Craven	Severe: wetness, percs slowly.	Moderate: slope, seepage.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
DoA: Dorovan	Severe: subsides, flooding.	Severe: subsides, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: excess humus.

TABLE 10.--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
ExA: Exum	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
GoA: Goldsboro	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
IcA: Icaria	Severe: wetness.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: wetness.
LeA: Lenoir	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
LoA: Leon	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
LyA: Lynchburg	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
NaA: Nawney	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
NoA, NoB: Noboco	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
PaA: Pactolus	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
PnA: Pantego	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
PuA: Pungo	Severe: subsides, wetness, percs slowly.	Severe: excess humus, wetness.	Severe: seepage, wetness, excess humus.	Severe: wetness.	Poor: wetness, excess humus, too acid.
RaA: Rains	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
RoA: Roanoke	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
StA, StB: State	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, thin layer.
TaA: Tomahawk	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness, seepage.	Severe: seepage, wetness.	Poor: thin layer.

TABLE 10.--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
ToA----------------- Tomotley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Ud------------------ Udorthents	Variable---------	Variable---------	Variable---------	Severe: slope.	Variable.
VaB----------------- Valhalla	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
WnD----------------- Winton	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, wetness, slope.
WnE----------------- Winton	Severe: wetness, percs slowly, slope.	Severe: seepage, slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope.

TABLE 11.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Topsoil
AaB: Alaga	Good	Probable	Poor: too sandy.
AtA: Altavista	Fair: wetness, low strength.	Improbable: excess fines.	Fair: too clayey.
BaA: Ballahack	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
BeA: Belhaven	Poor: wetness.	Improbable: excess fines.	Poor: excess humus, wetness, too acid.
BnA: Bladen	Poor: low strength, wetness.	Improbable: excess fines.	Poor: thin layer, wetness.
BoB: Bonneau	Good	Improbable: excess fines.	Fair: too sandy.
CfA: Cape Fear	Poor: wetness, low strength.	Improbable: excess fines.	Poor: too clayey, wetness.
ChA: Chowan	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
CoB: Conetoe	Good	Probable	Poor: too sandy.
CrA, CrB, CrC: Craven	Fair: wetness.	Improbable: excess fines.	Poor: too clayey.
DoA: Dorovan	Poor: wetness.	Probable	Poor: excess humus, wetness.
ExA: Exum	Fair: wetness, low strength.	Improbable: excess fines.	Fair: too clayey.
GoA: Goldsboro	Fair: wetness.	Improbable: excess fines.	Fair: too clayey.
IcA: Icaria	Poor: wetness.	Probable	Poor: wetness.
LeA: Lenoir	Poor: low strength.	Improbable: excess fines.	Poor: too clayey.
LoA: Leon	Poor: wetness.	Probable	Poor: too sandy, wetness.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Topsoil
LyA: Lynchburg	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
NaA: Nawney	Poor: low strength, wetness.	Improbable: excess fines.	Poor: wetness.
NoA, NoB: Noboco	Fair: wetness.	Improbable: excess fines.	Fair: too clayey.
PaA: Pactolus	Fair: wetness.	Probable	Poor: too sandy.
PnA: Pantego	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
PuA: Pungo	Poor: wetness.	Improbable: excess humus.	Poor: excess humus, wetness, too acid.
RaA: Rains	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
RoA: Roanoke	Poor: wetness.	Improbable: excess fines.	Poor: too clayey, wetness.
StA, StB: State	Good	Probable	Fair: too clayey.
TaA: Tomahawk	Fair: wetness.	Probable	Fair: too sandy.
ToA: Tomotley	Poor: wetness.	Improbable: excess fines.	Poor: wetness.
Ud: Udorthents	Poor: slope.	Improbable: excess fines.	Variable.
VaB: Valhalla	Good	Probable	Poor: too sandy.
WnD: Winton	Fair: wetness.	Improbable: excess fines.	Fair: slope, too clayey, small stones.
WnE: Winton	Fair: wetness, slope.	Improbable: excess fines.	Poor: slope.

TABLE 12.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions
AaB: Alaga	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake.	Too sandy, soil blowing.
AtA: Altavista	Moderate: seepage.	Severe: piping, wetness.	Moderate: deep to water, slow refill.	Favorable	Wetness	Wetness, soil blowing.
BaA: Ballahack	Severe: seepage.	Severe: wetness.	Slight	Flooding	Wetness, flooding.	Wetness.
BeA: Belhaven	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Subsides, too acid.	Wetness, soil blowing, too acid.	Wetness, soil blowing.
BnA: Bladen	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
BoB: Bonneau	Severe: seepage.	Severe: thin layer.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Soil blowing.
CfA: Cape Fear	Slight	Severe: hard to pack, wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
ChA: Chowan	Severe: seepage.	Severe: excess humus, wetness.	Severe: slow refill.	Flooding, subsides.	Wetness, flooding.	Wetness.
CoB: Conetoe	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, soil blowing.	Too sandy, soil blowing.
CrA, CrB: Craven	Moderate: seepage.	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
CrC: Craven	Moderate: seepage, slope.	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Wetness, percs slowly, slope.	Wetness, percs slowly.
DoA: Dorovan	Moderate: seepage.	Severe: excess humus.	Severe: cutbanks cave.	Ponding, flooding, subsides.	Soil blowing, flooding.	Soil blowing.
ExA: Exum	Slight	Moderate: piping, wetness.	Severe: slow refill.	Favorable	Wetness, erodes easily, soil blowing.	Erodes easily, wetness, soil blowing.
GoA: Goldsboro	Moderate: seepage.	Moderate: piping, wetness.	Moderate: deep to water, slow refill.	Favorable	Wetness, soil blowing.	Wetness, soil blowing.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions
IcA: Icaria	Severe: seepage.	Severe: wetness, piping, seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness	Wetness, too sandy.
LeA: Lenoir	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.
LoA: Leon	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.
LyA: Lynchburg	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness.
NaA: Nawney	Severe: seepage.	Severe: wetness.	Slight	Flooding	Flooding	Wetness.
NoA: Noboco	Moderate: seepage.	Severe: piping.	Moderate: deep to water.	Favorable	Wetness	Wetness.
NoB: Noboco	Moderate: seepage, slope.	Severe: piping.	Moderate: deep to water.	Slope	Slope, wetness.	Wetness.
PaA: Pactolus	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness, too sandy, soil blowing.
PnA: Pantego	Moderate: seepage.	Severe: wetness, piping.	Moderate: slow refill.	Favorable	Wetness	Wetness.
PuA: Pungo	Slight	Severe: excess humus, wetness.	Severe: slow refill.	Percs slowly, subsides, too acid.	Wetness, soil blowing, percs slowly.	Wetness, soil blowing, percs slowly.
RaA: Rains	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness	Wetness, soil blowing.
RoA: Roanoke	Severe: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, percs slowly, erodes easily.	Erodes easily, wetness, percs slowly.
StA: State	Severe: seepage.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing	Soil blowing.
StB: State	Severe: seepage.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing, slope.	Soil blowing.
TaA: Tomahawk	Severe: seepage.	Severe: piping, wetness, seepage.	Severe: cutbanks cave.	Cutbanks cave	Wetness, droughty, fast intake.	Wetness.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Terraces and diversions
ToA--------------- Tomotley	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable------	Wetness, soil blowing.	Wetness, soil blowing.
Ud---------------- Udorthents	Variable-------	Slight---------	Severe: no water.	Deep to water	Variable-------	Variable.
VaB--------------- Valhalla	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Slope, droughty, fast intake.	Too sandy, soil blowing.
WnD, WnE---------- Winton	Severe: slope.	Moderate: piping, wetness.	Severe: no water.	Slope----------	Slope, wetness.	Slope, wetness.

TABLE 13.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
AaB-------------- Alaga	0-5	Sand-------------	SM, SP-SM	A-2, A-1-b, A-3	0	100	90-100	40-70	5-25	---	NP
	5-99	Sand, loamy sand, loamy fine sand.	SM, SW-SM, SP-SM	A-2	0	100	100	50-80	10-35	<25	NP-4
AtA-------------- Altavista	0-9	Fine sandy loam	ML, CL-ML, SM, SC-SM	A-4	0	95-100	90-100	65-99	35-60	<23	NP-7
	9-40	Sandy clay loam, loam, sandy loam.	CL, CL-ML, SC, SC-SM	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	20-45	5-28
	40-72	Variable---------	---	---	---	---	---	---	---	---	---
BaA-------------- Ballahack	0-35	Loam-------------	SM, SC, CL, ML	A-4	0	100	100	60-95	36-70	<30	NP-10
	35-55	Sandy clay loam, loam.	SC, CL	A-4, A-6	0	100	100	70-98	36-65	20-40	8-20
	55-70	Stratified sand to sandy clay.	SM, SC, ML, CL	A-2, A-4	0	100	95-100	50-95	15-60	<30	NP-10
BeA-------------- Belhaven	0-20	Muck-------------	PT	---	---	---	---	---	---	---	---
	20-24	Sandy loam, fine sandy loam, mucky loam.	SM, SC, SC-SM	A-2, A-4	0	100	100	60-85	30-49	<30	NP-10
	24-65	Loam, clay loam, sandy clay loam.	CL, CL-ML, SC, SC-SM	A-4, A-6	0	100	100	80-100	36-95	15-36	4-15
	65-72	Stratified sand to sandy loam.	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-35	---	NP
BnA-------------- Bladen	0-9	Loam-------------	CL, ML, CL-ML	A-4	0	100	98-100	80-100	51-90	<30	NP-10
	9-64	Clay, sandy clay, clay loam.	CL, CH	A-7	0	100	99-100	75-100	55-85	45-67	23-45
	64-90	Clay, sandy clay, clay loam.	CL, CH, SC	A-4, A-6, A-7	0	100	89-99	75-95	45-75	25-60	8-35
BoB-------------- Bonneau	0-27	Loamy fine sand	SM	A-2	0	100	100	50-95	15-35	---	NP
	27-51	Sandy loam, sandy clay loam, fine sandy loam.	SC, SC-SM	A-2, A-6, A-4	0	100	100	60-100	30-50	21-40	4-21
	51-72	Sandy loam, sandy clay loam, sandy clay.	CL, SC, SC-SM, CL-ML	A-4, A-6, A-2	0	100	100	60-95	25-60	20-40	4-18
CfA-------------- Cape Fear	0-13	Loam-------------	ML, CL-ML, CL	A-4, A-6	0	100	95-100	85-100	60-90	20-40	3-15
	13-41	Clay loam, clay, silty clay.	ML, CL, MH, CH	A-7	0	100	95-100	90-100	60-85	41-65	15-35
	41-72	Variable---------	---	---	---	---	---	---	---	---	---
ChA-------------- Chowan	0-6	Loam-------------	CL-ML, ML, MH	A-7-5, A-4, A-6	0	100	100	90-100	85-95	22-60	4-24
	6-35	Loam, silt loam, silty clay loam.	CL, MH, ML	A-7-5, A-4, A-6	0	100	100	90-100	85-96	22-62	6-30
	35-72	Sapric material	PT	---	---	---	---	---	---	---	NP

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
CoB-------------- Conetoe	0-22	Fine sand, loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	100	50-99	5-30	<20	NP
	22-41	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC, SC-SM	A-2, A-4	0	100	100	50-99	20-40	<30	NP-10
	41-72	Loamy sand, fine sand.	SM, SP, SP-SM	A-2, A-3, A-1	0	100	100	40-99	4-30	<20	NP
CrA, CrB, CrC---- Craven	0-8	Fine sandy loam	ML, CL, SM, SC	A-4, A-6	0	100	95-100	75-100	45-90	<35	NP-15
	8-51	Clay, clay loam	CH, CL	A-7	0	100	95-100	90-100	65-98	40-70	24-43
	51-72	Loam, sandy loam, loamy sand.	SM, SC-SM, SC	A-2, A-4, A-6	0	100	95-100	50-100	15-49	<35	NP-15
DoA-------------- Dorovan	0-2	Mucky peat-------	PT	---	0	---	---	---	---	---	---
	2-72	Muck-------------	PT	---	0	---	---	---	---	---	---
ExA-------------- Exum	0-19	Silt loam--------	ML, CL-ML, CL	A-4	0	100	95-100	80-100	51-80	<25	NP-10
	19-72	Clay loam, silty clay loam, sandy clay loam.	CL	A-4, A-6, A-7	0	100	95-100	90-100	60-90	22-49	8-30
GoA-------------- Goldsboro	0-8	Fine sandy loam	SM, SC-SM, SC	A-2, A-4, A-6	0	95-100	95-100	50-100	15-45	<25	NP-14
	8-27	Sandy clay loam, sandy loam, loam.	SC-SM, SC, CL-ML, CL	A-2, A-4, A-6	0	98-100	95-100	60-100	25-55	16-37	4-18
	27-72	Sandy clay loam, clay loam, sandy clay.	SC, CL, CL-ML, CH	A-4, A-6, A-7-6	0	95-100	90-100	65-95	36-70	25-55	6-32
IcA-------------- Icaria	0-14	Fine sandy loam	SM, SC-SM, ML	A-2, A-4	0	98-100	98-100	65-95	30-65	<30	NP-7
	14-36	Sandy clay loam, clay loam, loam.	SC, CL	A-4, A-6	0	98-100	98-100	75-95	36-75	18-40	7-18
	36-55	Loamy sand, sand, loamy fine sand.	SM	A-2	0	100	100	50-85	15-30	---	NP
	55-62	Sand, fine sand	SM, SP-SM	A-2	0	100	100	50-75	10-30	---	NP
LeA-------------- Lenoir	0-7	Loam-------------	ML, CL, CL-ML	A-4	0	100	100	85-98	60-85	20-35	3-10
	7-72	Clay, silty clay, clay loam.	CL, CH	A-6, A-7	0	100	100	85-99	55-95	30-55	11-35
LoA-------------- Leon	0-11	Sand-------------	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
	11-14	Sand, fine sand, loamy sand.	SM, SP-SM, SP	A-3, A-2-4	0	100	100	80-100	3-20	---	NP
	14-80	Sand, fine sand	SP, SP-SM	A-3, A-2-4	0	100	100	80-100	2-12	---	NP
LyA-------------- Lynchburg	0-8	Fine sandy loam	SM, ML, SC-SM, CL-ML	A-2, A-4	0	92-100	90-100	75-100	25-55	<30	NP-7
	8-58	Sandy clay loam, clay loam.	SC-SM, SC, CL, CL-ML	A-2, A-4, A-6	0	92-100	90-100	70-100	25-67	15-40	4-18
	58-72	Clay-------------	CL, ML, CH, MH	A-7-5, A-7-6	0	100	95-100	90-100	65-95	40-50	15-25

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
NaA----------------------- Nawney	0-1	Loam---------------------	SM, SC, SC-SM	A-2, A-4	0	100	98-100	60-90	30-50	<28	NP-9
	1-55	Stratified sandy loam to silty clay loam.	SM, SC, ML, CL	A-4, A-6, A-7	0	100	98-100	60-100	35-95	14-46	3-25
	55-62	Variable---------------	---	---	---	---	---	---	---	---	---
NoA, NoB------------- Noboco	0-11	Fine sandy loam	SM, SC-SM, SC	A-2	0	95-100	95-100	50-91	15-33	<25	NP-14
	11-37	Sandy loam, sandy clay loam, clay loam.	SC-SM, SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	95-100	70-96	30-63	20-38	4-15
	37-72	Sandy clay loam, clay loam, sandy clay.	SC-SM, SC, CL, CL-ML	A-4, A-6, A-7-6	0	98-100	98-100	70-98	36-72	20-52	4-23
PaA----------------------- Pactolus	0-45	Sand---------------------	SM, SP-SM	A-2, A-3	0	100	100	51-100	6-30	---	NP
	45-80	Sand, fine sand, loamy fine sand.	SP-SM, SM	A-2, A-3	0	100	100	51-100	5-30	---	NP
PnA----------------------- Pantego	0-21	Fine sandy loam, loam.	SM, ML	A-2, A-4	0	100	95-100	60-95	25-75	<35	NP-10
	21-50	Sandy clay loam, loam, clay loam.	SC, CL, SC-SM, CL-ML	A-4, A-6, A-2	0	100	95-100	65-100	30-80	20-40	4-16
	50-74	Clay loam, sandy clay, sandy clay loam.	CL, SC	A-6, A-7	0	100	95-100	80-100	36-80	25-49	11-24
PuA----------------------- Pungo	0-72	Muck---------------------	PT	---	---	---	---	---	---	---	---
RaA----------------------- Rains	0-6	Fine sandy loam	SM, ML	A-2, A-4	0	100	95-100	50-85	25-56	<35	NP-10
	6-40	Sandy clay loam, clay loam.	SC, SC-SM, CL, CL-ML	A-2, A-4, A-6	0	100	95-100	55-98	30-70	18-40	4-20
	40-48	Sandy clay loam, clay loam, sandy clay.	SC, SC-SM, CL, CL-ML	A-4, A-6, A-7	0	100	98-100	60-98	36-72	18-45	4-28
	48-72	Clay loam, sandy clay loam, sandy clay.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	95-100	60-95	30-60	15-40	3-18
RoA----------------------- Roanoke	0-12	Loam---------------------	SC-SM, CL-ML, CL, SC	A-4, A-6	0	95-100	85-100	60-100	35-90	20-35	5-16
	12-35	Clay, silty clay, clay loam.	CH, CL	A-7	0	90-100	85-100	85-100	65-95	45-70	22-40
	35-72	Stratified sand to clay.	CL-ML, GM-GC, CH, SM	A-1, A-2, A-4	0-5	40-100	35-100	25-95	15-90	10-60	NP-40
StA, StB------------- State	0-18	Fine sandy loam	SM, ML, CL-ML, SC-SM	A-2, A-4	0	95-100	95-100	45-85	25-55	<28	NP-7
	18-48	Loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	75-100	35-80	24-40	8-22
	48-72	Stratified sand to fine sandy loam.	SM, SC-SM, SP-SM	A-1, A-2, A-3, A-4	0	85-100	60-100	40-90	5-50	<25	NP-7

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag-ments 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct					Pct	
TaA-------------- Tomahawk	0-16	Fine sand, loamy fine sand.	SM, SP-SM	A-2-4, A-1-b	0	100	95-100	40-99	10-30	---	NP
	16-28	Sandy loam, fine sandy loam.	SM, SC, SC-SM	A-2-4, A-4	0	100	95-100	50-99	20-49	<25	NP-10
	28-72	Fine sand, sand, loamy sand.	SM, SP-SM, SP	A-2-4, A-1-b, A-3	0	100	95-100	35-98	2-20	---	NP
ToA-------------- Tomotley	0-7	Fine sandy loam	SM, SC-SM	A-2, A-4	0	98-100	95-100	75-99	25-50	<30	NP-7
	7-42	Fine sandy loam, sandy clay loam, clay loam.	SC-SM, SC, CL-ML, CL	A-2, A-4, A-6	0	98-100	95-100	75-100	30-70	20-40	6-23
	42-55	Fine sandy loam, sandy clay loam, loam.	SC-SM, SC, CL-ML, CL	A-4, A-6, A-7	0	98-100	95-100	75-99	36-75	20-45	6-22
	55-74	Variable---------	---	---	---	---	---	---	---	---	---
Ud--------------- Udorthents	0-60	Sandy loam-------	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6, A-7	0-3	95-100	90-100	70-98	30-90	20-45	4-25
VaB-------------- Valhalla	0-21	Fine sand--------	SM, SP-SM, SP	A-2, A-3, A-1-b	0	100	95-100	35-65	2-20	---	NP
	21-36	Fine sandy loam, loamy fine sand, sandy clay loam.	SM, SC, SC-SM	A-2, A-4	0	100	95-100	50-80	20-40	<30	NP-10
	36-82	Fine sand, sand	SM, SP-SM, SP	A-2, A-3, A-1-b	0	100	95-100	35-65	2-20	---	NP
WnD, WnE--------- Winton	0-15	Fine sandy loam	ML, SM, CL, SC	A-2, A-4, A-6	0-3	90-100	90-100	50-99	25-65	<30	NP-15
	15-53	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	90-100	45-95	25-70	20-45	8-30
	53-70	Variable---------	---	---	---	---	---	---	---	---	---

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AaB--------------	0-5	1-10	1.30-1.70	>6.0	0.05-0.09	3.6-6.0	Low-----------	0.10	5	.5-1
Alaga	5-99	2-12	1.30-1.70	>6.0	0.05-0.09	3.6-6.0	Low-----------	0.10		
AtA--------------	0-9	10-20	1.30-1.50	2.0-6.0	0.12-0.20	3.6-6.5	Low-----------	0.24	5	.5-3
Altavista	9-40	18-35	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.0	Low-----------	0.24		
	40-72	---	---	---	---	---	-------------	----		
BaA--------------	0-35	5-20	1.40-1.60	2.0-6.0	0.10-0.20	4.5-5.5	Low-----------	0.10	5	5-10
Ballahack	35-55	18-35	1.30-1.50	0.6-2.0	0.12-0.17	4.5-5.5	Low-----------	0.10		
	55-70	5-40	1.30-1.60	0.6-20	0.06-0.18	4.5-5.5	Low-----------	0.17		
BeA--------------	0-20	---	0.40-0.65	0.2-6.0	0.20-0.26	3.5-4.5	Low-----------	----	---	20-95
Belhaven	20-24	5-15	1.45-1.65	2.0-6.0	0.10-0.24	3.6-5.5	Low-----------	0.24		
	24-65	10-35	1.30-1.45	0.2-0.6	0.12-0.20	3.6-6.5	Low-----------	0.24		
	65-72	2-8	1.60-1.70	6.0-20	0.04-0.09	3.6-6.5	Low-----------	0.15		
BnA--------------	0-9	15-27	1.30-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low-----------	0.37	5	2-3
Bladen	9-64	35-55	1.65-1.75	0.06-0.2	0.12-0.16	3.6-5.5	Moderate-----	----		
	64-90	35-70	1.60-1.70	0.06-0.2	0.12-0.16	3.6-5.5	Moderate-----	----		
BoB--------------	0-27	5-15	1.30-1.70	6.0-20	0.05-0.11	3.6-6.5	Low-----------	0.15	5	.5-2
Bonneau	27-51	18-35	1.40-1.60	0.6-2.0	0.10-0.15	3.6-6.0	Low-----------	0.20		
	51-72	15-40	1.40-1.60	0.6-2.0	0.10-0.16	3.6-6.0	Low-----------	0.20		
CfA--------------	0-13	5-15	1.30-1.50	0.6-6.0	0.15-0.22	4.5-6.5	Low-----------	0.15	5	5-15
Cape Fear	13-41	35-60	1.25-1.40	0.06-0.2	0.12-0.22	3.6-6.0	Moderate-----	0.32		
	41-72	5-30	1.40-1.70	---	---	---	-------------	----		
ChA--------------	0-6	5-25	1.20-1.40	2.0-6.0	0.15-0.20	3.6-6.0	Low-----------	0.32	4	2-4
Chowan	6-35	18-35	1.40-1.60	0.2-0.6	0.15-0.20	3.6-6.0	Low-----------	0.32		
	35-72	2-12	0.40-0.65	0.2-6.0	0.20-0.26	3.6-5.0	Low-----------	----		
CoB--------------	0-22	2-10	1.60-1.75	6.0-20	0.03-0.07	4.5-6.0	Low-----------	0.15	5	.5-1
Conetoe	22-41	10-22	1.40-1.60	2.0-6.0	0.10-0.15	4.5-6.0	Low-----------	0.15		
	41-72	2-10	1.60-1.70	6.0-20	0.05-0.10	4.5-6.0	Low-----------	0.10		
CrA, CrB, CrC----	0-8	7-20	1.30-1.45	0.2-2.0	0.12-0.15	3.6-5.5	Low-----------	0.32	5	.5-2
Craven	8-51	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	Moderate-----	0.32		
	51-72	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	Low-----------	0.32		
DoA--------------	0-2	---	0.25-0.40	0.6-2.0	0.20-0.25	3.6-4.4	-------------	----	---	20-80
Dorovan	2-72	---	0.35-0.55	0.6-2.0	0.20-0.25	3.6-5.5	-------------	----		
ExA--------------	0-19	12-18	1.30-1.50	2.0-6.0	0.15-0.20	3.5-6.0	Low-----------	0.37	5	.5-2
Exum	19-72	18-35	1.30-1.40	0.2-0.6	0.15-0.20	3.5-5.5	Low-----------	0.37		
GoA--------------	0-8	5-15	1.40-1.60	2.0-6.0	0.10-0.15	3.6-5.5	Low-----------	0.20	5	.5-2
Goldsboro	8-27	18-30	1.30-1.50	0.6-2.0	0.11-0.17	3.6-5.5	Low-----------	0.24		
	27-72	20-34	1.30-1.40	0.6-2.0	0.11-0.20	3.6-5.5	Low-----------	0.24		
IcA--------------	0-14	5-20	1.30-1.40	0.6-6.0	0.12-0.18	3.6-5.5	Low-----------	0.17	5	3-15
Icaria	14-36	18-35	1.45-1.55	0.6-2.0	0.14-0.20	3.6-5.5	Low-----------	0.28		
	36-55	2-12	1.40-1.60	2.0-6.0	0.06-0.10	3.6-5.5	Low-----------	0.17		
	55-62	2-10	1.40-1.65	2.0-6.0	0.02-0.05	3.6-5.5	Low-----------	0.17		
LeA--------------	0-7	6-20	1.30-1.50	0.6-2.0	0.14-0.18	3.6-5.5	Low-----------	0.37	5	2-4
Lenoir	7-72	35-60	1.20-1.35	0.06-0.2	0.13-0.15	3.6-5.5	Moderate-----	0.32		

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
LoA	0-11	1-6	1.40-1.65	6.0-20	0.02-0.05	3.6-5.5	Low	0.10	5	.5-4
Leon	11-14	2-8	1.50-1.70	0.6-6.0	0.05-0.10	3.6-5.5	Low	0.15		
	14-80	1-6	1.40-1.65	0.6-6.0	0.02-0.05	3.6-5.5	Low	0.10		
LyA	0-8	5-20	1.30-1.60	2.0-6.0	0.09-0.13	3.6-5.5	Low	0.20	5	.5-5
Lynchburg	8-58	18-35	1.30-1.50	0.6-2.0	0.12-0.16	3.6-5.5	Low	0.20		
	58-72	35-50	1.40-1.70	0.06-0.2	0.14-0.18	3.6-5.5	Moderate	----		
NaA	0-1	5-18	1.25-1.35	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.24	5	2-6
Nawney	1-55	18-35	1.25-1.50	0.6-2.0	0.10-0.22	3.6-5.5	Moderate	0.28		
	55-62	---	---	---	---	---	-------------	----		
NoA, NoB	0-11	5-20	1.50-1.80	2.0-6.0	0.13-0.15	3.6-6.0	Low	0.15	5	.5-2
Noboco	11-37	18-35	1.45-1.75	0.6-2.0	0.11-0.14	3.6-5.5	Low	0.24		
	37-72	20-43	1.45-1.70	0.6-2.0	0.06-0.14	3.6-5.5	Low	0.24		
PaA	0-45	2-10	1.60-1.75	6.0-20	0.05-0.10	3.6-5.5	Low	0.10	5	.5-2
Pactolus	45-80	2-12	1.60-1.75	6.0-20	0.03-0.07	3.6-5.5	Low	0.10		
PnA	0-21	5-15	1.40-1.60	2.0-6.0	0.12-0.20	3.6-5.5	Low	0.15	5	4-10
Pantego	21-50	18-35	1.30-1.50	0.6-2.0	0.12-0.20	3.6-5.5	Low	0.28		
	50-74	20-40	1.30-1.60	0.6-2.0	0.15-0.20	3.6-5.5	Low	0.28		
PuA	0-72	---	0.35-0.60	0.6-6.0	0.20-0.26	<4.5	Low	----	---	40-90
Pungo										
RaA	0-6	5-20	1.30-1.60	2.0-6.0	0.10-0.14	3.6-6.5	Low	0.20	5	1-6
Rains	6-40	18-35	1.30-1.60	0.6-2.0	0.11-0.15	3.6-5.5	Low	0.24		
	40-48	18-40	1.30-1.50	0.6-2.0	0.10-0.15	3.6-5.5	Low	0.28		
	48-72	15-45	1.30-1.60	0.6-2.0	0.10-0.15	3.6-5.5	Low	0.28		
RoA	0-12	10-27	1.20-1.50	0.6-2.0	0.14-0.20	3.6-5.5	Low	0.37	4	.5-2
Roanoke	12-35	35-60	1.35-1.65	<0.2	0.10-0.19	3.6-5.5	Moderate	0.24		
	35-72	5-50	1.20-1.50	0.06-20	0.04-0.14	3.6-6.5	Moderate	0.24		
StA, StB	0-18	5-15	1.25-1.40	0.6-6.0	0.08-0.15	3.6-5.5	Low	0.28	5	<2
State	18-48	18-34	1.35-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Low	0.28		
	48-72	2-15	1.35-1.50	>2.0	0.02-0.10	3.6-6.5	Low	0.17		
TaA	0-16	2-8	1.60-1.75	6.0-20	0.04-0.10	4.5-5.5	Low	0.10	5	.5-2
Tomahawk	16-28	5-15	1.45-1.65	2.0-6.0	0.10-0.14	4.5-5.5	Low	0.15		
	28-72	2-8	1.60-1.75	6.0-20	0.04-0.08	3.6-6.5	Low	0.10		
ToA	0-7	5-20	1.30-1.60	2.0-6.0	0.10-0.15	3.6-5.5	Low	0.20	5	1-6
Tomotley	7-42	18-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-5.5	Low	0.20		
	42-55	15-45	1.30-1.60	0.2-2.0	0.12-0.18	3.6-6.0	Low	0.20		
	55-74	---	---	---	---	---	-------------	----		
Ud	0-60	10-50	1.30-1.65	0.06-2.0	0.10-0.17	4.5-7.8	Moderate	0.28	5	0-1
Udorthents										
VaB	0-21	2-8	1.40-1.60	2.0-6.0	0.06-0.10	3.6-6.0	Low	0.15	5	.5-1
Valhalla	21-36	10-20	1.30-1.55	2.0-6.0	0.10-0.15	3.6-6.0	Low	0.24		
	36-82	2-8	1.40-1.75	6.0-20	0.02-0.05	3.6-6.0	Low	0.15		
WnD, WnE	0-15	7-20	1.30-1.40	2.0-6.0	0.12-0.20	3.6-6.0	Low	0.20	5	.5-3
Winton	15-53	18-35	1.30-1.50	0.2-2.0	0.12-0.20	3.6-6.0	Low	0.24		
	53-70	---	---	---	---	---	-------------	----		

TABLE 15.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "occasional," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
AaB: Alaga	A	None	---	---	>6.0	---	---	---	---	Low	Moderate.
AtA: Altavista	C	None	---	---	1.5-2.5	Apparent	Dec-Apr	---	---	Moderate	Moderate.
BaA: Ballahack	D	Occasional	Brief	Nov-Mar	0-1.0	Apparent	Nov-Mar	---	---	High	High.
BeA: Belhaven	D	None	---	---	0-1.0	Apparent	Nov-May	2-8	10-26	High	High.
BnA: Bladen	D	None	---	---	0-1.0	Apparent	Dec-May	---	---	High	High.
BoB: Bonneau	A	None	---	---	3.5-5.0	Apparent	Dec-Mar	---	---	Low	High.
CfA: Cape Fear	D	None	---	---	0-1.5	Apparent	Nov-May	---	---	High	High.
ChA: Chowan	D	Frequent	Very long.	Nov-Apr	0-0.5	Apparent	Nov-May	---	---	High	High.
CoB: Conetoe	A	None	---	---	>6.0	---	---	---	---	Low	High.
CrA, CrB, CrC: Craven	C	None	---	---	2.0-3.0	Apparent	Dec-Apr	---	---	High	High.
DoA: Dorovan	D	Frequent	Very long.	Jan-Dec	0-0.5	Apparent	Jan-Dec	6-12	51-80	High	High.
ExA: Exum	C	None	---	---	2.0-3.0	Apparent	Dec-Apr	---	---	Moderate	High.
GoA: Goldsboro	B	None	---	---	2.0-3.0	Apparent	Dec-Apr	---	---	Moderate	High.
IcA: Icaria	D	None	---	---	0-1.0	Apparent	Nov-Apr	---	---	High	High.
LeA: Lenoir	D	None	---	---	1.0-2.5	Apparent	Dec-May	---	---	High	High.
LoA: Leon	B/D	None	---	---	0-1.0	Apparent	Jun-Feb	---	---	High	High.
LyA: Lynchburg	C	None	---	---	0.5-1.5	Apparent	Nov-Apr	---	---	High	High.
NaA: Nawney	D	Frequent	Very long.	Jan-Dec	0-0.5	Apparent	Jan-Dec	---	---	High	High.
NoA, NoB: Noboco	B	None	---	---	2.5-4.0	Apparent	Dec-Mar	---	---	Moderate	High.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Subsidence		Risk of corrosion	
		Frequency	Dura-tion	Months	Depth	Kind	Months	Initial	Total	Uncoated steel	Concrete
					Ft			In	In		
PaA------------ Pactolus	A	None--------	---	---	1.5-3.0	Apparent	Dec-Apr	---	---	Low------	High.
PnA------------ Pantego	B/D	None--------	---	---	0-1.5	Apparent	Nov-May	---	---	High-----	High.
PuA------------ Pungo	D	None--------	---	---	0-1.0	Apparent	Nov-May	16-24	36-50	High-----	High.
RaA------------ Rains	B/D	None--------	---	---	0-1.0	Apparent	Nov-Apr	---	---	High-----	High.
RoA------------ Roanoke	D	None--------	---	---	0-1.0	Apparent	Nov-May	---	---	High-----	High.
StA, StB------- State	B	None--------	---	---	4.0-6.0	Apparent	Dec-Jun	---	---	Moderate	High.
TaA------------ Tomahawk	A	None--------	---	---	1.5-3.0	Apparent	Dec-Apr	---	---	Moderate	High.
ToA------------ Tomotley	B/D	None--------	---	---	0-1.0	Apparent	Nov-Apr	---	---	High-----	High.
Ud------------- Udorthents	B	None--------	---	---	>6.0	---	---	---	---	Moderate	High.
VaB------------ Valhalla	A	None--------	---	---	>4.0	Apparent	Nov-Mar	---	---	Low------	Moderate.
WnD, WnE------- Winton	C	None--------	---	---	2.0-4.0	Perched	Dec-May	---	---	Moderate	Moderate.

TABLE 16.--ENGINEERING INDEX TEST DATA

(LL means liquid limit; PI, plasticity index; MD, maximum dry density; OM, optimum moisture; and NP, nonplastic. Location of pedon sampled is the same as that given for the typical pedon in "Soil Series and Their Morphology")

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution							LL	PI	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			MD	OM
										Pct		Lb/ cu ft	Pct
Bladen loam:													
(S87NC-073-8)*													
A------ 0 to 9	A-4(4)	ML	100	100	100	80	47	25	16	30	6	100.3	18.0
Btg2--- 12 to 37	A-7-6(23)	CL	100	100	100	90	68	54	47	46	24	97.1	24.0
Btg3--- 37 to 53	A-7-6(24)	CL	100	100	100	87	60	50	44	46	27	101.1	19.0
Conetoe fine sand:													
(S87NC-073-9)													
Ap----- 0 to 7	A-2-4(0)	SM	100	100	98	16	8	5	3	18	NP	107.2	12.7
E------ 7 to 22	A-2-4(0)	SM	100	100	98	18	13	8	5	17	NP	110.3	10.5
Bt1---- 22 to 30	A-2-4(0)	SM	100	100	99	25	20	15	15	18	NP	108.0	11.5
C2----- 49 to 72	A-2-4(0)	SM	100	100	98	13	6	5	4	18	NP	102.1	13.8
Tomahawk fine sand:													
(S87NC-073-6)													
Ap----- 0 to 8	A-2-4(0)	SM	100	100	99	14	12	6	4	18	NP	112.1	11.5
Bt1---- 16 to 22	A-2-4(0)	SM	100	100	99	24	21	16	13	18	NP	120.3	11.3
2Bhb1-- 46 to 52	A-3(0)	SP	100	100	98	2	2	2	2	22	NP	101.0	14.4
Valhalla fine sand:													
(S87NC-073-7)**													
Ap----- 0 to 7	A-3(0)	SP-SM	100	100	100	9	8	5	3	17	NP	107.6	12.7
Bt1---- 21 to 27	A-2-4(0)	SM	100	100	100	23	21	16	13	16	NP	122.2	10.9
2Bhb--- 60 to 66	A-2-4(0)	SP-SM	100	100	98	11	7	4	3	22	NP	107.1	13.3

* The percentage passing sieve number 200 for the Btg2 and Btg3 horizons is higher than that allowed for the series. This difference does not affect use, management, or interpretations.

** The percentage passing sieve number 40 for all horizons is higher than that allowed for the series. This difference does not affect use, management, or interpretations.

TABLE 17.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Alaga	Thermic, coated Typic Quartzipsamments
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Ballahack	Fine-loamy, mixed, acid, thermic Cumulic Humaquepts
Belhaven	Loamy, mixed, dysic, thermic Terric Medisaprists
Bladen	Clayey, mixed, thermic Typic Albaquults
Bonneau	Loamy, siliceous, thermic Arenic Paleudults
Cape Fear	Clayey, mixed, thermic Typic Umbraquults
Chowan	Fine-silty, mixed, nonacid, thermic Thapto-Histic Fluvaquents
Conetoe	Loamy, mixed, thermic Arenic Hapludults
Craven	Clayey, mixed, thermic Aquic Hapludults
Dorovan	Dysic, thermic Typic Medisaprists
Exum	Fine-silty, siliceous, thermic Aquic Paleudults
Goldsboro	Fine-loamy, siliceous, thermic Aquic Paleudults
Icaria	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Umbraquults
Lenoir	Clayey, mixed, thermic Aeric Paleaquults
Leon	Sandy, siliceous, thermic Aeric Haplaquods
Lynchburg	Fine-loamy, siliceous, thermic Aeric Paleaquults
Nawney	Fine-loamy, mixed, acid, thermic Typic Fluvaquents
Noboco	Fine-loamy, siliceous, thermic Typic Paleudults
Pactolus	Thermic, coated Aquic Quartzipsamments
Pantego	Fine-loamy, siliceous, thermic Umbric Paleaquults
Pungo	Dysic, thermic Typic Medisaprists
Rains	Fine-loamy, siliceous, thermic Typic Paleaquults
Roanoke	Clayey, mixed, thermic Typic Ochraquults
State	Fine-loamy, mixed, thermic Typic Hapludults
*Tomahawk	Loamy, siliceous, thermic Arenic Hapludults
Tomotley	Fine-loamy, mixed, thermic Typic Ochraquults
Udorthents	Udorthents
Valhalla	Loamy, siliceous, thermic Arenic Hapludults
Winton	Fine-loamy, mixed, thermic Aquic Hapludults

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