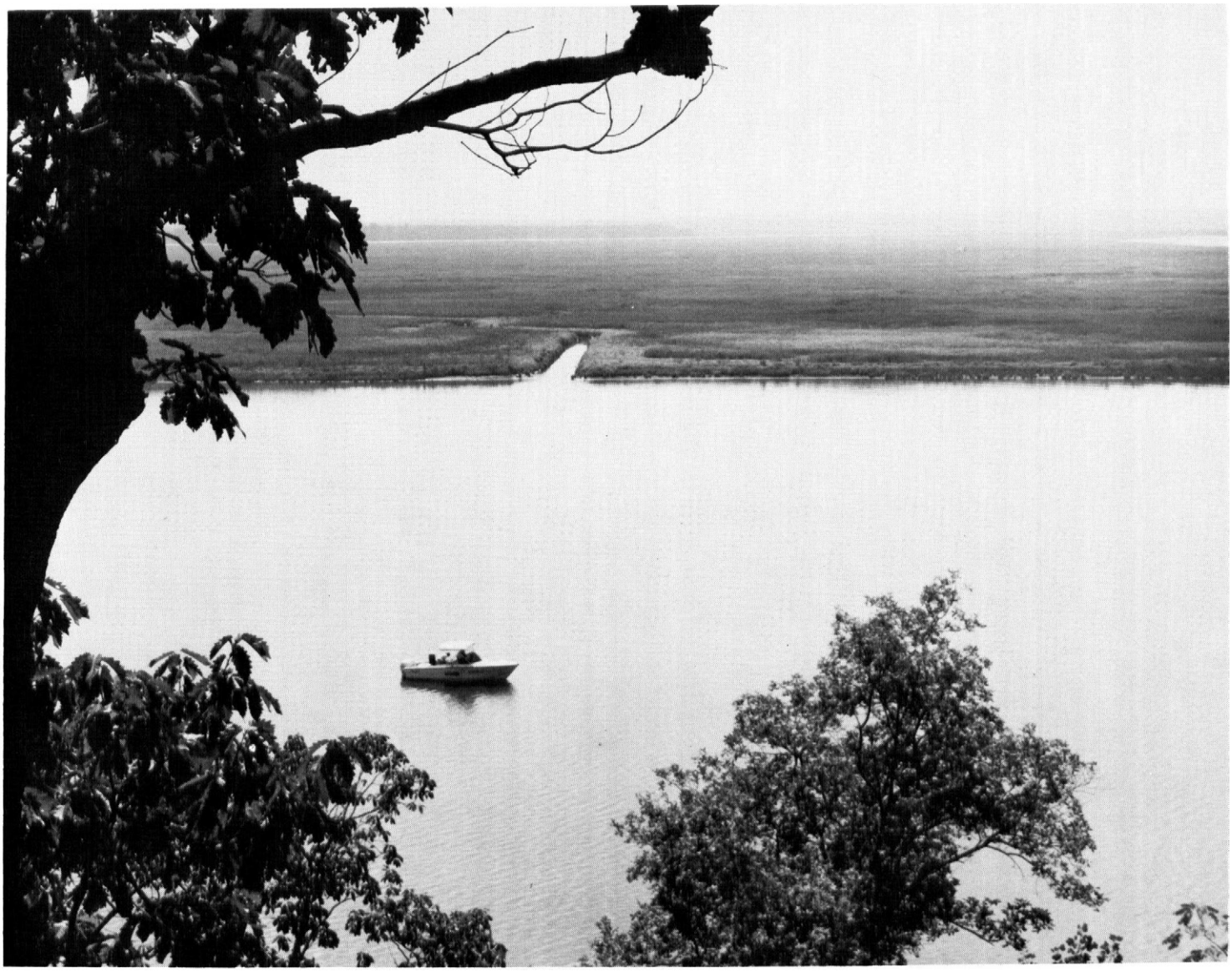
United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Virginia Polytechnic
Institute and
State University

Soil Survey of New Kent County, Virginia



How To Use This Soil Survey

General Soil Map

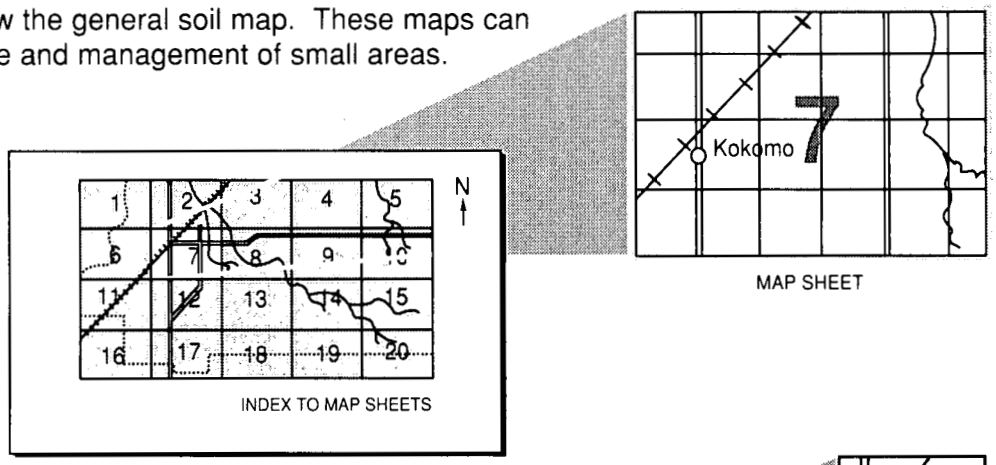
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

Detailed Soil Maps

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

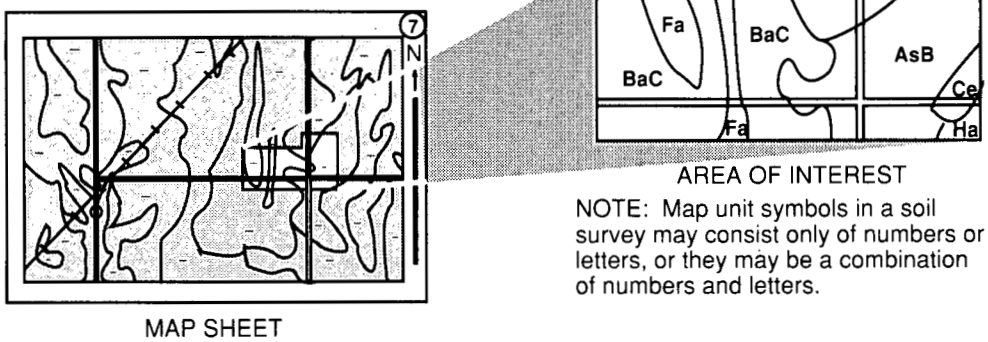
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

MAP SHEET

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



MAP SHEET

AREA OF INTEREST

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

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

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

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This survey was made cooperatively by the Soil Conservation Service and the Virginia Polytechnic Institute and State University. The survey is part of the technical assistance furnished to the Colonial Soil and Water Conservation District. This survey was financed in part by the Virginia Department of Conservation and Historic Resources and the New Kent County Board of Supervisors.

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.

Cover: In the background is Hill Marsh, the largest freshwater marsh along the Pamunkey River. It is mostly Bohicket muck, 0 to 1 percent slopes.

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Soil Series

Issued July 1989

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in New Kent 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 to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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

George C. Norris
State Conservationist
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Soil Survey of New Kent County, Virginia

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United States Department of Agriculture, Soil Conservation Service,
in cooperation with
Virginia Polytechnic Institute and State University

New Kent County is on the part of the Coastal Plain known as the Lower Peninsula of Virginia (fig. 1). The county has a total area of 221 square miles, or 141,440 acres, 9 square miles of which is water. About 80 percent of the land area is woodland, and most of the rest is used for farming. New Kent, the county seat, is in the north-central part of the county.

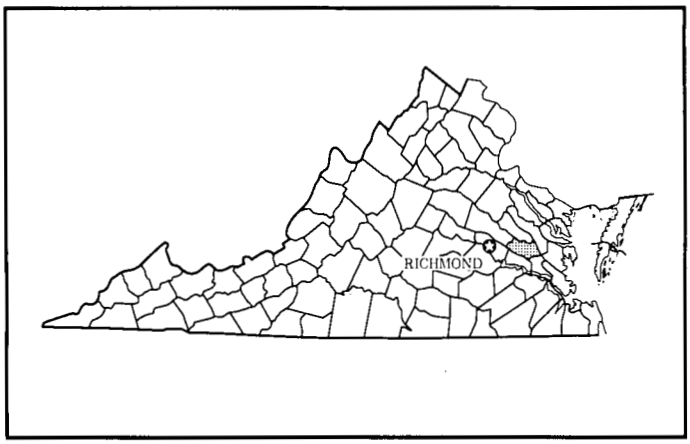

Figure 1.—Location of New Kent County in Virginia.

General Nature of the Survey Area

This section provides information about some of the natural and cultural factors that affect land use in the county.

Climate

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Richmond in the period 1949 to 1978. 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 39 degrees F, and the average daily minimum temperature is 28 degrees. The lowest temperature on record, which occurred at Richmond on January 28, 1961, is -1 degree F. In summer the average temperature is 76 degrees, and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred at Richmond on July 6, 1977, is 105 degrees F.

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 (40 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 45 inches. Of this, 24 inches, or 55 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 18 inches. The heaviest 1-day rainfall during the period of record was 8.79 inches at Richmond on August 12, 1955. Thunderstorms occur on about 35 days each year, and most occur in summer.

Average seasonal snowfall is 14 inches. The greatest snow depth at any one time during the period of record was 15 inches. On an average of 4 days, at least 1 inch

of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 53 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 about 40 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 9.1 miles per hour, in March.

Water Resources

Several small, privately owned wells and one state-owned well are in the county, but most of the water in the county is from two major sources, ground water and surface water.

Ground Water

The county is underlain by clay, sand, marl, shell, and gravel strata that dip and thicken to the east. A basement complex of granitic rock is at a depth of about 650 feet in the western part and 1,450 feet in the eastern part.

The major, but little-used, supplies of water in the county are in deep, unconsolidated, artesian aquifers. The most prolific water-bearing zone in the county is between depths of 300 and 700 feet, though large amounts of artesian water probably are at a greater depth. The highest reported yield from the aquifers is 470 gallons per minute from a 382-foot-deep well at Woodhaven Shores. Another well, drilled to a depth of 306 feet at the Five Lakes subdivision in 1968, yielded 274 gallons per minute at completion. Yields of 500 to 1,000 gallons per minute probably are available from 8- to 10-inch-diameter wells.

Water under artesian conditions also is at a depth of 100 to 200 feet in most of the county, but the potential yield of these aquifers is much less than that from deeper aquifers. Few wells have produced more than 50 gallons per minute from this shallower zone. Many wells in this zone had natural flows in the county, but the static water level has dropped significantly over the past 40 years.

The shallow shell and sand strata at a depth of 20 to 50 feet in most of the county contain a water table. Numerous wells, producing less than 10 gallons per minute for domestic use, are in this zone.

The water in the deep artesian aquifers in New Kent County is soft to moderately hard and is low in content of sulfates, chlorides, and nitrates. The concentration of sodium bicarbonate increases with depth. The content of flouride is up to 1.5 milligrams per liter in places. Water from the shallow aquifers is usually soft, unless it is obtained from the shell beds. The concentration of iron is high in some shallow aquifers.

Surface Water

New Kent is bounded on the north by the Pamunkey River, on the east by the York River and Ware Creek, and on the south by the Chickahominy River. The Pamunkey River is a source of large supplies of surface water at all times except during periods of extreme drought, and fairly large supplies are available from the Chickahominy River. The water is soft and therefore of excellent quality for municipal and many industrial uses. The only other streams of the county are small tributaries of the Chickahominy and Pamunkey Rivers, and their capacities are limited. Millponds are on some of the small tributaries.

The part of the Chickahominy River that is impounded by Walkers Dam is a source of water for the city of Newport News. The Diascund Reservoir, a mile-long structure completed in 1963 on the Diascund Creek, is an integral part of the Newport News water system and can supply 30 million gallons of water a day.

Transportation

U.S. Route 60, one of Virginia's main east-west roadways, runs through New Kent. Route 249 also crosses the county in an east-west direction, joining U.S. Route 60 and Interstate Route 64 at Bottoms Bridge.

A main rail line is along the southern border of the county and provides freight service from Providence Forge. Another rail line, from West Point to Danville, crosses the northern part of the county, providing freight service from Tunstall and Quinton.

The eastern edge of the county is bounded by a navigable tidal portion of the York River. Chartered, ocean-going vessels drawing up to 18 feet of water safely navigate the length of the York River to just above the town of West Point in King William County. Barges and other shallow-draught vessels use the Pamunkey River.

The nearest facility offering commercial airline service to the county is Richard Evelyn Byrd International Airport, near Richmond.

Agriculture

Corn, soybeans, and small grain make up about 75 percent of the total value of farm products in the county. Meat animals, vegetables, forest products, and poultry and dairy products account for most of the rest.

The trend in farming in the county has been toward decreasing acreages in corn and vegetables and increasing acreages in small grain and soybeans, while the average farm size has increased.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. 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. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material has few or no roots or other living organisms and has been changed very little by other biologic activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable 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, acidity, and other features that enable them to identify soils. After describing the soils in the survey area 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 generally are collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were 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 were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability 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 always be at a specific level in the soil on a specific date.

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

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 several 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. These latter soils are called inclusions or included 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 mentioned 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 soil 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 the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association 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 building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

In some areas along the borders of New Kent County, the boundaries on the general soil map and names of the general soil map units do not match those of adjoining counties. These discrepancies exist because of differences in the detail of mapping, changes in soil classification, and different proportions of the same soil in adjoining counties. Where some of these conditions exist, the adjoining soils are similar.

Soil Descriptions

Coastal Plain Uplands, Side Slopes, and Upland Flood Plains

1. Kempsville-Emporia-Suffolk

Very deep, well drained, gently sloping soils that dominantly have a loamy subsoil; on narrow to broad ridges

This unit makes up about 15 percent of the survey area. The unit is mostly on finger ridges to the York, Pamunkey, and Chickahominy Rivers and larger creeks and branches. The slope mostly ranges from 2 to 6 percent.

The unit is about 40 percent Kempsville soils, 20 percent Emporia soils, 4 percent Suffolk soils, and 36 percent soils of minor extent.

The Kempsville soils are on narrow to broad ridges. They have a surface layer of brown fine sandy loam. The subsoil is yellowish brown and strong brown sandy clay loam and fine sandy loam in the upper part, yellowish brown and pale brown fine sandy loam in the middle part, and yellowish red fine sandy loam in the lower part. The upper part of the subsoil is mottled with pale brown and light yellowish brown.

The Emporia soils are on narrow to broad ridges. They have a surface layer of dark grayish brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is yellowish brown and strong brown loam in the upper part; yellowish red clay loam in the middle part; and variegated red, yellowish red, yellowish brown, strong brown, and gray sandy clay and sandy clay loam in the lower part.

The Suffolk soils are on medium-size ridges. They have a surface layer of brown fine sandy loam and a subsoil of brown and strong brown fine sandy loam and sandy clay loam.

The common minor soils are well drained Norfolk, Orangeburg, Uchee, and Caroline soils and moderately well drained Slagle and Craven soils. The well drained soils are generally on ridges, and the moderately well drained soils are generally in depressions or on points of ridges.

About half of the acreage of this unit is used for farming. The farmland is throughout the unit. Some small areas are used for community development, and some areas are in woodland. The wooded areas consist of mixed hardwoods and pines.

The farmed areas are used mostly for soybeans, corn, and small grains. Some areas are used for pasture and hay. Acidity, low natural fertility, and a hazard of erosion are the main limitations for farming. Overgrazing and grazing when the soils are wet are the major concerns of pasture management.

The soils are suited to trees. The native climax forest is mixed hardwoods; however, some areas have been reforested with loblolly pine. Potential productivity is moderately high. Erosion is a hazard along logging roads and skid trails during and after timber harvest.

The soils in this unit are suitable as sites for sanitary facilities and community development. Slope, a seasonal high water table, and permeability are the main limitations.

2. Caroline-Emporia

Very deep, well drained, gently sloping soils that dominantly have a clayey and loamy subsoil; on narrow

to broad ridges

This unit makes up about 9 percent of the survey area. The unit is on the highest ridges. The slope ranges mostly from 2 to 10 percent.

The unit is about 40 percent Caroline soils, about 31 percent Emporia soils, and 29 percent soils of minor extent.

The Caroline soils have a surface layer of dark grayish brown and yellowish brown loam. The subsurface layer is yellowish brown loam. The subsoil is yellowish brown loam in the upper part; yellowish red clay loam in the middle part; and mottled yellowish red, yellowish brown, and light brownish gray clay in the lower part.

The Emporia soils have a surface layer of dark grayish brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is yellowish brown and strong brown loam in the upper part; yellowish red clay loam in the middle part; and variegated strong brown, yellowish brown, and yellowish red and gray sandy clay and sandy clay loam in the lower part.

The common minor soils are well drained Kempsville, Uchee, Norfolk, and Suffolk soils and moderately well drained Slagle and Craven soils. The well drained soils are on various landscape positions. The Slagle soils are in depressions, and the Craven soils are in depressions and on ridge points.

About 20 percent of the acreage of this unit is used for farming. The farmland is throughout the unit. Some small areas of community development are in this unit.

The farmland consists mostly of soybeans, corn, and small grains. A few areas of hay and pasture are in this unit. Acidity, low natural fertility, and a hazard of erosion are the main limitations for farming. Overgrazing and grazing when the soils are wet are the major concerns of pasture management.

The soils in this unit are suited to trees. The native climax forest is a mixture of hardwoods; however, several areas have been reforested with loblolly pine. Potential productivity is moderately high. The erosion hazard along logging roads and skid trails and low strength during wet periods restrict the use of equipment for managing timber.

A shrink-swell potential, the permeability, and a seasonal high water table limit the soils in this unit as sites for sanitary facilities and community development.

3. Slagle-Craven-Emporia

Very deep, moderately well drained and well drained, gently sloping, undulating soils that have a loamy and clayey subsoil; in depressions

This unit makes up about 9 percent of the survey area. The unit consists mostly of upland depressions and a few undulating ridges. The slope ranges from about 2 to 6 percent.

The unit is about 25 percent Slagle soils, 24 percent Craven soils, 11 percent Emporia soils, and 40 percent soils of minor extent.

The Slagle soils are moderately well drained. They are on ridges and in depressions. They have a surface layer of brown fine sandy loam. The subsurface is light yellowish brown fine sandy loam. The subsoil is yellowish brown, mottled sandy clay loam in the upper part. It is mottled yellowish brown, pale brown, strong brown, and light brownish gray in the lower part.

The Craven soils are moderately well drained. They are on narrow to medium-size ridges and side slopes. They have a surface layer of brown loam. The subsurface layer is light yellowish brown loam. The subsoil is brownish yellow and yellowish brown clay loam and clay in the upper part and yellowish brown, mottled clay loam in the lower part.

The Emporia soils are well drained. They are on the higher parts of the landscape. They have a surface layer of dark grayish brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is yellowish brown and strong brown loam in the upper part; yellowish red clay loam in the middle part; and variegated red, yellowish red, yellowish brown, strong brown, and gray sandy clay and sandy clay loam in the lower part.

The common minor soils are well drained Caroline, Kempsville, and Uchee soils and moderately well drained Nevarc soils. The well drained soils are generally on the slightly higher positions, and the Nevarc soils are on the steeper parts.

About 20 percent of the acreage of this unit is used for farming. The farmland is throughout the unit.

The farmland consists mostly of soybeans, corn, and small grains. A few areas of hay and pasture are in this unit. Acidity, low natural fertility, a hazard of erosion, and wetness are the main limitations for farming. Overgrazing and grazing when the soils are wet are the major concerns of pasture management.

The soils in this unit are suited to trees. The native climax forest is a mixture of hardwoods; however, several large areas have been reforested with loblolly pine. Potential productivity is moderately high. Soil wetness restricts the use of equipment for managing timber. Erosion is a hazard along logging roads and skid trails.

The soils in this unit are generally unsuitable for sanitary facilities and community development. A shrink-swell potential and a seasonal high water table are the main limitations.

4. Nevarc-Remlik-Johnston

Very deep, moderately well drained and well drained, moderately steep to very steep soils that have a clayey and loamy subsoil—on side slopes; very deep, very poorly drained, nearly level soils—on flood plains

This unit makes up about 49 percent of the survey area. The slope ranges from 0 to 2 percent on the flood plains and is up to 60 percent on the side slopes.

The unit is about 30 percent Nevarc soils, 26 percent Remlik soils, 7 percent Johnston soils, and 37 percent soils of minor extent.

The Nevarc soils are moderately well drained and are on the side slopes. They have a surface layer of dark grayish brown loam. The subsurface layer is light yellowish brown loam. The subsoil is reddish yellow clay in the upper part and mottled light gray, yellowish red, and strong brown sandy clay loam in the lower part.

The Remlik soils are well drained and are on the side slopes. They have a surface layer of dark grayish brown loamy sand. The subsurface layer is light yellowish brown and yellowish brown loamy sand. The subsoil is strong brown fine sandy loam.

The Johnston soils are very poorly drained and are on the flood plains. They have a surface layer of black mucky loam and a substratum of dark gray sandy loam and dark grayish brown loamy sand.

The common minor soils are well drained Emporia soils; moderately well drained Seabrook and Munden soils; somewhat poorly drained Dragston and Augusta soils; poorly drained Nimmo, Tomotley, and Roanoke soils; and very poorly drained Nawney soils. The Emporia soils are on side slopes. The Seabrook and Dragston soils are on the slightly higher areas of larger flood plains. The Nimmo, Tomotley, and Nawney soils are on the wider flood plains.

Most of this unit is wooded. A small amount of the acreage has been cleared and is used for farming. The farmland is throughout the unit. A few reservoirs and recreation facilities are in the unit.

Most of the farmland is hay and pasture. Acidity, slope, low natural fertility, a hazard of erosion, and wetness are the main limitations for farming. Overgrazing and grazing when the soils are wet are the major concerns of pasture management.

The soils in this unit are suited to trees. The native climax forest is a mixture of hardwoods; however, several large areas have been reforested with loblolly pine. Potential productivity is moderately high. Slope restricts the use of equipment for managing timber. Erosion is a hazard along logging roads and skid trails.

The soils in this unit are not suited to sanitary facilities or community development. Slope, a shrink-swell potential, and a seasonal high water table are the main limitations.

River Terraces, Marshes, and Swamps

5. Altavista-Dogue-Pamunkey

Very deep, moderately well drained and well drained, nearly level and gently sloping soils that have a loamy and clayey subsoil; on river terraces mainly along the Pamunkey and York Rivers

This unit makes up about 5 percent of the survey area. Most of the acreage of the Dogue soils is along the rivers in the eastern part of the unit, especially near the York River. Most of the acreage of the Pamunkey soils is near the Pamunkey River. The slope ranges from 0 to 6 percent.

The unit is about 27 percent Altavista soils, 26 percent Dogue soils, 22 percent Pamunkey soils, and 25 percent soils of minor extent.

The Altavista soils are moderately well drained and are on the terraces. They have a surface layer of brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is mostly yellowish brown fine sandy loam and sandy clay loam in the upper part and mottled yellowish brown, light brownish gray, and strong brown sandy clay loam in the lower part.

The Dogue soils are moderately well drained and are on ridges. They have a surface layer of dark grayish brown fine sandy loam. The subsurface layer is pale brown fine sandy loam. The subsoil is mostly yellowish brown clay in the upper part and mottled gray, yellowish brown, and yellowish red clay in the lower part.

The Pamunkey soils are well drained and are on narrow to broad ridges. They have a surface layer of brown fine sandy loam. The subsoil is strong brown loam and sandy clay loam in the upper part and strong brown and yellowish red fine sandy loam in the lower part.

The common minor soils are well drained Bojac soils, moderately well drained Tetotum soils, somewhat poorly drained Augusta and Wahee soils, and poorly drained Roanoke soils. The Bojac soils generally are on ridges. The Tetotum soils are on ridges and terraces. The Augusta, Wahee, and Roanoke soils are in depressions at the lowest landscape positions and are near seepage areas near escarpments.

About half of the acreage of the unit is used for farming. Soybeans, corn, and small grains are the principal crops. The wooded areas consist of mixed hardwoods and pines.

The higher part of this unit along the Pamunkey River is well suited to farming, but the soils along the York River are not as well suited because they have more clay, are more acid, and have slower permeability.

The terrace soils in this unit are suited to trees. The soils in the drainageways support water-tolerant species of oak, maple, and sweetgum. Potential productivity is moderately high on this unit. The use of logging equipment is restricted on these soils during winter and after heavy rainstorms.

The soils in this unit are poorly suited to sanitary facilities and community development. Ground-water contamination in areas used for waste disposal is the major limitation.

6. Tomotley-Altavista-Seabrook

Very deep, poorly drained and moderately well drained,

nearly level soils that have a loamy and sandy subsoil and substratum; on river terraces mainly along the Chickahominy River

This unit makes up about 3 percent of the survey area. It consists mostly of narrow to broad terraces and depressions. The slope ranges from 0 to 2 percent.

The unit is about 35 percent Tomotley soils, 29 percent Altavista soils, 21 percent Seabrook soils, and 15 percent soils of minor extent.

The Tomotley soils are poorly drained and are on low terraces, in depressions, at heads of drainageways, and in old alluvial-filled channels. They have a surface layer of very dark grayish brown loam. The subsurface layer is dark grayish brown fine sandy loam. The subsoil is dark gray sandy clay loam with brown and yellow mottles.

The Altavista soils are moderately well drained and are on narrow to broad ridges. They have a surface layer of brown fine sandy loam. The subsurface layer is light yellowish brown fine sandy loam. The subsoil is yellowish brown fine sandy loam and sandy clay loam in the upper part and mottled yellowish brown, strong brown, and light brownish gray sandy clay loam in the lower part.

The Seabrook soils are moderately well drained and are on ridge points and old alluvial fans. They have a surface layer of very dark grayish brown loamy sand and a substratum of light olive brown loamy sand in the upper part and mottled yellowish brown, pale brown, and light gray loamy sand in the lower part.

The common minor soils are somewhat excessively drained Catpoint soils on points of ridges; well drained State, Conetoe, and Bojac soils on the slightly higher landscape positions; and moderately well drained Dogue and Munden soils on ridges and alluvial fans. Also of minor extent are somewhat poorly drained Augusta, Wahee, and Dragston soils on landscape positions lower than the Altavista and Seabrook soils but slightly higher than the Tomotley soils; poorly drained Roanoke and Nimmo soils at about the same landscape positions as the Tomotley soils; very poorly drained Nawney soils on lower landscape positions that are flooded and ponded for longer periods than the Tomotley soils.

About 30 percent of this unit is used for farming. Soybeans, corn, and small grains are the major crops. Areas along U.S. Route 60 are used for community development. The woodlands are mostly mixed hardwoods and pines. The wet flats are in water-tolerant woodland.

The moderately well drained soils in this unit are suited to crops and pasture. Droughtiness and leaching of plant nutrients are the main limitations. Overgrazing and grazing when the soils are wet are the major concerns of pasture management. Deep-rooted pasture grasses are needed on the more droughty soils, such as Catpoint and Seabrook soils.

Most of the acreage of the poorly drained and somewhat poorly drained soils are in woodland. If drained, these soils are suited to crops and pasture.

The soils in this unit are suited to trees. Water-tolerant trees, such as maple, sweet gum, ash, and water oak, grow on the broad areas of wet soils. Potential productivity is high on these soils. The sand in the surface layer and the wetness restrict the use of equipment for managing timber.

The soils in this unit are poorly suited to sanitary facilities and community development. A seasonal high water table, flooding, and ponding are the main limitations. Ground-water pollution is a hazard in areas used for waste disposal.

7. Nawney-Lanexa-Mattan

Very deep, very poorly drained, nearly level soils formed in mineral and organic deposits; in marshes and swamps and on flood plains and low terraces

This unit makes up about 4 percent of the survey area. The unit borders upland areas. The marshes have fresh and brackish water.

The unit is about 35 percent Nawney soils, 35 percent Lanexa soils, 12 percent Mattan soils, and 18 percent soils of minor extent.

The Nawney soils are along the headwaters of creeks and branches and in wooded marshes. They have a surface layer of dark gray and dark grayish brown silt loam. The substratum is gray clay loam in the upper part and greenish gray silty clay loam and clay loam in the lower part.

The Lanexa soils are along the tidal creeks and streams. They have a surface layer of very dark gray mucky silty clay underlain by very dark grayish brown muck. The substratum is very dark grayish brown mucky silty clay.

The Mattan soils are in freshwater tidal swamps along rivers, creeks, and small streams. They have a surface layer of gray muck underlain by very dark grayish brown muck. The substratum is very dark grayish brown loamy sand and dark gray sandy clay loam.

The common minor soils are very poorly drained Johnston and Bohicket soils, poorly drained Nimmo and Tomotley soils, somewhat poorly drained Dragston soils, and moderately well drained Altavista soils. The Johnston soils are on the narrower flood plains. The Bohicket soils are in some of the larger marshes. The Tomotley and Nimmo soils are above the Walkers Dam area of the Chickahominy River. The Dragston soils are on some low terraces on the flood plains. The Altavista soils are on narrow to broad ridges.

About 1 percent of the unit, mostly better drained soils of minor extent, is used for farming. The Nawney and Mattan soils are in swamps that support water-tolerant trees, such as ash, water tupelo, gum, baldcypress, and maple. The Lanexa soils support mainly marsh vegetation.

The soils in swamps are poorly suited to trees, and the soils in marshes are unsuited to trees. Wetness and low strength limit the use of equipment for managing timber.

The soils in this unit are not suited to sanitary facilities and community development. A high water table, a shrink-swell potential, low strength, and flooding are the main limitations.

8. Bohicket-Lanexa-Mattan

Very deep, very poorly drained, nearly level soils formed in mineral material and organic matter; in marshes and swamps that are flooded daily

This unit makes up about 6 percent of the survey area. It is along the Chickahominy, York, and Pamunkey Rivers and the larger creeks and branches.

The unit is about 44 percent Bohicket soils, 24 percent Lanexa soils, 24 percent Mattan soils, and 8 percent soils of minor extent.

The Bohicket soils are on island fringes and in creek coves and deltas. They are in high and low marshes. They have a surface layer of very dark grayish brown muck and a substratum of very dark grayish brown and gray mucky silty clay and silty clay.

The Lanexa soils are in marshes along tidal creeks and streams. They have a surface layer of very dark gray mucky silty clay. The substratum is very dark grayish brown muck and very dark grayish brown mucky silty clay.

The Mattan soils are in freshwater tidal swamps along rivers, creeks, and small streams. They have a surface layer of gray muck underlain by very dark grayish brown muck. The substratum is very dark grayish brown loamy sand and dark gray sandy clay loam.

The common minor soils are very poorly drained Johnston and Nawney soils and poorly drained Nimmo and Tomotley soils. The Johnston soils are on the narrower flood plains, and the Nawney soils are at the headwaters of creeks and branches and in wooded marshes. The Nimmo and Tomotley soils are at the higher landscape positions.

About 1 percent of the unit, mainly minor soils, is used for farming. Only some of the minor soils and the Mattan soils are suited to trees. Wetness limits the use of equipment for managing woodland. A high water table and low strength make the soils in this unit generally unsuited to sanitary facilities and community development.

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, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

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

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer 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, Kempsville fine sandy loam, 2 to 6 percent slopes, is one of several phases in the Kempsville series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Kempsville-Emporia complex, 2 to 6 percent slopes, is an example.

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 potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

1A—Altavista fine sandy loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and moderately well drained. It is on medium-size to broad stream terraces. The areas of this soil commonly are long and narrow or irregularly oval and range from about 2 to 110 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, brown fine sandy loam

Subsurface layer:
9 to 13 inches, light yellowish brown fine sandy loam

Subsoil:
13 to 18 inches, yellowish brown fine sandy loam
18 to 28 inches, yellowish brown sandy clay loam with strong brown and light brownish gray mottles
28 to 39 inches, mottled yellowish brown, light brownish gray, and strong brown sandy clay loam
39 to 47 inches, mottled light brownish gray, yellowish brown, and strong brown sandy clay loam

Substratum:
47 to 74 inches, streaked and mottled yellowish brown, strong brown, and pale brown stratified fine sandy loam, loamy fine sand, and fine sand

Included with this soil in mapping are small areas of well drained State, Pamunkey, and Bojac soils; moderately well drained Dogue, Munden, and Tetotum soils; and somewhat poorly drained Augusta soils. The State, Pamunkey, Bojac, Dogue, and Tetotum soils are throughout the unit. The Munden and Augusta soils are

in shallow depressions. Included soils make up about 15 percent of this unit.

Major soil properties:

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid to moderately acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: 1.5 to 2.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

This soil is mostly in cropland, but some areas are in woodland.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. The soil is wet in spring. Drainage helps to alleviate wetness and protects crops from damage. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 135 cubic feet. Wetness limits the use of equipment for managing timber, and plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table is the main limitation of the soil as a site for community development, especially as a site for buildings, sanitary landfills or septic tank absorption fields, and most types of recreation.

The capability subclass is IIw.

2A—Altavista-Dogue complex, 0 to 2 percent slopes. This unit consists of very deep, nearly level, moderately well drained soils on narrow to broad terraces. Slopes commonly are smooth and range from 400 to 1,000 feet long. The areas commonly are long and narrow or irregularly oval and range from about 3 to 30 acres. They are about 50 percent Altavista soil, 30 percent Dogue soil, and 20 percent other soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Altavista soil are as follows—

Surface layer:
0 to 9 inches, brown fine sandy loam

Subsurface layer:
9 to 13 inches, light yellowish brown fine sandy loam

Subsoil:
13 to 18 inches, yellowish brown fine sandy loam
18 to 28 inches, yellowish brown sandy clay loam with strong brown and light brownish gray mottles
28 to 39 inches, mottled yellowish brown, light brownish gray, and strong brown sandy clay loam
39 to 47 inches, mottled light brownish gray, yellowish brown, and strong brown sandy clay loam

Substratum:
47 to 74 inches, streaked and mottled yellowish brown, strong brown, and pale brown stratified fine sandy loam, loamy fine sand, and fine sand

The typical sequence, depth, and composition of the layers of the Dogue soil are as follows—

Surface layer:
0 to 3 inches, dark grayish brown fine sandy loam

Subsurface layer:
3 to 9 inches, pale brown fine sandy loam

Subsoil:
9 to 13 inches, light olive brown and light yellowish brown loam
13 to 24 inches, yellowish brown clay
24 to 33 inches, yellowish brown clay with gray and strong brown mottles
33 to 43 inches, mottled gray, yellowish brown, and yellowish red clay
43 to 60 inches, mottled gray, yellowish brown, and yellowish red sandy clay loam

Included with this unit in mapping are small areas of well drained Pamunkey soils, somewhat poorly drained Wahee soils, and poorly drained Roanoke soils. The Pamunkey soils are on finger-ridge points, and the Wahee and Roanoke soils are in small, wet areas and narrow drainageways.

Major soil properties—

Permeability: Altavista soil—moderate; Dogue soil—moderately slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Altavista soil—very strongly acid to moderately acid; Dogue soil—extremely acid to strongly acid.
Surface runoff: Slow.

Erosion hazard: Slight.
Tilth: Altavista soil—good; Dogue soil—fair.
Depth to the water table: Altavista soil—1.5 to 2.5 feet; Dogue soil—1.5 to 3 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Altavista soil—low; Dogue soil—moderate.

Most areas of this unit are farmed. Some areas are in woodland, and some areas are in pasture.

This unit is suited to cultivated crops and to pasture and hay. Crops on these soils respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and increase runoff and erosion.

Potential productivity for loblolly pine on these soils is very high. The estimated annual production of wood per acre is 135 cubic feet. Wetness limits the use of equipment for managing timber, and plant competition limits the establishment of stands of desirable tree species.

Low strength, the moderate shrink-swell potential, and the moderately slow permeability of the Dogue soil and the seasonal high water in both soils are the main limitations of this unit for community development. The low strength and shrink-swell potential limit the Dogue soil as a building site, and the high water table limits excavation. The permeability and the water table also limit the Dogue soil as a site for septic tank absorption fields. The water table limits the Altavista soil as a site for septic tank absorption fields. The low strength also limits the suitability of the Dogue soil as subgrade material for roads and streets.

The capability subclass is IIw.

3A—Augusta fine sandy loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and somewhat poorly drained. It is on low stream terraces and broad flats. The areas of this soil commonly are long and narrow, but some smaller areas are irregularly oval and slightly concave. The areas range from about 4 to 15 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 8 inches, grayish brown fine sandy loam

Subsurface layer:
8 to 12 inches, light brownish gray fine sandy loam with light yellowish brown and yellowish brown mottles

Subsoil:
12 to 17 inches, light yellowish brown fine sandy loam with light brownish gray and yellow mottles
17 to 25 inches, mottled yellowish brown and gray sandy clay loam
25 to 50 inches, mottled yellowish brown and gray sandy clay loam
50 to 60 inches, mottled yellowish brown, gray, and yellowish red sandy clay loam

Substratum:
60 to 70 inches, gray sandy loam with yellowish brown and strong brown mottles

Included with this soil in mapping are small areas of moderately well drained Altavista, Munden, and Seabrook soils; somewhat poorly drained Dragston soils; and poorly drained Nimmo and Tomotley soils. The Altavista, Munden, and Seabrook soils are on the slightly higher, oval or elongated ridges. The Dragston soils are throughout the unit. The Nimmo and Tomotley soils are around small drainageways and in depressions. Also included are small areas that have water on the surface for brief periods after heavy or prolonged rainfall. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid to moderately acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: 1 to 2 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most of the acreage of this soil is in woodland. The rest is farmed or in pasture.

If drained, this soil is well suited to cultivated crops. Alfalfa is short lived because of seasonal wetness. Crops on this soil respond well to lime and fertilizer but are sometimes damaged in undrained areas after heavy or prolonged rains. The soil is wet and cold in spring, and wetness often interferes with tillage. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

If drained, this soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of

grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 130 cubic feet. Wetness limits the use of equipment for managing timber, and plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table is the main limitation of the soil as a site for community development, especially as a site for buildings, sanitary landfills, septic tank absorption fields, and most types of recreation.

The capability subclass is IIIw.

4A—Bohicket muck, 0 to 1 percent slopes, frequently flooded. This soil is very deep, nearly level, and very poorly drained. It is in tidal marshes along the York and Pamunkey Rivers and at the mouth of smaller streams (fig. 2). The areas of this soil commonly are long and winding, but some areas are broad. The areas range from about 3 to 100 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:

0 to 9 inches, very dark grayish brown muck

Substratum:

Figure 2.—An area of Bohicket muck, 0 to 1 percent slopes, frequently flooded, at Mills Creek.

9 to 40 inches, very dark grayish brown mucky silty clay
40 to 57 inches, gray silty clay
57 to 80 inches, dark greenish gray silty clay

Included with this soil in mapping are small areas of very poorly drained Johnston, Mattan, and Lanexa soils. The Lanexa and Mattan soils are in freshwater areas. The Johnston soils are near smaller streams on the flood plains not flooded by tidal waters. Included soils make up 20 percent of some areas.

Major soil properties—

Permeability: Very slow.
Available water capacity: High.
Organic matter content: Very high.
Natural fertility: High.
Soil reaction: Slightly acid to moderately alkaline; extremely acid after drying.
Surface runoff: Very slow.
Erosion hazard: Slight.
Tilth: Poor.
Water table: Surface to 2 feet above the surface.
Root zone: Surface to a depth of 2 feet for salt-tolerant grasses.
Shrink-swell potential: High.

Most areas of this soil are in salt-tolerant grasses and forbs. Tidal flooding, low strength, wetness, the high shrink-swell potential, and a high sulfur content make this soil generally unsuitable for most uses other than wildlife habitat.

The capability subclass is VIIIw.

5A—Bojac loamy sand, 0 to 2 percent slopes. This soil is very deep, nearly level, and well drained. It is on low stream terraces along the Chickahominy, Pamunkey, and York Rivers. The areas of this soil commonly are broad and irregularly shaped. They range from 3 to 40 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, brown loamy sand

Subsurface layer:
10 to 18 inches, dark yellowish brown loamy sand

Subsoil:
18 to 30 inches, brown fine sandy loam
30 to 52 inches, strong brown fine sandy loam

Substratum:
52 to 61 inches, mottled strong brown and pale brown sand
61 to 70 inches, yellowish brown sand with pale brown mottles

Included with this soil in mapping are small areas of Altavista, Tetotum, Dragston, Munden, Seabrook, Conetoe, Tarboro, Pamunkey, and State soils. The Altavista, Tetotum, Munden, and Seabrook soils are in the slightly lower areas throughout the map unit, and the Dragston soils are in swales and around shallow drainageways. The Conetoe, Tarboro, Pamunkey, and State soils are throughout the map unit. Included soils make up about 25 percent of this unit.

Major soil properties—

Permeability: Moderately rapid.
Available water capacity: Low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to slightly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: 4 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are farmed. A few areas are in woodland.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer, but growth and yields are sometimes limited by the low available water capacity. Conservation tillage, cover crops and grasses and legumes in the cropping system, stubble mulch, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce erosion and crop damage, and improve moisture content in the soil.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and damages the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 93 cubic feet. The sand in the surface layer limits seedling survival.

The seasonal high water table, the moderately rapid permeability, and the coarse texture of the soil are the main limitations for community development. The high water table and permeability limit the soil as a site for septic tank absorption fields, sewage lagoons, and sanitary landfills. The coarse texture limits excavation because of sloughing and makes the soil droughty for lawns.

The capability subclass is IIs.

6B—Caroline loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is on

narrow upland ridges and side slopes. The areas commonly are irregularly long and narrow. They range from about 5 to 20 acres. Slopes are 150 to 350 feet long.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches, dark grayish brown loam

Subsurface layer:
3 to 8 inches, yellowish brown loam

Subsoil:
8 to 14 inches, yellowish brown loam
14 to 28 inches, yellowish red clay loam with strong brown and yellowish brown mottles
28 to 52 inches, yellowish red clay loam with yellowish brown mottles
52 to 64 inches, mottled yellowish red, yellowish brown, and light brownish gray clay

Included with this soil in mapping are small areas of well drained Emporia, Kempsville, and Uchee soils and moderately well drained Craven and Slagle soils. The Emporia, Kempsville, and Uchee soils are throughout the unit. The Slagle and Craven soils are in shallow depressions and on foot slopes. Also included are soils that have a redder subsoil than this Caroline soil. Included soils make up about 15 percent of this unit.

Major soil properties—

Permeability: Moderately slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Fair.
Depth to the water table: More than 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this soil are in woodland. A few areas are farmed or in pasture.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. The erosion hazard is moderate and is a major management concern. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer, reduces the stands of desirable grasses and legumes, and increases runoff and the erosion hazard.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 105 cubic feet. Plant competition limits establishment of stands of desirable tree species.

The moderately slow permeability, the moderate shrink-swell potential, low strength, and the high clay content of the subsoil are the main limitations of the soil for community development. The permeability, shrink-swell potential, and clay content limit the soil as a site for septic tank absorption fields, buildings, sanitary landfills, and most types of recreation. The low strength is a limitation of the soil as a site for roads and streets and as a source material for roadfill.

The capability subclass is IIe.

7B—Caroline-Emporia complex, 2 to 6 percent slopes. This unit consists of very deep, gently sloping, well drained soils on medium-size, broad upland ridges and side slopes. Slopes commonly are smooth and range from 400 to 1,000 feet long. The areas commonly are long and narrow or irregularly oval and range from about 2 to 30 acres. They are about 40 percent Caroline soil, 35 percent Emporia soil, and 25 percent other soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Caroline soil are as follows—

Surface layer:
0 to 3 inches, dark grayish brown loam

Subsurface layer:
3 to 8 inches, yellowish brown loam

Subsoil:
8 to 14 inches, yellowish brown loam
14 to 28 inches, yellowish red clay loam with strong brown and yellowish brown mottles
28 to 52 inches, yellowish red clay loam with yellowish brown mottles
52 to 64 inches, mottled yellowish red, yellowish brown, and light brownish gray clay

The typical sequence, depth, and composition of the layers of the Emporia soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown fine sandy loam

Subsurface layer:
2 to 12 inches, light yellowish brown fine sandy loam

Subsoil:
12 to 16 inches, yellowish brown and light yellowish brown loam

16 to 30 inches, strong brown loam with light yellowish brown mottles
30 to 40 inches, yellowish red clay loam with red mottles
40 to 50 inches, variegated red, yellowish red, strong brown, yellowish brown, and gray sandy clay
50 to 56 inches, variegated red, yellowish red, yellowish brown, and gray sandy clay loam

Substratum:
56 to 63 inches, variegated yellowish red, strong brown, yellowish brown, and gray stratified sandy clay loam and sandy loam

Included with this unit in mapping are small areas of well drained Kempsville, Norfolk, Suffolk, and Uchee soils. Also included are moderately well drained Craven and Slagle soils. The Kempsville, Norfolk, Suffolk, and Uchee soils are on similar landscape positions, and the Craven and Slagle soils are in depressions and on ridge points.

Major soil properties—

Permeability: Caroline soil—moderately slow; Emporia soil—moderately slow to slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Caroline soil—extremely acid to strongly acid; Emporia soil—very strongly acid or strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Caroline soil—fair; Emporia soil—good.
Depth to the water table: Caroline soil—more than 6 feet; Emporia soil—3 to 4.5 feet.
Root zone: more than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this unit are in woodland. Some areas are farmed, and some areas are in pasture. A small acreage is in urban development.

This unit is well suited to cultivated crops and to pasture and hay. Crops on these soils respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and increase runoff and erosion.

Potential productivity for loblolly pine on these soils is high. The estimated annual production of wood per acre is 100 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Low strength, moderate shrink-swell potential, and permeability of both soils and the seasonal high water table in the Emporia soil are the main limitations of this unit for community development. The low strength and shrink-swell potential limit the unit as a building site, and the high water table limits excavations. The moderately slow permeability and the water table also limit the unit as a site for septic tank absorption fields. Low strength is a limitation of the soils as subgrade material for roads and streets.

The capability subclass is IIe.

7C—Caroline-Emporia complex, 6 to 10 percent slopes. This unit consists of very deep, sloping, well drained soils on narrow upland ridges and side slopes. Slopes are commonly smooth and range from 400 to 1,000 feet long. The areas commonly are narrow and winding and range from about 2 to 30 acres. They are about 40 percent Caroline soil, 35 percent Emporia soil, and 25 percent other soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Caroline soil are as follows—

Surface layer:
0 to 3 inches, dark grayish brown loam

Subsurface layer:
3 to 8 inches, yellowish brown loam

Subsoil:
8 to 14 inches, yellowish brown loam
14 to 28 inches, yellowish red clay loam with strong brown and yellowish brown mottles
28 to 52 inches, yellowish red clay loam with yellowish brown mottles
52 to 64 inches, mottled yellowish red, yellowish brown, and light brownish gray clay

The typical sequence, depth, and composition of the layers of the Emporia soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown fine sandy loam

Subsurface layer:
2 to 12 inches, light yellowish brown fine sandy loam

Subsoil:
12 to 16 inches, yellowish brown and light yellowish brown loam
16 to 30 inches, strong brown loam with light yellowish brown mottles
30 to 40 inches, yellowish red clay loam with red mottles

40 to 50 inches, variegated red, yellowish red, strong brown, yellowish brown, and gray sandy clay
50 to 56 inches, variegated red, yellowish red, yellowish brown, and gray sandy clay loam

Substratum:
56 to 63 inches, variegated yellowish red, strong brown, yellowish brown, and gray stratified sandy clay loam and sandy loam

Included with this unit in mapping are small areas of well drained Kempsville, Norfolk, Suffolk, and Uchee soils. Also included are moderately well drained Craven and Slagle soils. The Kempsville, Norfolk, Suffolk, and Uchee soils are on similar landscape positions, and the Craven and Slagle soils are in depressions and on ridge points.

Major soil properties—

Permeability: Caroline soil—moderately slow; Emporia soil—moderately slow to slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Caroline soil—extremely acid to strongly acid; Emporia soil—very strongly acid or strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Caroline soil—fair; Emporia soil—good.
Depth to the water table: Caroline soil—more than 6 feet; Emporia soil—3 to 4.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this unit are in woodland. Some areas are farmed, and some areas are in pasture. A small acreage is in urban development.

This unit is fairly well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and increase runoff and erosion.

Potential productivity for loblolly pine on these soils is high. The estimated annual production of wood per acre is 100 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Low strength, moderate shrink-swell potential, and permeability of both soils and the seasonal high water table in the Emporia soil are the main limitations of this unit for community development. The low strength and shrink-swell potential limit the unit as a building site, and the high water table limits excavations. The moderately slow permeability and the water table also limit the unit as a site for septic tank absorption fields. Low strength is a limitation of the soils as subgrade material for roads and streets.

The capability subclass is IIIe.

8A—Catpoint fine sand, 0 to 4 percent slopes. This soil is very deep, nearly level to gently sloping, and somewhat excessively drained. It is mostly on low terraces along the Chickahominy River. The areas of this soil commonly are long and narrow and parallel to large streams and drainageways. The areas range from about 5 to 10 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches, dark grayish brown fine sand

Subsoil:
7 to 24 inches, yellowish brown fine sand

Subsurface layer:
24 to 39 inches, brownish yellow fine sand with pale brown mottles

Subsoil:
39 to 72 inches, brownish yellow and light yellowish brown fine sand and lamellae of yellowish brown fine sandy loam

Included with this soil in mapping are small areas of Seabrook and Munden soils in shallow depressions adjacent to smaller drainageways and Conetoe soils on similar landscapes. Included soils make up about 15 percent of this unit.

Major soil properties—

Permeability: Rapid.
Available water capacity: Low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid to slightly acid.
Surface runoff: Slow.
Erosion hazard: Moderate by wind.
Tilth: Good.
Depth to the water table: 4 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland. A few areas are farmed.

This soil is moderately well suited to cultivated crops and to pasture and hay. It is droughty during the growing

season, and crop response to lime and fertilizer is limited by the low available water capacity (fig. 3). The wind erosion hazard is a major management concern, especially during the early growing season, because blowing soil often damages or covers small plants. Conservation tillage, cover crops and grasses and legumes in the cropping system, and stubble mulch help to increase organic matter content, maintain tilth, reduce erosion and crop damage, and improve the moisture-holding capacity of the soil.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts up the surface layer and damages the stands of grasses and legumes, thereby reducing yields and increasing the erosion hazard.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 110 cubic feet. The sand in the surface layer limits the use of equipment for managing timber and limits seedling survival.

The sandy texture and the seasonal high water table are the main limitations for community development. They limit the soil as a site for sewage lagoons, septic tank absorption fields, and sanitary landfills because of seepage and the hazard of pollution to ground water and nearby streams. The sandy texture makes shallow excavations unstable and limits the soil as daily cover for landfills and for some types of recreation. This soil is good as subgrade material for local roads and streets.

The capability subclass is IIIs.

Figure 3.—Irrigation on droughty Catpoint fine sand, 0 to 4 percent slopes.

9A—Conetoe loamy sand, 0 to 4 percent slopes. This soil is very deep, nearly level, and well drained. It is on low river terraces. The areas of this soil commonly are long and narrow. They range from about 3 to 10 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, dark grayish brown loamy sand

Subsurface layer:
5 to 10 inches, light yellowish brown loamy sand
10 to 25 inches, brownish yellow loamy sand

Subsoil:
25 to 31 inches, yellowish brown fine sandy loam
31 to 46 inches, yellowish brown loamy sand
46 to 55 inches, yellowish brown sand

Substratum:
55 to 72 inches, yellowish brown sand with light yellowish brown mottles

Included with this soil in mapping are small areas of moderately well drained Seabrook, Tarboro, and Bojac soils. The Seabrook soils are in shallow depressions. The Tarboro and Bojac soils commonly are throughout the unit. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Moderately rapid.
Available water capacity: Low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight by water and moderate by wind.
Tilth: Good.
Depth to the water table: 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are farmed, and a few areas are in woodland.

This soil is well suited to cultivated crops and moderately well suited to pasture and hay. The soil is droughty during the growing season, however, and crop response to lime and fertilizer is limited by the low available water capacity. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and hold moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the soft surface layer and damages the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 100 cubic feet. The sand in the surface layer limits the use of equipment for managing timber and limits seedling survival.

The moderately rapid permeability and the sandy texture of the soil are the main limitations for community development. The permeability causes a hazard of pollution to ground water and nearby streams in areas used for septic tank absorption fields and sanitary landfills. The sandy texture makes excavations unstable, and the surface of the soil is dusty when dry. The soil holds a low amount of moisture, which limits the growth of grasses and shrubs.

The capability subclass is IIs.

10B—Craven loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on narrow to broad upland flats and narrow to medium-size ridges and side slopes. The areas commonly are irregularly oval or rectangular, and slopes are 200 to 800 feet wide. The areas range from about 2 to 15 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, brown loam

Subsurface layer:
4 to 9 inches, light yellowish brown loam

Subsoil:
9 to 14 inches, brownish yellow clay loam
14 to 20 inches, yellowish brown clay
20 to 27 inches, yellowish brown clay with gray, strong brown, and yellowish red mottles
27 to 40 inches, mottled strong brown, gray, and yellowish red clay loam
40 to 60 inches, mottled and streaked light gray, brownish yellow, and yellowish brown clay loam

Substratum:
60 to 80 inches, streaked and mottled light gray, yellowish brown, and light olive brown stratified sandy clay loam and clay loam

Included with this soil in mapping are small areas of well drained Caroline, Emporia, Kempsville, and Uchee soils and moderately well drained Slagle soils. The well drained soils are generally on the higher areas throughout the unit, and the Slagle soils are on the same areas as this Craven soil. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Fair.
Depth to the water table: 2 to 3 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this soil are in woodland. A few areas are farmed or used for pasture.

This soil is moderately well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer, but wetness in the spring restricts tillage and makes crops such as alfalfa short-lived. The erosion hazard is a major management concern. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content, improve tilth, control erosion, and reduce crusting. Grassed waterways and diversions also help to reduce erosion in critical areas.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures on this soil. Grazing during periods of seasonal wetness compacts the surface layer of this soil, damages the grasses and legumes, and increases erosion.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 110 cubic feet. Wetness limits the use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table, slow permeability, moderate shrink-swell potential, clayey subsoil, and low strength of the soil are the main limitations for community development. The permeability and the seasonal high water table limit the soil as a site for sanitary landfills and septic systems, and the low strength and the shrink-swell potential limit the soil as a building site. The clayey subsoil restricts vehicular traffic when the soil is wet.

The capability subclass is IIe.

10C—Craven loam, 6 to 10 percent slopes. This soil is very deep, strongly sloping, and moderately well drained. It is on narrow to medium-size upland ridges and side slopes. The areas commonly are long and narrow, and slopes are about 150 to 250 feet wide. The areas range from about 2 to 15 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, brown loam

Subsurface layer:
4 to 9 inches, light yellowish brown loam

Subsoil:
9 to 14 inches, brownish yellow clay loam
14 to 20 inches, yellowish brown clay
20 to 27 inches, yellowish brown clay with gray, strong brown, and yellowish red mottles
27 to 40 inches, mottled strong brown, gray, and yellowish red clay loam
40 to 60 inches, mottled and streaked light gray, brownish yellow, and yellowish brown clay loam

Substratum:
60 to 80 inches, streaked and mottled light gray, yellowish brown, and light olive brown stratified sandy clay loam and clay loam

Included with this soil in mapping are small areas of well drained Caroline, Emporia, Kempsville, and Uchee soils and moderately well drained Slagle soils. The well drained soils are generally on the higher areas throughout the unit, and the Slagle soils are on the same areas as this Craven soil. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Rapid.
Erosion hazard: Severe.
Tilth: Fair.
Depth to the water table: 2 to 3 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this soil are in woodland. A few areas are farmed or used for pasture.

This soil is poorly suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer, but wetness in the spring restricts tillage and makes crops such as alfalfa short-lived. The erosion hazard is a major management concern. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content, improve tilth, control erosion, and reduce crusting. Grassed waterways and diversions also help to reduce erosion in critical areas.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures on this soil.

Grazing during periods of seasonal wetness compacts the surface layer of the soil, damages the grasses and legumes, and increases erosion.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 110 cubic feet. Wetness limits the use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table, slow permeability, moderate shrink-swell potential, clayey subsoil, low strength, and slope of the soil are the main limitations for community development. The high water table, slow permeability, and slope limit the soil as a site for septic systems and sanitary landfills. The shrink-swell potential and low strength limit the soil as a building site. The clayey subsoil restricts vehicular traffic when the soil is wet.

The capability subclass is IVe.

11B—Craven-Caroline complex, 2 to 6 percent slopes. This unit consists of very deep, gently sloping soils on narrow ridgetops and side slopes. Slopes are uneven and complex and are 100 to 500 feet wide. The areas of this unit are narrow and winding and range from 2 to 20 acres. They are about 40 percent moderately well drained Craven soil, 25 percent well drained Caroline soil, and 35 percent other soils. The soils are so intermingled that it was not practical to map them separately.

The typical sequence, depth, and composition of the layers of the Craven soil are as follows—

Surface layer:
0 to 4 inches, brown loam

Subsurface layer:
4 to 9 inches, light yellowish brown loam

Subsoil:
9 to 14 inches, brownish yellow clay loam
14 to 20 inches, yellowish brown clay
20 to 27 inches, yellowish brown clay with gray, strong brown, and yellowish red mottles
27 to 40 inches, mottled strong brown, gray, and yellowish red clay loam
40 to 60 inches, mottled and streaked light gray, brownish yellow, and yellowish brown clay loam

Substratum:
60 to 80 inches, streaked and mottled light gray, yellowish brown, and light olive brown stratified sandy clay loam and clay loam

The typical sequence, depth, and composition of the layers of the Caroline soil are as follows—

Surface layer:
0 to 3 inches, dark grayish brown loam

Subsurface layer:
3 to 8 inches, yellowish brown loam

Subsoil:
8 to 14 inches, yellowish brown loam
14 to 28 inches, yellowish red clay loam with strong brown and yellowish brown mottles
28 to 52 inches, yellowish red clay loam with yellowish brown mottles
52 to 64 inches, mottled yellowish red, yellowish brown, and light brownish gray clay

Included with these soils in mapping are small areas of well drained Emporia and Kempsville soils and moderately well drained Slagle soils. These soils are throughout the unit. Also included are small areas of ferricrete outcrops, severely eroded areas on points of ridges and upper side slopes, and soils that are similar to the Craven and Caroline soils in depth and texture but are dominantly red in the subsoil.

Major soil properties—

Permeability: Craven soil—slow; Caroline soil—moderately slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Fair.
Depth to the water table: Craven soil—2 to 3 feet; Caroline soil—more than 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of these soils are in woodland. A small acreage is farmed or in pasture.

This unit is somewhat poorly suited to cultivated crops and moderately well suited to pasture and hay. Crops on these soils respond well to lime and fertilizer, but wetness in the spring often restricts tillage on the Craven soil. Conservation tillage, cover crops and grasses and legumes in the cropping system, stubble mulch, and crop residue on and in the soil help to maintain organic matter content and tilth, reduce erosion and crop damage, and help to hold moisture in the soil. Grassed waterways and diversions also help to reduce erosion in critical areas.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures on this unit. Grazing during periods of seasonal wetness compacts the surface layer, damages stands of grasses and legumes, and increases erosion.

Potential productivity for loblolly pine on this unit is high. The estimated annual production of wood per acre

is 110 cubic feet. Wetness limits the use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water tables, the slow and moderately slow permeability, and the moderate shrink-swell potential are the main limitations of this unit for community development. They especially limit the unit as a site for septic tank absorption fields, sanitary landfills, buildings, and most types of recreation.

The capability subclass is IIe.

12B—Craven-Uchee complex, 2 to 6 percent slopes. This unit consists of very deep, gently sloping soils on narrow ridgetops. Slopes are uneven and complex and are 100 to 500 feet wide. The areas of this unit are long and winding and range from about 4 to 20 acres. They are about 35 percent moderately well drained Craven soil, 35 percent well drained Uchee soil, and 30 percent other soils. The soils are so intermingled that it was not practical to map them separately.

The typical sequence, depth, and composition of the layers of the Craven soil are as follows—

Surface layer:
0 to 4 inches, brown loam

Subsurface layer:
4 to 9 inches, light yellowish brown loam

Subsoil:
9 to 14 inches, brownish yellow clay loam
14 to 20 inches, yellowish brown clay
20 to 27 inches, yellowish brown clay with gray, strong brown, and yellowish red mottles
27 to 40 inches, mottled strong brown, gray, and yellowish red clay loam
40 to 60 inches, mottled and streaked light gray, brownish yellow, and yellowish brown clay loam

Substratum:
60 to 80 inches, streaked and mottled light gray, yellowish brown, and light olive brown stratified sandy clay loam and clay loam

The typical sequence, depth, and composition of the layers of the Uchee soil are as follows—

Surface layer:
0 to 11 inches, brown loamy fine sand

Subsurface layer:
11 to 25 inches, pale brown loamy fine sand with lamellae of yellowish brown loamy fine sand

Subsoil:
25 to 35 inches, yellowish brown sandy clay loam
35 to 50 inches, yellowish brown sandy clay loam with brownish yellow, gray, and strong brown mottles

Substratum:
50 to 63 inches, mottled gray, light yellowish brown, and brownish yellow fine sandy loam

Included with these soils in mapping are small, intermingled areas of well drained Caroline, Emporia, and Kempsville soils and moderately well drained Slagle soils. These soils are throughout the map unit. Also included are small areas of ferricrete outcrops and severely eroded areas that are generally on points of ridges and upper parts of side slopes and steeper areas on side slopes and along narrow escarpment fronts. Seeps are at the base of some slopes.

Major soil properties—

Permeability: Craven soil—slow; Uchee soil—moderately slow.
Available water capacity: Craven soil—moderate; Uchee soil—low to moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Craven soil—extremely acid to strongly acid; Uchee soil—very strongly acid or strongly acid.
Surface runoff: Craven soil—medium; Uchee soil—slow.
Erosion hazard: Craven soil—moderate; Uchee soil—slight by water and moderate by wind.
Tilth: Craven soil—fair; Uchee soil—good.
Depth to the water table: Craven soil—2 to 3 feet; Uchee soil—3.5 to 5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of these soils are in woodland. A small acreage is farmed or in pasture.

This unit is fairly suited to cultivated crops and to pasture and hay. Crops on these soils generally respond well to lime and fertilizer, but wetness in the spring often restricts tillage on the Craven soil and the low available water capacity often limits crop response to lime and fertilizer on the Uchee soil. The erosion hazard is a major management concern. The use of equipment is limited and hazardous on some of the narrow ridges in the unit. Conservation tillage, cover crops and grasses and legumes in the cropping system, stubble mulch, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce erosion and crop damage, and hold moisture in the soil. Grassed waterways and diversions also help to reduce erosion in critical areas.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures on this unit. Grazing during periods of seasonal wetness compacts the surface layer, damages the stands of grasses and legumes, and increases erosion.

Potential productivity for loblolly pine on this unit is high. The estimated annual production of wood per acre is 115 cubic feet. Wetness in the Craven soil and sand in the surface layer of the Uchee soil limit the use of equipment for managing timber. The sand in the surface layer of the Uchee soil limits seedling survival. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table, the slope, the slow permeability in the Craven soil, and the moderate shrink-swell potential are the main limitations of this unit for community development. They especially limit the unit as a site for septic tank absorption fields, sanitary landfills, buildings, and most types of recreation.

The capability subclass is IIIe.

13A—Dogue fine sandy loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and moderately well drained. It is on narrow to broad ridges on terraces along rivers, creeks, and smaller streams, at an elevation generally of 40 to 50 feet above sea level. Most areas of this soil are irregularly oval or rectangular and range from 2 to 50 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches, dark grayish brown fine sandy loam

Subsurface layer:
3 to 9 inches, pale brown fine sandy loam

Subsoil:
9 to 13 inches, light olive brown and light yellowish brown loam
13 to 24 inches, yellowish brown clay
24 to 33 inches, yellowish brown clay with gray and strong brown mottles
33 to 43 inches, mottled gray, yellowish brown, and yellowish red clay
43 to 60 inches, mottled gray, yellowish brown, and yellowish red sandy clay loam

Included with this soil in mapping are small areas of well drained Pamunkey soils, moderately well drained Altavista soils, somewhat poorly drained Wahee soils, and poorly drained Roanoke soils. The Pamunkey soils are on the slightly higher areas throughout the unit. The Altavista soils are throughout the unit. The Wahee and Roanoke soils are in shallow depressions and at the slightly lower positions. Also included are soils that are deeper than this Dogue soil, soils that have higher silt content, and soils that have a clayey substratum. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Moderately slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Fair.
Depth to the water table: 1.5 to 3 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this soil are in woodland. Some areas are farmed, and a few areas are in pasture.

This soil is well suited to cultivated crops and to pasture and hay. Crops respond well to lime and fertilizer. The soil is wet and cold in the early spring, and wetness often interferes with early tillage and late-fall harvesting. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes. Overgrazing also increase runoff and the erosion hazard.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 130 cubic feet. Wetness limits the use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table and the shrink-swell potential are the main limitations of the soil for community development. The seasonal high water table limits the soil as a building site and as a site for sanitary landfills or septic tank absorption fields. The shrink-swell potential limits its use as a subgrade material for roads and streets and as a foundation for buildings.

The capability subclass is IIw.

14A—Dragston fine sandy loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and somewhat poorly drained. It is on broad, low terraces along the Chickahominy and Pamunkey Rivers. The areas of this soil commonly are oblong or irregularly shaped. They range from about 3 to 10 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches, very dark grayish brown fine sandy loam
3 to 10 inches, olive brown fine sandy loam with yellowish brown and grayish brown mottles

Subsurface layer:
10 to 17 inches, light gray fine sandy loam with brownish yellow mottles

Subsoil:
17 to 25 inches, pale brown and yellowish brown fine sandy loam with light brownish gray mottles
25 to 40 inches, mottled yellowish brown and gray fine sandy loam
40 to 49 inches, gray fine sandy loam with yellowish brown mottles

Substratum:
49 to 60 inches, grayish brown sand with yellowish brown mottles

Included with this soil in mapping are small areas of moderately well drained Altavista and Seabrook soils, somewhat poorly drained Augusta soils, and poorly drained Nimmo and Tomotley soils. The Altavista and Seabrook soils are in slightly higher convex areas, the Augusta soils are throughout the unit, and the Nimmo and Tomotley soils are in shallow depressions. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Moderately rapid.
Available water capacity: Low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: 6 inches to 1.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland. Some areas are farmed, and some are in pasture.

If drained, this soil is well suited to cultivated crops and moderately well suited to pasture and hay. Drainage systems are difficult to install, however, because of the wet, sandy substratum. The soil is droughty during the growing season, and crop response to lime and fertilizer is limited by low available water capacity. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and hold moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the soft surface layer and damages the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 110 cubic feet. Wetness limits the use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table and the moderately rapid permeability of the soil are the main limitations for community development. They especially limit the soil as a building site or as a site for sanitary landfills or septic tank absorption fields. Also, both cause a contamination hazard to ground water and nearby streams in areas used as sites for septic tanks or landfills.

The capability subclass is IIIw.

15B—Emporia fine sandy loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is on medium-size and broad upland ridges. Slopes are smooth, commonly convex, and 150 to 800 feet long. The areas of this soil commonly are long and narrow or irregularly oval. They range from 3 to 40 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown fine sandy loam

Subsurface layer:
2 to 12 inches, light yellowish brown fine sandy loam

Subsoil:
12 to 16 inches, yellowish brown and light yellowish brown loam
16 to 30 inches, strong brown loam with light yellowish brown mottles
30 to 40 inches, yellowish red clay loam with red mottles
40 to 50 inches, variegated red, yellowish red, strong brown, yellowish brown, and gray sandy clay
50 to 56 inches, variegated red, yellowish red, strong brown, yellowish brown, and gray sandy clay loam

Substratum:
56 to 63 inches, variegated red, strong brown, yellowish brown, and gray stratified sandy clay loam and sandy loam

Included with this soil in mapping are small areas of well drained Caroline, Suffolk, and Uchee soils and moderately well drained Slagle soils. The Caroline, Suffolk, and Uchee soils are on small knolls, and the Slagle soils are in shallow depressions. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Moderately slow to slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.

Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: 3 to 4.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this soil are in woodland. Some of the acreage is in farmland or pasture, and some is in residential developments.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, control erosion, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing causes compaction of the surface layer and increases runoff and erosion.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 100 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Low strength, the moderate shrink-swell potential, the seasonal high water table, and the slow permeability are the main limitations of the soil for community development. The low strength and moderate shrink-swell potential limit the soil as a building site, and the high water table limits excavations. The slow permeability and the water table also limit the soil as a site for septic tank absorption fields.

The capability subclass is IIe.

16A—Johnston mucky loam, 0 to 2 percent slopes, frequently flooded. This soil is very deep, nearly level, and very poorly drained. It is on flood plains and along major drainageways throughout the survey area. The areas are long and narrow or irregularly oval. They are 150 to 600 feet wide and are up to a mile in length. They range from 2 to 300 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 24 inches, black mucky loam

Substratum:
24 to 30 inches, dark gray sandy loam
30 to 64 inches, dark grayish brown loamy sand

Included with this soil in mapping are small areas of poorly drained Nimmo and Tomotley soils and very poorly drained Bohicket and Lanexa soils. The Nimmo and Tomotley soils are throughout the map unit and are on the upper part of the flood plains. The Bohicket and Lanexa soils are mostly at the lower part of the flood plains, adjacent to the tidal marshes. Also included throughout the unit are soils that have a subsoil of clay and sandy soils. In some areas are soils that are flooded for very long periods. Some of these soils are somewhat poorly drained and are near the base of side slopes, and some are near active stream channels. Gravel is in a few places.

Major soil properties—

Permeability: Moderately rapid.
Available water capacity: High.
Organic matter content: High.
Natural fertility: Medium.
Soil reaction: Strongly acid or very strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Fair.
Water table: 1 foot above the surface to a depth of 2.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

This soil is not suited to cultivated crops or to pasture and hay because of flooding and wetness. The potential productivity for trees is high, especially for water-tolerant hardwoods such as swamp tupelo, water oak, sweetgum, blackgum, maple, and cypress. These hardwood species generally regenerate naturally after timber harvest, and they cover most areas of the soil. Flooding and wetness are the main limitations for the use of timber harvesting equipment.

Flooding and ponding limit this unit for most uses other than wildlife habitat.

The capability subclass is VIIw.

17B—Kempsville fine sandy loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is on broad uplands and side slopes. Slopes commonly are 200 to 600 feet long. The areas of this soil are long and narrow or oval. They range from about 3 to 60 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 11 inches, brown fine sandy loam

Subsoil:
11 to 17 inches, yellowish brown fine sandy loam with light yellowish brown mottles
17 to 30 inches, strong brown sandy clay loam with light yellowish brown mottles
30 to 39 inches, yellowish brown fine sandy loam with pale brown mottles

39 to 53 inches, yellowish brown and pale brown fine sandy loam
53 to 84 inches, yellowish red sandy clay loam

Substratum:
84 to 90 inches, stratified yellowish red sandy clay loam and strong brown sandy loam

Included with this soil in mapping are small areas of well drained Emporia and Suffolk soils and moderately well drained Slagle soils. The Emporia soils are on the slightly lower areas, the Suffolk soils are on small knolls throughout the unit, and the Slagle soils are adjacent to drainageways and in depressions. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: More than 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland. Some areas are farmed, and some areas are in community development.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and damage the stands of grasses and legumes. This results in reduced yields and increased runoff and erosion.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 115 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

The moderate permeability, low strength of the subsoil, and the slope are the main limitations of this soil for community development. The permeability and the slope limit the soil as a site for septic tank absorption fields, sewage lagoons, and small commercial buildings. The low strength limits the soil as subgrade material for roads and streets.

The capability subclass is IIe.

18B—Kempsville gravelly fine sandy loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is on broad uplands and side slopes. Slopes commonly are 200 to 600 feet long. The areas of this soil are long and narrow or oval. They range from about 3 to 60 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 11 inches, brown and light yellowish brown gravelly fine sandy loam

Subsoil:
11 to 36 inches, yellowish brown and strong brown gravelly fine sandy loam with pale brown mottles
36 to 60 inches, strong brown and yellowish red gravelly sandy clay loam

Included with this soil in mapping are small areas of well drained Emporia and Suffolk soils and moderately well drained Slagle soils. The Emporia soils are on the slightly lower areas, the Suffolk soils are on small knolls throughout the unit, and the Slagle soils are adjacent to drainageways and in depressions. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: More than 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland. Some areas are farmed, and some areas are in community development.

This soil is fairly suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the

surface layer and damage the stands of grasses and legumes. This results in reduced yields and increased runoff and erosion.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 110 cubic feet. Plant competition limits establishment of stands of desirable tree species.

The moderate permeability and low strength of the subsoil are the main limitations of this soil for community development. The permeability limits the soil as a site for septic tank absorption fields, sewage lagoons, and small commercial buildings. The low strength limits the soil as subgrade material for roads and streets.

The capability subclass is IIe.

19B—Kempsville-Emporia complex, 2 to 6 percent slopes. This unit consists of very deep, gently sloping, well drained soils on medium-size to broad upland ridges and side slopes. Slopes are commonly smooth and range from 400 to 1,000 feet long. The areas of this unit commonly are long and narrow or irregularly oval and range from about 2 to 30 acres. They are about 50 percent Kempsville soil, 30 percent Emporia soil, and 20 percent other soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Kempsville soil are as follows—

Surface layer:
0 to 11 inches, brown fine sandy loam

Subsoil:
11 to 17 inches, yellowish brown fine sandy loam with light yellowish brown mottles
17 to 30 inches, strong brown sandy clay loam with light yellowish brown mottles
30 to 39 inches, yellowish brown fine sandy loam with pale brown mottles
39 to 53 inches, yellowish brown and pale brown fine sandy loam
53 to 84 inches, yellowish red fine sandy loam

Substratum:
84 to 90 inches, stratified yellowish red sandy clay loam and strong brown sandy loam

The typical sequence, depth, and composition of the layers of the Emporia soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown fine sandy loam

Subsurface layer:
2 to 12 inches, light yellowish brown fine sandy loam

Subsoil:
12 to 16 inches, yellowish brown and light yellowish brown loam
16 to 30 inches, strong brown loam with light yellowish brown mottles
30 to 40 inches, yellowish red clay loam with red mottles
40 to 50 inches, variegated red, yellowish red, strong brown, yellowish brown, and gray sandy clay
50 to 56 inches, variegated red, yellowish red, yellowish brown, and gray sandy clay loam

Substratum:
56 to 63 inches, variegated red, strong brown, yellowish brown, and gray stratified sandy clay loam and sandy loam

Included with these soils in mapping are small areas of well drained Caroline, Suffolk, and Uchee soils and moderately well drained Slagle soils. The Caroline soils are on the slightly higher areas, the Suffolk soils are on ridges toward creeks, and the Slagle soils are adjacent to drainageways and in depressions.

Major soil properties—

Permeability: Kempsville soil—moderate; Emporia soil—moderately slow to slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid to moderately acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: Kempsville soil—more than 6 feet; Emporia soil—3 to 4.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Kempsville soil—low; Emporia soil—moderate.

Most areas of this unit are in woodland. Some areas are farmed, and some areas are in pasture. A small acreage is in urban development.

This unit is well suited to cultivated crops and to pasture and hay. Crops on these soils respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and increase runoff and erosion.

Potential productivity for loblolly pine on these soils is high. The estimated annual production of wood per acre

is 105 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Low strength of both soils, the moderate shrink-swell potential and seasonal high water table of the Emporia soil, and slow permeability of the Emporia soil and moderate permeability of the Kempsville soil are the main limitations of this unit for community development. The low strength and moderate shrink-swell potential limit the Emporia soil as a building site, and the high water table limits excavations. The slow permeability and the water table also limit the Emporia soil as a site for septic tank absorption fields. The low strength limits the soils as subgrade material for roads and streets.

The capability subclass is IIe.

19C—Kempsville-Emporia complex, 6 to 10 percent slopes. This unit consists of very deep, strongly sloping, well drained soils on upland ridges and side slopes. Slopes are commonly smooth and range from 400 to 800 feet long. The areas of this unit commonly are long and narrow or winding and range from about 2 to 20 acres. They are about 50 percent Kempsville soil, 30 percent Emporia soil, and 20 percent other soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Kempsville soil are as follows—

Surface layer:
0 to 11 inches, brown fine sandy loam

Subsoil:
11 to 17 inches, yellowish brown fine sandy loam with light yellowish brown mottles
17 to 30 inches, strong brown sandy clay loam with light yellowish brown mottles
30 to 39 inches, yellowish brown fine sandy loam with pale brown mottles
39 to 53 inches, yellowish brown and pale brown fine sandy loam
53 to 84 inches, yellowish red fine sandy loam

Substratum:
84 to 90 inches, stratified yellowish red sandy clay loam and strong brown sandy loam

The typical sequence, depth, and composition of the layers of the Emporia soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown fine sandy loam

Subsurface layer:
2 to 12 inches, light yellowish brown fine sandy loam

Subsoil:
12 to 16 inches, yellowish brown and light yellowish brown loam
16 to 30 inches, strong brown loam with light yellowish brown mottles
30 to 40 inches, yellowish red clay loam with red mottles
40 to 50 inches, variegated red, yellowish red, strong brown, yellowish brown, and gray sandy clay
50 to 56 inches, variegated red, yellowish red, yellowish brown, and gray sandy clay loam

Substratum:
56 to 63 inches, variegated red, strong brown, yellowish brown, and gray stratified sandy clay loam and sandy loam

Included with these soils in mapping are small areas of well drained Caroline, Suffolk, and Uchee soils and moderately well drained Slagle soils. The Caroline soils are on the slightly higher areas, the Suffolk soils are on ridges toward creeks, and the Slagle soils are adjacent to drainageways and in depressions.

Major soil properties—

Permeability: Kempsville soil—moderate; Emporia soil—moderately slow to slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid to moderately acid.
Surface runoff: Rapid.
Erosion hazard: Severe.
Tilth: Good.
Depth to the water table: Kempsville soil—more than 6 feet; Emporia soil—3 to 4.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Kempsville soil—low; Emporia soil—moderate.

Most areas of this unit are in woodland. Some areas are farmed, and some areas are in pasture. A small acreage is in urban development.

This unit is fairly suited to cultivated crops and to pasture and hay. Crops on these soils respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and increase runoff and erosion.

Potential productivity for loblolly pine on these soils is high. The estimated annual production of wood per acre

is 105 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Low strength of both soils, the moderate shrink-swell potential and seasonal high water table of the Emporia soil, and slow permeability of the Emporia soil and moderate permeability of the Kempsville soil are the main limitations of this unit for community development. The low strength and moderate shrink-swell potential limit the Emporia soil as a building site, and the high water table limits excavations. The slow permeability and the water table also limit the Emporia soil as a site for septic tank absorption fields. The low strength limits the soils as subgrade material for roads and streets.

The capability subclass is IIIe.

20B—Kempsville-Suffolk complex, 2 to 6 percent slopes. This unit consists of very deep, gently sloping, well drained soils on medium-size upland ridges. Slopes are commonly smooth and range from 400 to 1,000 feet long. The areas of the unit commonly are long and narrow or irregularly oval and range from 4 to 30 acres. They are about 45 percent Kempsville soil, 30 percent Suffolk soil, and 25 percent other soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Kempsville soil are as follows—

Surface layer:
0 to 11 inches, brown fine sandy loam

Subsoil:
11 to 17 inches, yellowish brown fine sandy loam with light yellowish brown mottles
17 to 30 inches, strong brown sandy clay loam with light yellowish brown mottles
30 to 39 inches, yellowish brown fine sandy loam with pale brown mottles
39 to 53 inches, yellowish brown and pale brown fine sandy loam
53 to 84 inches, yellowish red fine sandy loam

Substratum:
84 to 90 inches, stratified yellowish red sandy clay loam and strong brown sandy loam

The typical sequence, depth, and composition of the layers of the Suffolk soil are as follows—

Surface layer:
0 to 7 inches, brown fine sandy loam

Subsoil:
7 to 11 inches, brown fine sandy loam
11 to 22 inches, strong brown sandy clay loam
22 to 36 inches, brown fine sandy loam
36 to 45 inches, strong brown loamy sand

Substratum:
40 to 60 inches, strong brown loamy sand

Included with these soils in mapping are small areas of Orangeburg, Emporia, and Norfolk soils. The Orangeburg and Norfolk soils are on the slightly higher areas, and the Emporia soils are on the slightly lower areas.

Major soil properties—

Permeability: Moderate.
Available water capacity: Kempsville soil—moderate; Suffolk soil—low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Kempsville soil—very strongly acid to moderately acid; Suffolk soil—extremely acid to strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: More than 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this unit are in woodland. Some areas are farmed, and some areas are in urban development.

This unit is well suited to cultivated crops and to pasture and hay. Crops on these soils respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and increase runoff and erosion.

Potential productivity for loblolly pine on these soils is high. The estimated annual production of wood per acre is 100 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Low strength of both soils and a hazard of groundwater contamination are the main limitations of the unit for community development. The low strength and sand in the substratum make excavations unstable.

The capability subclass of this complex is IIe.

21A—Lanexa mucky silty clay, 0 to 1 percent slopes, frequently flooded. This soil is deep, nearly level, and very poorly drained. It is in freshwater tidal marshes. The areas of this soil are irregular in shape. They range from about 3 to 100 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 15 inches, very dark grayish brown mucky silty clay

Organic layer:
15 to 40 inches, very dark grayish brown muck

Substratum:
40 to 60 inches, very dark grayish brown mucky silty clay

Included with this soil in mapping are small areas of very poorly drained Bohicket, Mattan, and Johnston soils. The Bohicket soils are throughout the unit near the Pamunkey and York Rivers. The Johnston soils are on flood plains of smaller streams but are not flooded by tidal water. Trees cover most of the acreage of the Mattan soils. Also included are areas of soils that have sandy layers within a depth of 60 inches. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Slow.
Available water capacity: High.
Organic matter content: High.
Natural fertility: Medium.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Very slow.
Erosion hazard: Slight.
Tilth: Poor.
Water table: 2 feet above the surface.
Root zone: More than 60 inches.
Shrink-swell potential: High.

Most areas of this soil are in water-tolerant grasses and forbs, mainly arrowleaf, cattails, giant cordgrass, and lilies. Scattered baldcypress and water tupelo are in some areas, but the soil is so soft that harvesting is generally impractical. The water in and on the soil makes this soil generally unsuitable for farming or community development. A lack of suitable outlets makes drainage impractical.

The capability subclass is VIIIw.

22A—Mattan muck, 0 to 1 percent slopes, frequently flooded. This soil is deep, nearly level, and very poorly drained. It is in freshwater swamps. The areas are irregular in shape. They range from about 3 to 100 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Organic layers:
0 to 14 inches, gray muck
14 to 40 inches, very dark grayish brown muck

Substratum:
40 to 48 inches, very dark grayish brown loamy sand
48 to 60 inches, dark gray sandy clay loam

Included with this soil in mapping are small areas of very poorly drained Lanexa soils on the lower areas of the unit. They make up about 15 percent of this unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: High.
Organic matter content: High.
Natural fertility: Medium.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Very slow.
Erosion hazard: Slight.
Tilth: Poor.
Water table: 2 feet above the surface during storms.
Root zone: More than 60 inches.
Shrink-swell potential: High.

The areas of this soil are in water-tolerant trees and an understory of forbs, mainly cattails and lilies. The common trees are baldcypress, gums, maples, and tupelo, but they are of poor quality and the soil is so soft that harvesting is impractical. The water in and on the soil makes this unit generally unsuitable for farming or community development.

The capability subclass is VIIw.

23A—Munden sandy loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and moderately well drained. It is on ridges and in shallow depressions. The areas of this soil commonly are irregular oval or long and narrow. They range from 2 to 10 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, dark grayish brown sandy loam

Subsurface layer:
10 to 18 inches, yellowish brown fine sandy loam

Subsoil:
18 to 24 inches, mottled yellowish brown and light yellowish brown fine sandy loam
24 to 35 inches, mottled light yellowish brown, pale brown, grayish brown, and light brownish gray sandy clay loam

Substratum:
35 to 65 inches, stratified pale brown and yellowish brown loamy sand

Included with this soil in mapping are areas of moderately well drained Altavista and Seabrook soils on similar landscapes and somewhat poorly drained

Augusta and Dragston soils in the lower areas and in shallow depressions.

Major soil properties—

Permeability: Moderate.
Available water capacity: Low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: 1.5 to 2.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most of the acreage of this soil is cultivated. Some areas are in woodland, and a few areas are in pasture.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage to the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 130 cubic feet. Wetness limits the use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table and the moderate permeability are the main limitations of the soil for community development. The water table limits the soil as a building site or as a site for sanitary landfills or septic tank absorption fields. The permeability causes a contamination hazard to ground water and nearby streams in areas used as sites for septic tanks or landfills.

The capability subclass is IIw.

24A—Nawney silt loam, 0 to 2 percent slopes, frequently flooded. This soil is very deep, nearly level, and very poorly drained. It is on flood plains and in drainageways. The areas of this soil commonly are long and narrow or irregular in shape and range from 2 to 500 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark gray silt loam

Subsurface layer:
4 to 7 inches, dark grayish brown silt loam

Substratum:
7 to 17 inches, gray clay loam with strong brown mottles
17 to 36 inches, greenish gray silty clay loam with strong brown mottles
36 to 41 inches, greenish gray clay loam with dark yellowish brown mottles
41 to 65 inches, dark greenish gray stratified sand and silty clay loam

Included with this soil in mapping are small areas of poorly drained Nimmo and Tomotley soils and very poorly drained Johnston, Lanexa, and Mattan soils. The Nimmo and Tomotley soils are at a slightly higher elevation than the Nawney soils and usually are not flooded. The Lanexa and Mattan soils are in marshes and swamps. The Lanexa soils have thick organic layers to a depth of more than 51 inches. Some included areas near the Lanexa soils have an organic surface layer thicker than 8 inches. Included soils make up about 25 percent of the unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Moderate.
Natural fertility: Low.
Soil reaction: Extremely acid to slightly acid.
Surface runoff: Very slow.
Erosion hazard: Slight.
Tilth: Poor.
Depth to the water table: 6 inches.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Wetness and flooding make this soil generally unsuitable for uses other than woodland and as habitat for wildlife. Most areas are covered with water-tolerant trees and an understory mainly of cattails and lilies. Most of the trees are baldcypress, gums, maples, and tupelo, but these trees are of poor quality and the soil is so soft that harvesting is impractical. The water in and on the soil makes this unit generally unsuitable for farming or community development.

The capability subclass is VIIw.

25A—Nawney silt loam, 0 to 2 percent slopes, ponded. This soil is very deep, nearly level, and very poorly drained. It is on flood plains and in drainageways. The areas of this soil commonly are long and narrow or irregular in shape and range from 2 to 500 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 4 inches, dark gray silt loam

Subsurface layer:
4 to 7 inches, dark grayish brown silt loam

Substratum:
7 to 17 inches, gray clay loam with strong brown mottles
17 to 36 inches, greenish gray silty clay loam with strong brown mottles
36 to 41 inches, greenish gray clay loam with dark yellowish brown mottles
41 to 65 inches, dark greenish gray stratified sands and silty clay loam

Included with this soil in mapping are small areas of poorly drained Nimmo and Tomotley soils and very poorly drained Johnston, Lanexa, and Mattan soils. The Nimmo and Tomotley soils are slightly higher than the Nawney soil and usually are not flooded. The Lanexa and Mattan soils are in marshes and swamps. The Lanexa soils have thick organic layers to a depth of more than 51 inches. Some included areas near the Lanexa soils have an organic surface layer thicker than 8 inches. Included soils make up about 25 percent of the unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Moderate.
Natural fertility: Low.
Soil reaction: Extremely acid to slightly acid.
Surface runoff: Ponded.
Erosion hazard: Slight.
Tilth: Poor.
Water table: From 3 feet above the surface to a depth of 6 inches.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Wetness and flooding make this soil generally unsuitable for uses other than woodland and as wildlife habitat. Most areas are in water-tolerant trees and an understory mainly of cattails and lilies. Most of the trees are baldcypress, gums, maples, and tupelo, but these trees are of poor quality and the soil is so soft that harvesting is impractical. The water in and on the soil makes this unit generally unsuitable for farming or community development.

The capability subclass is VIIw.

26D—Nevarc-Remlik complex, 6 to 15 percent slopes. This complex consists of very deep, moderately steep soils on side slopes along rivers, creeks, and drainageways. Slopes are convex and irregularly shaped and range from 100 to 200 feet wide. The areas of this complex are long and winding, and they range from about 2 to 20 acres. They are about 40 percent moderately well drained Nevarc soil, 35 percent well drained Remlik soil, and 25 percent included soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Nevarc soil are as follows—

Surface layer:
0 to 4 inches, dark grayish brown loam

Subsurface layer:
4 to 8 inches, light yellowish brown clay loam

Subsoil:
8 to 23 inches, reddish yellow clay
23 to 32 inches, reddish yellow clay with light gray and strong brown mottles
32 to 41 inches, mottled and streaked light gray, yellowish red, and strong brown sandy clay loam

Substratum:
41 to 55 inches, strong brown sandy clay loam with light gray mottles
55 to 72 inches, light gray and brownish yellow sand

The typical sequence, depth, and composition of the layers of the Remlik soil are as follows—

Surface layer:
0 to 4 inches, dark grayish brown loamy sand

Subsurface layer:
4 to 22 inches, light yellowish brown loamy sand
22 to 27 inches, yellowish brown loamy sand

Subsoil:
27 to 43 inches, strong brown fine sandy loam

Substratum:
43 to 72 inches, yellowish brown sand with strong brown lamellae

Included with this unit in mapping are small areas of well drained Caroline, Emporia, Kempsville, Suffolk, Orangeburg, and Uchee soils; moderately well drained Slagle and Dogue soils; very poorly drained Johnston soils; and soils with a sandy surface layer more than 40 inches thick. All those soils are throughout the unit. The Johnston soils are in small drainageways and along the edges of large drainageways. Small areas of gravelly or severely eroded soils are on some knobs and short, steep slopes. Outcrops of ironstone fragments are in some areas. Also included are springs or seeps, mainly at the base of the slope.

Major soil properties—

Permeability: Nevarc soil—slow; Remlik soil—moderate.
Available water capacity: Nevarc soil—moderate; Remlik soil—low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to moderately acid.
Surface runoff: Rapid.
Erosion hazard: Severe.
Tilth: Nevarc soil—fair; Remlik soil—good.
Depth to the water table: Nevarc soil—1.5 to 3 feet; Remlik soil—more than 4 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Nevarc soil—moderate; Remlik soil—low.

Slope limits the use of farm equipment and makes these soils generally unsuited for farming.

Most areas of these soils are in woodland, and potential productivity for loblolly pine on these soils is high. The estimated annual production of wood per acre is 105 cubic feet. Plant competition limits the establishment of stands of desirable tree species on these soils. The sandy surface layer of the Remlik soil limits the use of equipment for managing timber and limits seedling survival.

Slope is the main limitation of these soils as sites for community development, especially as sites for recreation, buildings, and sanitary facilities.

The capability subclass is IVe.

26E—Nevarc-Remlik complex, 15 to 25 percent slopes. This complex consists of very deep, steep soils on side slopes along rivers, creeks, and drainageways. Slopes are convex and irregularly shaped and range from 150 to 250 feet wide. The areas of this complex are long and winding, and they range from about 2 to 100 acres. They are about 40 percent moderately well drained Nevarc soil, 35 percent well drained Remlik soil, and 25 percent included soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Nevarc soil are as follows—

Surface layer:
0 to 4 inches, dark grayish brown loam

Subsurface layer:
4 to 8 inches, light yellowish brown clay loam

Subsoil:
8 to 23 inches, reddish yellow clay
23 to 32 inches, reddish yellow clay with light gray and strong brown mottles
32 to 41 inches, mottled and streaked light gray, yellowish red, and strong brown sandy clay loam

Substratum:
41 to 55 inches, strong brown sandy clay loam with light gray mottles
55 to 72 inches, light gray and brownish yellow sand

The typical sequence, depth, and composition of the layers of the Remlik soil are as follows—

Surface layer:
0 to 4 inches, dark grayish brown loamy sand

Subsurface layer:
4 to 22 inches, light yellowish brown loamy sand
22 to 27 inches, yellowish brown loamy sand

Subsoil:
27 to 43 inches, strong brown fine sandy loam

Substratum:
43 to 72 inches, yellowish brown sand with strong brown lamellae

Included with this unit in mapping are small areas of well drained Caroline, Emporia, Kempsville, and Suffolk soils and soils that have a surface layer more than 40 inches thick. Those soils are intermingled throughout the unit. Small areas of gravelly or severely eroded soils are on some knobs and short, steep slopes. Outcrops of ironstone fragments are in some areas. Also included are springs or seeps, mainly at the base of the slope.

Major soil properties—

Permeability: Nevarc soil—slow; Remlik soil—moderate.
Available water capacity: Nevarc soil—moderate; Remlik soil—low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to moderately acid.
Surface runoff: Very rapid.
Erosion hazard: Severe.
Tilth: Nevarc soil—fair; Remlik soil—good.
Depth to the water table: Nevarc soil—1.5 to 3 feet; Remlik soil—more than 4 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Nevarc soil—moderate; Remlik soil—low.

Slope limits the use of farm equipment and makes these soils generally unsuited for farming.

Most areas of these soils are in woodland. Potential productivity for loblolly pine on these soils is high. The estimated annual production of wood per acre is 105 cubic feet. Plant competition limits the establishment of stands of desirable tree species. Placing logging roads and skid trails on the contour helps to reduce runoff and control erosion. Slope limits the use of equipment for managing timber.

Slope is the main limitation of these soils as sites for community development, especially as sites for recreation, buildings, and sanitary facilities.

The capability subclass is VIe.

26F—Nevarc-Remlik complex, 25 to 60 percent slopes. This complex consists of very deep, very steep soils on side slopes along rivers, creeks, and drainageways. Slopes are convex and irregularly shaped and range from 150 to 250 feet wide. The areas of this complex are long and winding, and they range from about 2 to 100 acres. They are about 40 percent moderately well drained Nevarc soil, 35 percent well drained Remlik soil, and 25 percent included soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Nevarc soil are as follows—

Surface layer:
0 to 4 inches, dark grayish brown loam

Subsurface layer:
4 to 8 inches, light yellowish brown clay loam

Subsoil:
8 to 23 inches, reddish yellow clay
23 to 32 inches, reddish yellow clay with light gray and strong brown mottles
32 to 41 inches, mottled and streaked light gray, yellowish red, and strong brown sandy clay loam

Substratum:
41 to 55 inches, strong brown sandy clay loam with light gray mottles
55 to 72 inches, light gray and brownish yellow sand

The typical sequence, depth, and composition of the layers of the Remlik soil are as follows—

Surface layer:
0 to 4 inches, dark grayish brown loamy sand

Subsurface layer:
4 to 22 inches, light yellowish brown loamy sand
22 to 27 inches, yellowish brown loamy sand

Subsoil:
27 to 43 inches, strong brown fine sandy loam

Substratum:
43 to 72 inches, yellowish brown sand with strong brown lamellae

Included with this unit in mapping are small areas of well drained Emporia soils, soils that have a red subsoil, and soils that have a surface layer more than 40 inches thick. Those soils are intermingled throughout the unit. Small areas of gravelly or severely eroded soils are on some knobs and short, steep slopes. Outcrops of ironstone fragments are in some areas. Also included are springs or seeps, mainly at the base of the slope.

Major soil properties—

Permeability: Nevarc soil—slow; Remlik soil—moderate.
Available water capacity: Nevarc soil—moderate; Remlik soil—low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to moderately acid.
Surface runoff: Very rapid.
Erosion hazard: Severe.
Tilth: Nevarc soil—fair; Remlik soil—good.
Depth to the water table: Nevarc soil—1.5 to 3 feet; Remlik soil—more than 4 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Nevarc soil—moderate; Remlik soil—low.

Slope limits the use of farm equipment and makes these soils generally unsuited for farming.

Most areas of these soils are in woodland. Potential productivity for loblolly pine on these soils is high. The estimated annual production of wood per acre is 105 cubic feet. Plant competition limits the establishment of stands of desirable tree species. Placing logging roads and skid trails on the contour helps to reduce runoff and control erosion. Slope limits the use of equipment for managing timber.

Slope is the main limitation of these soils as sites for community development, especially as sites for recreation, buildings, and sanitary facilities.

The capability subclass is VIIe.

27A—Nimmo fine sandy loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and poorly drained. It is on broad inland flats. The areas of this soil commonly are oval or irregular in shape and range from 2 to 15 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, very dark grayish brown fine sandy loam

Subsurface layer:
5 to 8 inches, gray fine sandy loam
8 to 14 inches, gray loamy sand

Subsoil:
14 to 21 inches, gray fine sandy loam
21 to 43 inches, gray fine sandy loam with yellowish brown mottles

Substratum:
43 to 65 inches, gray loamy sand

Included with this soil in mapping are small areas of somewhat poorly drained Augusta and Dragston soils, poorly drained Tomotley soils, and very poorly drained Nawney soils. The Dragston and Augusta soils are at a slightly higher elevation than this Nimmo soil and the Augusta and Tomotley soils have more clay in the subsoil. The Nawney soils are in drainageways and depressions. Also included are soils that have water on the surface after heavy rains or during prolonged wet periods. Included soils make up about 15 percent of the unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: Surface layer to 1 foot.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

If drained, this soil is well suited to cultivated crops. Drainage systems are difficult to install, however, because of the wet, sandy substratum. Crops on this soil respond well to lime and fertilizer but are sometimes damaged in undrained areas after heavy or prolonged rains. The soil is wet and cold in spring, and wetness often interferes with tillage. Tilling within the proper range of moisture content reduces soil compaction and clodding. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Most areas of this soil are wooded. Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 140 cubic feet. Plant competition limits the establishment of stands of desirable tree species. Wetness limits the use of equipment for managing timber and limits seedling survival.

The seasonal high water table and the sandy texture of the substratum are the main limitations of the soil for community development. The seasonal high water table limits the soil as a site for septic tank absorption fields, buildings, and many types of recreation.

The capability subclass is IVw.

28B—Norfolk fine sandy loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is on upland ridges. The areas of this soil are oval. They range from about 5 to 10 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches, dark grayish brown fine sandy loam

Subsurface layer:
3 to 14 inches, light yellowish brown fine sandy loam

Subsoil:
14 to 22 inches, yellowish brown sandy clay loam
22 to 39 inches, yellowish brown sandy clay loam with strong brown, pale brown, and yellowish red mottles
39 to 47 inches, yellowish brown sandy clay loam with strong brown and yellowish red mottles
47 to 65 inches, variegated yellowish brown, strong brown, yellowish red, and gray sandy clay loam

Included with this soil in mapping are small areas of well drained Kempsville and Emporia soils and moderately well drained Slagle soils. The Kempsville and Emporia soils are on small knobs and upland ridges. The Slagle soils are in shallow depressions and near drainageways. Included soils make up about 15 percent of this unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: 4 to 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland. A small acreage is farmed.

This soil is well suited to cultivated crops, and crops on this soil respond well to lime and fertilizer. After heavy rains, however, a crust forms on the surface and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, stripcropping, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and using crop residue on or in the soil. All help to maintain organic matter content and tilth, reduce crusting, and improve water infiltration.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 125 cubic feet. This soil is easily managed for timber.

The seasonal high water table and the permeability are the main limitations of the soil as a site for community development, especially as a site for septic tank absorption fields, sewage lagoons, shallow excavations, and buildings with basements.

The capability subclass is IIe.

29B—Orangeburg fine sandy loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is on upland ridges. The areas of this soil are long and narrow or irregularly oval. They range from about 3 to 20 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 11 inches, dark brown fine sandy loam

Subsoil:
11 to 24 inches, yellowish red sandy clay loam
24 to 64 inches, red sandy clay loam

Included with this soil in mapping are small areas of well drained Emporia, Suffolk, and Kempsville soils and moderately well drained Slagle soils. The Emporia, Kempsville, and Suffolk soils are on upland ridges. The Slagle soils are in shallow upland depressions. Included soils make up about 15 percent of the unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: More than 5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland. A small acreage is farmed.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, and improve water infiltration. Grassed waterways and diversions help to reduce erosion in critical areas.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, deferred grazing, and lime and fertilizer help to increase the capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 110 cubic feet. This soil is easily managed for timber.

This soil has few or no limitations for community development.

The capability subclass is IIe.

30A—Pamunkey fine sandy loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and well drained. It is on broad stream terraces. The areas of this soil commonly are long and narrow. They range from about 5 to 80 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, brown fine sandy loam

Subsoil:
10 to 17 inches, strong brown loam
17 to 28 inches, strong brown sandy clay loam
28 to 36 inches, strong brown fine sandy loam
36 to 46 inches, yellowish red fine sandy loam

Substratum:
46 to 57 inches, strong brown sand
57 to 80 inches, yellowish brown sand

Included with this soil in mapping are small areas of well drained Bojac soils, moderately well drained Altavista soils, and poorly drained Augusta soils. The Bojac soils mainly are on the higher areas of the unit, the Altavista soils are in swales and shallow drainageways, and the Augusta soils are along narrow drainageways. Included soils make up about 15 percent of this unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Medium.
Soil reaction: Strongly acid to neutral.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: More than 60 inches.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are farmed (fig. 4). A few areas are in woodland.

This soil is well suited to cultivated crops, and crops on this soil respond well to lime and fertilizer. After

Figure 4.—Corn on Pamunkey fine sandy loam, 0 to 2 percent slopes.

heavy rains, however, a crust forms on the surface and the surface layer becomes compacted. The main management practices in cultivated areas are: using a conservation tillage system that includes no-till farming, stripcropping, and stubble mulching; using cover crops and grasses and legumes in the cropping system; and using crop residue in or on the soil. All help to maintain organic matter content and tilth, reduce crusting, and improve water infiltration.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation and deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing damages the stands of desirable grasses and legumes, thereby increasing runoff and the erosion hazard.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 125 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Rapid permeability in the substratum and low strength of the subsoil are the main limitations of the soil for community development. The permeability causes a hazard of ground-water pollution in areas used for sewage lagoons or sanitary landfills. The soil needs suitable base material to provide enough strength and stability for supporting vehicular traffic.

The capability class is I.

30B—Pamunkey fine sandy loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is on broad terraces along the Pamunkey River. The areas of this soil commonly are long and narrow or irregularly oval. They range from about 3 to 20 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, brown fine sandy loam

Subsoil:
10 to 17 inches, strong brown loam
17 to 28 inches, strong brown sandy clay loam
28 to 36 inches, strong brown fine sandy loam
36 to 46 inches, yellowish red fine sandy loam

Substratum:
46 to 57 inches, strong brown sand
57 to 80 inches, yellowish brown sand

Included with this soil in mapping are small areas of well drained Bojac soils and State soils and moderately well drained Altavista and Tetotum soils. The Bojac soils are on broad terraces throughout the unit. The State soils are on slightly lower areas. The Altavista and Tetotum soils are on slightly lower areas and near drainageways. Included soils make up about 15 percent of this unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Medium.
Soil reaction: Strongly acid to neutral.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: More than 60 inches.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are cultivated. A few areas are in woodland.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help maintain organic matter content and tilth, reduce crusting, increase water infiltration, and reduce erosion.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing damages the stands of desirable grasses and legumes, thereby increasing runoff and the erosion hazard.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 125 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Rapid permeability in the substratum and low strength of the subsoil are the main limitations of the soil for community development. The permeability causes a hazard of ground-water pollution in areas used for sewage lagoons or sanitary landfills. The soil needs suitable base material to provide enough strength and stability for supporting vehicular traffic.

The capability subclass is IIe.

31A—Roanoke silt loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and poorly drained. It is on low terraces in depressions and in broad drainageways. The areas of this soil are irregularly shaped and range from 2 to 50 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 3 inches, very dark brown silt loam

Subsurface layer:
3 to 8 inches, dark grayish brown silt loam

Subsoil:
8 to 17 inches, gray clay
17 to 50 inches, dark gray clay with light olive brown mottles
50 to 55 inches, mottled dark gray and gray sandy clay loam

Substratum:
55 to 65 inches, light brownish gray sand with yellowish brown mottles

Included with this soil in mapping are small areas of moderately well drained Dogue soils, somewhat poorly drained Wahee soils, and poorly drained Tomotley soils. The Dogue and Wahee soils are at slightly higher elevations than this Roanoke soil, and the Tomotley soils are on similar landscapes. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Very slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Poor.
Water table: Between the surface and a depth of 6 inches.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate to high.

Most areas of this soil are in woodland. A few areas are used for pasture or are farmed.

This soil is poorly suited to cultivated crops and moderately well suited to pasture and hay. Crops on this soil respond well to lime and fertilizer, but the soil is wet and cold in spring and wetness often interferes with tillage and damages crops. Surface drainage systems will improve the suitability if suitable outlets can be located. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce clodding, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacities of pastures. Overgrazing and grazing when the soil is wet compact the surface layer and damage the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 125 cubic feet. Wetness limits the use of equipment for managing timber and limits seedling survival. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table, the slow permeability, and the shrink-swell potential are the main limitations of the soil for community development. They limit the soil

as a site for buildings, sanitary landfills, septic tank absorption fields, and most types of recreation.

The capability subclass is IVw.

32A—Seabrook loamy sand, 0 to 2 percent slopes. This soil is very deep, nearly level, and moderately well drained. It is on low terraces along drainageways adjacent to the major rivers. The areas of this soil commonly are long and narrow. They range from about 3 to 20 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 5 inches, very dark grayish brown loamy sand

Substratum:
5 to 11 inches, light olive brown loamy sand
11 to 25 inches, light olive brown loamy sand with yellowish brown and pale brown mottles
25 to 37 inches, mottled yellowish brown, pale brown, and light gray loamy sand
37 to 72 inches, light gray sand with yellowish brown mottles

Included with this soil in mapping are small areas of well drained Bojac and Catpoint soils, moderately well drained Altavista and Munden soils, somewhat poorly drained Dragston soils, and poorly drained Nimmo and Tomotley soils. The Bojac and Catpoint soils are on the slightly higher areas throughout the map unit. The Altavista and Munden soils are on low terraces throughout the unit. The Dragston soils are in shallow depressions and along drainageways. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Rapid.
Available water capacity: Low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid to slightly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Good.
Depth to the water table: 2 to 4 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland. Some areas are farmed.

This soil is moderately well suited to cultivated crops and to pasture and hay. The soil is droughty during the growing season, and crop response to lime and fertilizer is limited by the low available water capacity. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and hold moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the surface layer and damages the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 125 cubic feet. The sand in the surface layer limits use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The rapid permeability, the seasonal high water table, and the sandy texture of the soil are the main limitations for community development. The permeability and the water table cause a contamination hazard to ground water and nearby streams in areas used for septic tank absorption fields or sanitary landfills. The sandy texture makes excavations unstable and makes the surface of the soil dusty when dry. The low available water capacity limits the growth of grasses and shrubs.

The capability subclass is IIIs.

33A—Slagle fine sandy loam, 0 to 2 percent slopes. This soil is very deep, gently sloping, and moderately well drained. It is on uplands. Slopes range from about 150 to 800 feet long. The areas of this soil commonly are long and narrow. They range from about 5 to 20 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 10 inches, brown fine sandy loam

Subsurface layer:
10 to 16 inches, light yellowish brown fine sandy loam

Subsoil:
16 to 21 inches, yellowish brown sandy clay loam with light yellowish brown mottles
21 to 28 inches, yellowish brown sandy clay loam with pale brown and light brownish gray mottles
28 to 40 inches, yellowish brown sandy clay loam with light brownish gray and yellowish red mottles
40 to 51 inches, mottled light brownish gray, yellowish brown, pale brown, and strong brown sandy loam

Substratum:
51 to 65 inches, mottled and streaked light brownish gray, yellowish brown, and strong brown fine sandy loam

Included with this soil in mapping are small areas of well drained Emporia soils and moderately well drained Craven soils. The Emporia soils are on the slightly higher areas, and the Craven soils are on uplands. Also included are small areas that have water on the surface for brief periods after heavy or prolonged rainfall during winter and spring. Included soils make up about 20 percent of this unit.

Major soil properties—

Permeability: Slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: 1.5 to 3 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this soil are in woodland. A few areas are cultivated, and a few areas are in pasture.

This soil is well suited to cultivated crops. Crops on this soil respond well to lime and fertilizer, but the soil is wet and cold in spring and wetness often interferes with tillage. Drainage helps to alleviate wetness and protects crops from damage. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, increase water infiltration, and reduce erosion.

This soil is well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet cause compaction of the surface layer and damage the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. Estimated annual production of wood per acre is 125 cubic feet. Wetness limits the use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table, low strength, and the slow permeability are the main limitations of the soil for community development. The water table and slow permeability limit the soil as a site for buildings, sanitary landfills, septic tank absorption fields, and most types of recreation. The low strength limits the soil as subgrade material for roads and streets.

The capability subclass is IIw.

34B—Slagle-Emporia complex, 2 to 6 percent slopes. This unit consists of very deep, gently sloping soils on upland ridges and in depressions. Slopes are commonly undulating and range from 200 to 2,000 feet wide. The areas commonly are long and narrow or irregularly oval and range from 2 to 20 acres. They are about 50 percent Slagle soil, 35 percent Emporia soil, and 15 percent other soils. The soils are so intermingled that it was not practical to separate them in mapping.

The typical sequence, depth, and composition of the layers of the Slagle soil are as follows—

Surface layer:
0 to 10 inches, brown fine sandy loam

Subsurface layer:
10 to 16 inches, light yellowish brown fine sandy loam

Subsoil:
16 to 21 inches, yellowish brown sandy clay loam with light yellowish brown mottles
21 to 28 inches, yellowish brown sandy clay loam with pale brown and light brownish gray mottles
28 to 40 inches, yellowish brown sandy clay loam with light brownish gray and yellowish red mottles
40 to 51 inches, mottled light brownish gray, yellowish brown, pale brown, and strong brown sandy loam

Substratum:
51 to 65 inches, mottled and streaked light brownish gray, yellowish brown, and strong brown fine sandy loam

The typical sequence, depth, and composition of the layers of the Emporia soil are as follows—

Surface layer:
0 to 2 inches, dark grayish brown fine sandy loam

Subsurface layer:
2 to 12 inches, light yellowish brown fine sandy loam

Subsoil:
12 to 16 inches, yellowish brown and light yellowish brown loam
16 to 30 inches, strong brown loam with light yellowish brown mottles
30 to 40 inches, yellowish red clay loam with red mottles
40 to 50 inches, variegated red, yellowish red, strong brown, yellowish brown, and gray sandy clay
50 to 56 inches, variegated red, yellowish red, strong brown, yellowish brown, and gray sandy clay loam

Substratum:

56 to 63 inches, variegated red, strong brown, yellowish brown, and gray stratified sandy clay loam and sandy loam

Included with these soils in mapping are small areas of well drained Caroline, Kempsville, and Craven soils. The Caroline and Kempsville soils are on the higher landscape positions, and the Craven soils are on ridges and in depressions.

Major soil properties—

Permeability: Slagle soil—slow; Emporia soil—moderately slow to slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: Slagle soil—1.5 to 3 feet; Emporia soil—3 to 4.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

Most areas of this unit are in woodland. Some areas are farmed, and some are in pasture (fig. 5).

This unit is fairly suited to cultivated crops and to pasture and hay. Crops on these soils respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to control runoff and erosion, maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is too wet compact the surface layer and increase runoff and erosion.

Potential productivity for loblolly pine is very high on the Slagle soil and high on the Emporia soil. The estimated annual production of wood per acre is 125 cubic feet on the Slagle soil and 100 cubic feet on the Emporia soil. Wetness limits use of equipment for managing timber on the Slagle soil. Plant competition limits the establishment of stands of desirable tree species on both soils.

Low strength in both soils, the moderate shrink-swell potential, the seasonal high water table, and the slow and moderately slow permeability are the main limitations of this unit for community development. The low strength and shrink-swell potential limit this unit as building site, and the high water table limits excavations. The permeability and the water table also limit this unit as a site for septic tank absorption fields. The low strength limit the soils as subgrade material for roads and streets.

The capability subclass is IIw.

35A—State very fine sandy loam, 0 to 2 percent slopes, rarely flooded. This soil is very deep, nearly level, and well drained. It is on low terraces. The areas range from about 3 to 25 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, brown very fine sandy loam

Subsoil:
9 to 15 inches, brown very fine sandy loam
15 to 36 inches, brown sandy clay loam
36 to 47 inches, yellowish brown very fine sandy loam

Substratum:
47 to 60 inches, yellowish brown very fine sandy loam with light brownish gray and strong brown mottles

Included with this soil in mapping are small areas of well drained Pamunkey, Bojac, and Conetoe soils; moderately well drained Altavista, Tetotum, Munden soils; and somewhat poorly drained Augusta soils. The Pamunkey soils are on the slightly higher areas. The Bojac and Conetoe soils are on the slightly lower areas, and the Augusta soils are on slightly lower areas and in depressions throughout the unit. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Medium.
Soil reaction: Very strongly acid to moderately acid.
Surface runoff: Medium.
Erosion hazard: Slight.
Tilth: Fair.
Depth to the water table: 4 to 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are farmed, but some areas are in woodland.

This soil is very well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing

Figure 5.—Pumpkins on Slagle-Emporia complex, 2 to 6 percent slopes.

causes compaction of the surface layer and reduces stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 140 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Rapid permeability in the substratum and a seasonal high water table are the main limitations of the soil for community development. Both cause a contamination

hazard to ground water and nearby streams in areas used as sites for septic tank absorption fields or sanitary landfills.

The capability class is I.

36B—Suffolk fine sandy loam, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is in long, broad areas or on broad upland ridges and near the points of ridges. The areas range from about 3 to 16 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches, brown fine sandy loam

Subsoil:
7 to 11 inches, brown fine sandy loam
11 to 22 inches, strong brown sandy clay loam
22 to 36 inches, brown fine sandy loam
36 to 45 inches, strong brown loamy sand

Substratum:
40 to 60 inches, strong brown loamy sand

Included with this soil in mapping are small areas of well drained Emporia and Kempsville soils and moderately well drained Slagle soils. The Kempsville soils are throughout the unit. The Emporia and Slagle soils are in the slightly lower areas and in depressions. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Medium.
Erosion hazard: Moderate.
Tilth: Good.
Depth to the water table: More than 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland, but some in the Holly Forks area are in cultivated crops.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content, reduce crusting, increase water infiltration, and control erosion.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pasture. Overgrazing causes compaction of the surface layer and reduces the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 115 cubic feet. Plant competition limits the establishment of stands of desirable tree species.

Rapid permeability in the substratum of this soil is the main limitation for community development. It causes a contamination hazard to ground water and nearby streams in areas used as sites for septic tank absorption fields, sewage lagoons, or sanitary landfills.

The capability subclass is IIe.

37A—Tarboro loamy sand, 0 to 4 percent slopes. This soil is very deep, nearly level to gently sloping, and somewhat excessively drained. It is mostly on low stream terraces along rivers and creeks. The areas of this soil commonly are long and narrow and parallel to streams and drainageways. They range from about 2 to 10 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 9 inches, dark brown loamy sand

Substratum:
9 to 39 inches, strong brown loamy sand
39 to 62 inches, yellowish brown sand with light yellowish brown mottles
62 to 80 inches, yellowish brown sand

Included with this soil in mapping are areas of well drained Bojac and Conetoe soils; moderately well drained Altavista, Munden, and Seabrook soils; and somewhat poorly drained Dragston soils. The Bojac and Conetoe soils are generally on stream terraces. The Altavista, Munden, and Seabrook are on the slightly lower areas. The Dragston soils are in shallow depressions and along drainageways. Included soils make up about 15 percent of the unit.

Major soil properties—

Permeability: Rapid.
Available water capacity: Low.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight by water; moderate by wind.
Tilth: Good.
Depth to the water table: More than 6 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most of the areas of this soil are farmed or in woodland.

This soil is moderately well suited to cultivated crops and to pasture and hay. It is droughty during the growing season, however, and crop response to lime and fertilizer is limited by the low available water capacity. The wind erosion hazard is a major management concern, especially during the early growing season, because blowing soil often damages or covers small plants. Conservation tillage, cover crops and grasses and legumes in the cropping system, and stubble mulch help to increase organic matter content, maintain tilth, reduce erosion and crop damage, and improve the moisture holding capacity of the soil.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the surface layer and damages the stands of grasses and legumes, thereby reducing yields and increasing the erosion hazard.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 95 cubic feet. The sand in the surface layer limits the use of equipment for managing timber and limits seedling survival.

The sandy texture of the soil is the main limitation for community development. It limits the soil as a site for sewage lagoons, septic tank absorption fields, and sanitary landfills because of seepage and the hazard of pollution to the ground water and nearby streams. It also limits shallow excavations, use of the soil for daily cover for landfills, and use of the soil as a site for some types of recreation. This soil is good as subgrade material for local roads and streets.

The capability subclass is IIIs.

38A—Tetotum loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and moderately well drained. It is on low terraces along the rivers. The areas are commonly long and narrow. They range from about 2 to 114 acres.

The typical sequence, depth, and composition of layers of this soil are as follows—

Surface layer:
0 to 13 inches, dark grayish brown loam

Subsoil:
13 to 18 inches, light yellowish brown and brown fine sandy loam
18 to 27 inches, yellowish brown clay loam
27 to 40 inches, mottled yellowish brown and light brownish gray loam
40 to 52 inches, mottled light gray, yellowish brown, and strong brown sandy clay loam

Substratum:
52 to 75 inches, light yellowish brown sand with yellowish brown mottles

Included with this soil in mapping are small areas of somewhat poorly drained Augusta and Wahee soils, poorly drained Roanoke soils, moderately well drained Altavista and Dogue soils, and well drained State and Pamunkey soils. The Augusta, Wahee, and Roanoke soils are in shallow depressions. The Altavista and Dogue soils are throughout the unit, and the State and Pamunkey soils are on the slightly higher areas throughout the unit. Included soils make up about 20 percent of the unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: High.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Fair.
Depth to the water table: 1.5 to 2.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are farmed. Some areas are in woodland, and a few are in pasture.

This soil is well suited to cultivated crops and to pasture and hay. Crops on this soil respond well to lime and fertilizer. The soil is wet and cold in the early spring. Drainage of low areas helps to alleviate spring wetness and protects crops from damage. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 120 cubic feet. Wetness limits the use of equipment for managing timber. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table and low strength are the main limitations of the soil for community development. The water table limits the soil as a site for buildings, sanitary landfills, or septic tank absorption fields. The soil needs suitable base material to provide enough strength and stability for supporting vehicular traffic.

The capability subclass is IIw.

39A—Tomotley loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and poorly drained. It is on broad flats. The areas of this soil commonly are irregularly oval or rectangular. They range from about 3 to 10 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 7 inches, very dark grayish brown loam

Subsurface layer:
7 to 17 inches, dark grayish brown fine sandy loam

Subsoil:
17 to 31 inches, dark gray sandy clay loam with yellowish brown and dark yellowish brown mottles
31 to 40 inches, dark gray sandy clay loam with gray mottles

Substratum:
40 to 65 inches, gray coarse sand and sand

Included with this soil in mapping are small areas of somewhat poorly drained Dragston soils and very poorly Johnston and Nawney soils. The Dragston soils are on the slightly higher areas, and the Johnston soils are in shallow depressions throughout the unit. Water is on the surface of some soils after heavy rains, during winter and spring, and during prolonged wet periods. Included soils make up about 15 percent of the unit.

Major soil properties—

Permeability: Moderate.
Available water capacity: Moderate.
Organic matter content: Moderate.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Fair.
Water table: Between the surface and a depth of 1 foot.
Root zone: More than 60 inches.
Shrink-swell potential: Low.

Most areas of this soil are in woodland, but a few areas have been drained and are farmed.

Unless the soil is drained, it is not suited to cultivated crops or hay and is poorly suited to pasture. Overgrazing when the soil is wet compacts the surface layer and damages the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 140 cubic feet. Wetness limits use of equipment for managing timber and limits seedling survival. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table is the main limitation of the soil as a site for community development, especially as a site for buildings, septic tank absorption fields, sanitary landfills, or most types of recreation.

The capability subclass is IVw.

40B—Uchee loamy fine sand, 2 to 6 percent slopes. This soil is very deep, gently sloping, and well drained. It is on upland ridges and side slopes. Slopes range from 150 to 400 feet long. The areas of this soil are irregularly elongated or irregularly circular. They range from about 2 to 10 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 11 inches, brown loamy fine sand

Subsurface layer:
11 to 25 inches, pale brown loamy fine sand with lamellae of yellowish brown loamy fine sand

Subsoil:
25 to 35 inches, yellowish brown sandy clay loam
35 to 50 inches, yellowish brown sandy clay loam with brownish yellow, gray, and strong brown mottles

Substratum:
50 to 63 inches, mottled gray, light yellowish brown, and brownish yellow fine sandy loam

Included with this soil in mapping are small areas of well drained Emporia, Kempsville, and Suffolk soils and moderately well drained Slagle soils. The Kempsville, Emporia, and Suffolk soils are on ridges and side slopes, and the Slagle soils are in shallow depressions and adjacent to drainageways. Included soils make up about 15 percent of this unit.

Major soil properties—

Permeability: Moderately slow.
Available water capacity: Low to moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Very strongly acid or strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight by water; moderate by wind.
Tilth: Good.
Depth to the water table: 3.5 to 5 feet
Root zone: More than 60 inches.
Shrink-swell potential: Moderate.

More than half the acreage of this soil is in woodland. A few areas are farmed.

This soil is suited to cultivated crops and moderately well suited to pasture and hay. The soil is droughty during the growing season, and crop response to lime

and fertilizer is often limited by the available water capacity. The wind erosion hazard is a major management concern, especially during the early growing season, because blowing soil often damages or covers small plants. Conservation tillage, cover crops and grasses and legumes in the cropping system, stubble mulch, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce erosion and crop damage, and hold moisture in the soil.

Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation grazing, deferred grazing, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing cuts the surface layer and damages the stands of grasses and legumes, thereby reducing yields and increasing the erosion hazard.

Potential productivity for loblolly pine on this soil is high. The estimated annual production of wood per acre is 115 cubic feet. The sand in the surface layer limits the use of equipment for managing timber and limits seedling survival. Plant competition limits the establishment of stands of desirable tree species.

The moderately slow permeability, the moderate shrink-swell potential, the sandy texture, and the seasonal high water are the main limitations for community development. The permeability, shrink-swell potential, and seasonal water table limit the soil as a site for sewage lagoons, septic tank absorption fields, buildings, and sanitary landfills. The sandy texture makes excavations unstable and makes the soil dusty when dry. The low available water capacity limits the growth of grasses and shrubs.

The capability subclass is IIs.

41B—Udorthents, loamy, gently sloping. This unit consists of pits that provide gravel, marl, road base and other foundation material and areas of landfills. The pits make up about 80 percent of the unit. Trees are on some older sites, and pools of water are common in the deeper pits.

This unit is poorly suited to farming, woodland, and wildlife habitat. Its suitability for urban and recreation uses ranges from fair to poor. Onsite investigation is needed to determine the suitability of the unit for any use.

Capability subclass: not assigned.

42A—Wahee silt loam, 0 to 2 percent slopes. This soil is very deep, nearly level, and somewhat poorly drained. It is near drainageways and along the rim of broad upland flats. The areas of this soil commonly are long and narrow or irregularly oval. They range from about 3 to 15 acres.

The typical sequence, depth, and composition of the layers of this soil are as follows—

Surface layer:
0 to 2 inches, grayish brown silt loam

Subsurface layer:
2 to 5 inches, mottled light olive brown, yellowish brown, and light brownish gray silt loam

Subsoil:
5 to 9 inches, mottled pale brown, light olive brown, and gray silty clay loam
9 to 17 inches, mottled brown, grayish brown, yellowish brown, and light brownish gray clay
17 to 29 inches, gray clay with yellowish brown and strong brown mottles
29 to 41 inches, gray clay with yellowish red, strong brown and yellowish brown mottles
41 to 56 inches, gray clay with yellowish brown mottles

Substratum:
56 to 70 inches, stratified light gray sand and pale brown loamy sand

Included with this soil in mapping are small areas of moderately well drained Dogue soils and poorly drained Tomotley and Roanoke soils. The Dogue soils are on the slightly higher areas throughout the map unit, and the Tomotley and Roanoke soils are near small drainageways and in depressions. Also included are areas of soils that are similar to this Wahee soil but that have a thinner subsoil. Included soils make up about 15 percent of this unit.

Major soil properties—

Permeability: Slow.
Available water capacity: Moderate.
Organic matter content: Low.
Natural fertility: Low.
Soil reaction: Extremely acid to strongly acid.
Surface runoff: Slow.
Erosion hazard: Slight.
Tilth: Fair.
Depth to the water table: 6 inches to 1.5 feet.
Root zone: More than 60 inches.
Shrink-swell potential: Moderate to high.

Most areas of this soil are in woodland, but some areas are farmed.

This soil is moderately well suited to cultivated crops. Crops on this soil respond well to lime and fertilizer, but the soil is wet and cold in spring and wetness often interferes with tillage. Drainage helps to alleviate wetness and protects crops from damage. Conservation tillage, cover crops and grasses and legumes in the cropping system, and crop residue in and on the soil help to maintain organic matter content and tilth, reduce crusting, and increase water infiltration.

This soil is moderately well suited to pasture and hay. Establishing and maintaining a mixture of grasses and legumes and using proper stocking rates, rotation

grazing, deferred grazing, drainage, and lime and fertilizer help to increase the carrying capacity of pastures. Overgrazing and grazing when the soil is wet cause compaction of the surface layer and damage the stands of grasses and legumes.

Potential productivity for loblolly pine on this soil is very high. The estimated annual production of wood per acre is 125 cubic feet. Wetness limits the use of equipment for managing timber and limits seedling survival. Plant competition limits the establishment of stands of desirable tree species.

The seasonal high water table and the clayey texture and slow permeability of the subsoil are the main limitations of the soil for community development. They especially limit the soil as a site for buildings, sanitary landfills, or septic tank absorption fields.

The capability subclass is IIIw.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland (fig. 6).

Figure 6.—Industry encroaching on Pamunkey fine sandy loam, 0 to 2 percent slopes, a prime farmland soil.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 6 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 46,400 acres of prime farmland. That acreage makes up about 33 percent of the total acreage in the survey area and is mainly along the rivers, but is in all parts of the county.

The soil map units that make up prime farmland in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed Soil Map Units."

Some soils in table 5 are classified as prime farmland if certain limitations of the soil are overcome. The measures needed to overcome the limitations of such soils are given in parentheses after the name of the map unit.

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 avoid 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 behavior 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 in 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 recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where 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

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 Soil 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 "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

New Kent County had approximately 25,450 acres in farmland in 1982, according to Virginia Cooperative Crop Reporting Service. Of this, 12,500 acres was used as cultivated cropland, 1,000 acres as cropland pasture, 8,600 acres as woodland and woodland pasture, and 800 acres as all other cropland.

Corn, soybeans, and small grain are the major crops in the survey area. Most pastures are tall fescue or a mixture of clover and grasses. Hogs and cattle are raised on a limited basis. The climate and many of the soils are suited to vegetables, small fruit, melons, and ornamental plants. Deep, well drained soils—for example, Suffolk and Kempsville soils on uplands and Pamunkey and Bojac soils on terraces—are especially well suited to vegetables and small fruits because the soils are warm early in spring.

Most of the well drained upland soils are also suited to orchards and nursery plants. Soils in low areas where air drainage is poor and frost is more frequent generally are poorly suited to early-season vegetables, small fruits, and orchards.

Soil fertility is low in most soils in the survey area, and most soils are very strongly acid or strongly acid unless they have been limed. Most of the arable soils respond well to nitrogen, phosphorus, and potassium fertilizers.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

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

The management needed to obtain the indicated yields of the various crops depends on the kind of soil

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

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

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

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

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

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

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

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

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

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

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

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

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

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

Woodland Management and Productivity

Table 7 can be used in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same management and have the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 through 8, high; 9 through 11, very high; and 12 or more, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W*, excessive water in or on the soil; *T*, excessive alkalinity, acidity, sodium salts, or other toxic substances in the soil; *D*, restricted rooting depth caused by bedrock, hardpan, or other restrictive layer; *C*, clay in the upper part of the soil; *S*, sandy texture; and *F*, high content of rock fragments in the soil profile. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one

limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

In table 7, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 15. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, gravel on the surface, soil wetness, and texture of the surface layer. A rating of *Slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 2 months. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 2 to 6 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 6 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occurring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality (fig. 7).

Windthrow hazard is the likelihood of trees being uprooted (tipped over) by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions are a seasonal high water table and bedrock or a fragipan or other limiting layer. A rating of *slight* indicates that normally no trees are blown down by the wind. Strong winds may break trees but do not uproot them. A rating of *moderate* indicates that moderate or strong winds occasionally blow down a few trees during periods of soil wetness. A rating of *severe* indicates that moderate or strong winds may blow down many trees during periods of soil wetness.

The use of specialized equipment that does not damage surficial root systems during partial cutting operations can help reduce windthrow. Care in thinning or no thinning also can help reduce windthrow.

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

The *productivity class*, a number, represents an expected volume produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. One cubic meter per hectare equals 14.3 cubic feet per acre.

Trees to plant are those that are suited to the soil and are planted for commercial wood production.

Recreation

The soils of the survey area are rated in table 8 according to 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 sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning

Figure 7.—Pine seedlings on Catpoint fine sand, 0 to 4 percent slopes.

recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, 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 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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 mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing 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 or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the 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 or a hardpan 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

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 9, 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 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 flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

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

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

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, birch, cherry, maple, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are gray dogwood, 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, spruce, yew, cedar, and hemlock.

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, arrowhead, pickerelweed, cordgrass, 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, swamps, and ponds.

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

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

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

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

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. The ratings are given in the following tables: 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 need to 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, 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, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) 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 10 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 a cemented pan or a very firm dense layer; gravel 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 the 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, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to a cemented pan, gravel content, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

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

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth. Flooding, wetness, slope, gravel content, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 11 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 11 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and 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, a high water table, depth to a cemented pan, and flooding affect absorption of the effluent. Gravel content or a cemented pan 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.

Table 11 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, a high water table, depth to a cemented pan, flooding, gravel content, and content of organic matter.

Excessive seepage due to rapid permeability of 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 and

cemented pans can cause construction problems, and gravel 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 needs to be considered.

The ratings in table 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, gravel content, highly organic layers, soil reaction, and content of salts and sodium affect trench type 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 type 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 wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over a cemented pan 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 12 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help 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 gravel content, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and pebbles, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are 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, gravel, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 12, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to

12 percent silty fines. This material must be at least 3 feet thick. All other soils are rated as an improbable source.

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 slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, gravel, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They have little or no gravel and have slopes of less than 8 percent. They are low in content of soluble salts, 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 soluble salts, 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 soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 13 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 for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment (fig. 8). Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

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 even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. 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, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil.

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 a cemented pan 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 potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to a cemented pan, 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.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, gravel, and depth to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Figure 8.—A farm pond on Slagle-Emporia complex, 2 to 6 percent slopes.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Gravel, wetness, slope, and depth to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

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

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. 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.

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 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 14 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 "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 about 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, CL-ML.

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

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

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

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

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 15 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 consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water 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, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

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 is given in inches of water per inch of soil for each major soil layer. 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.

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.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of soil if used as construction material, and the potential of the soil to corrode metal and concrete.

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

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater 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 in tons per acre per year. The 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 0.05 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 without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

1. Sands, coarse sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.
2. Loamy sands, loamy fine sands, and loamy very fine sands. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
3. Sandy loams, coarse sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.
4. Clays, silty clays, clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.
5. Loamy soils that are less than 20 percent clay and less than 5 percent finely divided calcium carbonate and sandy clay loams and sandy clays that are less than 5 percent finely divided calcium carbonate. These soils are slightly erodible. Crops can be grown if measures to control wind erosion are used.
6. Loamy soils that are 20 to 35 percent clay and less than 5 percent finely divided calcium carbonate, except silty clay loams. These soils are very slightly erodible. Crops can easily be grown.
7. Silty clay loams that are less than 35 percent clay and less than 5 percent finely divided calcium carbonate. These soils are very slightly erodible. Crops can easily be grown.
8. Stony or gravelly soils and other soils not subject to wind erosion.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 15, 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 16 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 not protected by vegetation 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.

Some soils in table 16 are assigned to two hydrologic soil groups because they have a seasonal high water table but can be drained. The first letter applies to the drained condition of the soil and the second letter to the undrained condition.

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 high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, 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 16 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is expressed as *none, rare, occasional, common,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional*

means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *Common* is used when classification as occasional or frequent does not affect interpretations. 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. November-May, for example, means that flooding can occur during the period November through May. 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 absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are 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 depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, *perched, artesian,* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 16.

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. An *artesian* water table is under] head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. 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.

The two numbers in the "High water table—Depth" column 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 the water table exists for less than a month.

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 creates a severe corrosion environment. 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 is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (*4*). 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 from laboratory measurements. Table 17 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten 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 Utisol.

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

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

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

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series. State series is an example of a soil series within the family of fine-loamy, mixed, thermic Typic Hapludults.

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. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual* (*3*). Many of the technical terms used in the descriptions are defined in *Soil Taxonomy* (*4*). 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."

Altavista Series

The soils of the Altavista series are very deep and moderately well drained. They formed in loamy fluvial sediments. They are on stream terraces. Slopes range from 0 to 2 percent.

Altavista soils commonly are near State, Pamunkey, Bojac, Dogue, Munden, Tetotum, and Augusta soils. The Altavista soils have gray mottles within 24 inches of the top of the argillic horizon, but neither the State, Pamunkey, nor Bojac soils have gray mottles that high in

the soil pedon. The argillic horizon in the Altavista soils has less clay than in the Dogue soils, less silt than in the Tetotum soils, and more clay than in the Munden soils.

Typical pedon of Altavista fine sandy loam, 0 to 2 percent slopes, about 1,800 feet south of the junction of VA-636 and VA-30, 100 feet northwest of VA-30:

Ap—0 to 9 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; few fine roots; common fine tubular pores; strongly acid; abrupt smooth boundary.

E—9 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; friable, slightly sticky, nonplastic; few fine roots; common fine tubular pores and few fine vesicular pores; few fine flakes of mica; moderately acid; clear smooth boundary.

Bt1—13 to 18 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; few faint clay films on faces of peds; few fine flakes of mica; moderately acid; clear smooth boundary.

Bt2—18 to 28 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) mottles and few fine faint light brownish gray (10YR 6/2) mottles in the lower 4 inches; weak medium and fine subangular blocky structure; friable, sticky, plastic; few fine roots; common fine tubular pores; common distinct clay films on faces of peds; moderately acid; gradual smooth boundary.

Bt3—28 to 39 inches; mottled yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

BC—39 to 47 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) sandy clay loam; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

C—47 to 74 inches; streaked and mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and pale brown (10YR 6/3) stratified fine sandy loam, loamy fine sand, and fine sand; massive; compact in place; friable, slightly sticky, nonplastic; few fine flakes of mica; very strongly acid.

The Bt horizon ranges from 18 to 48 inches in thickness and extends to a depth of 30 to 60 inches or more. Reaction in unlimed areas ranges from very strongly acid to moderately acid. Gravel-size rock fragments make up 0 to 5 percent of the volume of the A and B horizons, and their amount ranges from common to many in the C horizon of some pedons. The amount of flakes of mica ranges from few to common in the B and C horizons of most pedons.

The A or Ap horizon has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 1 through 4. The E horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 6. The A and E horizons are sandy loam, fine sandy loam, or loam.

The Bt horizon mainly has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 3 through 8. The lower part of the Bt horizon of some pedons has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 or 2, or it is mottled without dominant matrix hue. The Bt horizon is fine sandy loam, loam, clay loam, or sandy clay loam.

The BC horizon has a color range the same as that of the Bt horizon. It is sandy loam, loam, or sandy clay loam.

The C horizon is mottled. It commonly is stratified sand, loamy sand, sandy loam, or fine sandy loam.

Augusta Series

The soils of the Augusta series are very deep and somewhat poorly drained. They formed in loamy fluvial sediments. They are on low stream terraces. Slopes range from 0 to 2 percent.

Augusta soils are near Altavista, Dragston, Munden, Nimmo, Seabrook, and Tomotley soils. The Augusta soils are grayer in the upper part of the subsoil than the Altavista, Seabrook, or Munden soils. They have more clay in the subsoil than the Dragston soils, and they are not gray in the surface layer, as are the Nimmo and Tomotley soils.

Typical pedon of Augusta fine sandy loam, 0 to 2 percent slopes, about 800 feet north of the junction of VA-615 and the C&O Railroad, 300 feet west of Route VA-615, 800 feet south of the junction VA-615 and U.S.-60:

Ap—0 to 8 inches; grayish brown (10YR 5/2) fine sandy loam; friable, slightly sticky; common fine and few coarse and medium roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

E—8 to 12 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct light yellowish brown (10YR 6/4) mottles and few fine distinct yellowish brown (10YR 5/6) mottles; weak medium granular structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

BE—12 to 17 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; common medium distinct light brownish gray (10YR 6/2) and yellow (2.5Y 7/6)

mottles; weak medium subangular blocky structure; friable, sticky, plastic; common fine and few medium roots; common fine and medium tubular pores; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt1—17 to 25 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 6/1) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2—25 to 50 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 6/1) sandy clay loam; weak medium and coarse subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium and few coarse tubular pores; common distinct clay films on faces of peds; few fine flakes of mica; few fine highly weathered feldspar crystals; very strongly acid; gradual smooth boundary.

BC—50 to 60 inches; mottled yellowish brown (10YR 5/8) and gray (10YR 6/1) sandy clay loam; many coarse distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium tubular pores; few distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg—60 to 70 inches; gray (10YR 6/1) sandy loam; many coarse distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/8) mottles; massive; friable, sticky, plastic; few fine flakes of mica; few fine quartz pebbles; very strongly acid.

Solum thickness ranges from 40 to 80 inches. Reaction in unlimed areas ranges from very strongly acid to moderately acid. Few or common flakes of mica are throughout the solum of many pedons.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. The E horizon has hue of 10YR through 5Y, value of 5 through 7, and chroma of 2 through 4. The A and E horizons are sandy loam, fine sandy loam, or loam.

The BE horizon has hue of 10YR through 5Y, value of 5 or 6, and chroma of 4 or 6. It is sandy loam, fine sandy loam, or loam. Some pedons do not have a BE horizon.

The upper part of the Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 through 6, or it is mottled without dominant matrix color. The lower part of the Bt horizon is neutral or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 0 through 6, or it is mottled without dominant matrix color. The Bt horizon is loam, clay loam, or sandy clay loam.

The BC horizon is neutral or has hue of 10YR through 2.5Y, value of 5 through 7, and chroma of 0 through 8, or it is mottled without dominant matrix color. It is sandy loam, loam, clay loam, or sandy clay loam. Some pedons do not have a BC horizon.

The C horizon is neutral or has hue of 10YR through 5Y, value of 5 through 7, and chroma of 0 through 2. It mainly is loamy sand, sandy loam, or loam. In some pedons it is stratified and has layers and pockets of sandy clay loam.

Bohicket Series

The soils of the Bohicket series are very deep and very poorly drained. They formed in thin organic material over clayey fluvial sediments. They are along creeks and rivers on tidal marshes that are inundated twice daily by saline and brackish water. Slopes are less than 1 percent.

Bohicket soils are near Altavista, Johnston, Lanexa, Mattan, Nimmo, State, and Tomotley soils. The Bohicket soils have sulfidic materials within 20 inches of the surface, but the other soils do not.

Typical pedon of Bohicket muck, 0 to 1 percent slopes, frequently flooded, about 3,600 feet southwest of the mouth of Ware Creek at York River, 600 feet west of Ware Creek, 8,100 feet east of the junction of VA-600 and VA-601:

Oa—0 to 9 inches; very dark grayish brown (10YR 3/2) muck (sapric material); massive; slightly sticky; many fine and medium fibrous roots; soil flows easily between fingers when squeezed; common fibers and pockets of organic (sapric) and mineral material; moderate sulfur odor; neutral; gradual smooth boundary.

Cg1—9 to 40 inches; very dark grayish brown (10YR 3/2) mucky silty clay loam; massive; sticky; few fine fibrous roots; soil flows easily between fingers when squeezed; common fibers and pockets of organic (sapric) material; moderate sulfur odor; moderately alkaline; gradual smooth boundary.

Cg2—40 to 57 inches; gray (5Y 5/1) silty clay; massive; sticky; soil flows easily between fingers when squeezed; few fibers and thin layers of organic (sapric) material; strong sulfur odor; moderately alkaline; gradual smooth boundary.

Cg3—57 to 80 inches; dark greenish gray (5GY 4/1) silty clay; massive; sticky; soil flows easily between fingers when squeezed; few fibers and thin layers of organic (sapric) material; strong sulfur odor; moderately alkaline.

The soil ranges mainly from slightly acid to moderately alkaline. After air drying for 30 days, it is extremely acid. The N value of all horizons between depths of 10 and 40 inches is 1 or more. Soil salinity is high. Organic layers with a combined thickness of less than 16 inches are in some pedons.

The Oa or A horizon has hue of 10YR through 5Y, value of 2 through 4, and chroma of 1 or 2. This horizon is muck, silty clay loam, mucky silty clay loam, silty clay, or mucky silty clay.

The Cg horizon has hue of 10YR through 5GY, value of 2 through 7, and chroma of 1 or 2. It mainly is silty clay loam, silty clay, or clay or the mucky analogues of these textures. Some pedons have thin strata of clay loam, silt loam, sandy loam, loamy sand, or sand.

Bojac series

The soils of the Bojac series are very deep and well drained. They formed in loamy fluvial sediments. They are on low terraces adjacent to major streams. Slopes range from 0 to 2 percent.

Bojac soils are near Altavista, Tetotum, Dragston, Munden, Seabrook, Conetoe, Tarboro, Pamunkey, and State soils. The Bojac soils do not have gray mottles in the upper part of the pedon, as do the Altavista, Tetotum, Dragston, Munden, and Seabrook soils. The Bojac soils have a thinner surface layer than the Conetoe soils, have more clay in the subsoil than the Tarboro soils, and have less clay in the subsoil than the Pamunkey or State soils.

Typical pedon of Bojac loamy sand, 0 to 2 percent slopes, about 3,500 feet south of the mouth of Mill Creek, 4,000 feet northeast of junction of VA-636 and VA-30, 6,000 feet southeast of the VA-30 bridge at Eltham, 1,500 feet west of the mouth of Ferry Creek:

Ap—0 to 10 inches; brown (10YR 4/3) loamy sand; weak fine granular structure; very friable; common fine roots; common fine and medium tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

E—10 to 18 inches; dark yellowish brown (10YR 4/6) loamy sand; moderate medium and fine granular structure; very friable; few fine roots; common fine and medium tubular pores; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt1—18 to 30 inches; brown (7.5YR 5/4) fine sandy loam; weak coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and clay bridges on sand grains; few fine flakes of mica; moderately acid; gradual smooth boundary.

Bt2—30 to 42 inches; strong brown (7.5YR 5/6) fine sandy loam; weak medium and coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and clay bridges on sand grains; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt3—42 to 52 inches; strong brown (7.5YR 5/6) fine sandy loam; weak coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; many distinct clay films and clay bridges on sand grains; common fine flakes of mica; strongly acid; gradual wavy boundary.

C1—52 to 61 inches; mottled strong brown (7.5YR 5/6) and pale brown (10YR 6/3) sand; single grain; loose; common fine and medium tubular pores; common fine flakes of mica; 5 percent rounded quartz gravel; strongly acid; clear wavy boundary.

C2—61 to 70 inches; yellowish brown (10YR 5/6) sand; common medium faint pale brown (10YR 6/3) mottles; single grain; loose; common fine flakes of mica; common black grains of sand; 10 percent rounded quartz gravel; strongly acid.

The solum thickness ranges from 30 to 65 inches. In unlimed areas reaction of the A, E, and B horizons ranges from extremely acid to slightly acid. Reaction of the C horizon ranges from very strongly acid to moderately acid. Quartz gravel makes up 0 to 5 percent of the volume of the soil.

The A or Ap horizon has hue of 7.5YR through 2.5Y, value of 3 through 6, and chroma of 1 through 4. The E horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 4 or 6. The A and E horizons are loamy sand, sandy loam, or fine sandy loam.

Some pedons have a BA or BE horizon that has hue of 7.5YR through 2.5Y, value of 4 through 6, and chroma of 4 through 6. It is sandy loam, fine sandy loam, or loam.

The Bt horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 4 through 8. It mainly is sandy loam, fine sandy loam, or loam. Some pedons have a thin subhorizon of sandy clay loam or clay loam. Low chroma mottles are below a depth of 40 inches in some pedons.

Some pedons have a BC horizon that has colors and mottles similar to those of the Bt horizon. It is loamy sand or loamy fine sand.

The C horizon has hue of 7.5YR through 2.5Y, value of 4 through 7, and chroma of 3 through 8. High or low chroma mottles or both are in many pedons. The C horizon is commonly stratified and ranges from coarse sand to loamy fine sand.

Caroline Series

The soils of the Caroline series are very deep and well drained. They formed in clayey fluvial and marine sediments. They are on uplands. Slopes range from 2 to 10 percent.

Caroline soils are near Emporia, Kempsville, Slagle, Craven, and Uchee soils. The Caroline soils have more clay in the subsoil than the Emporia, Kempsville, or Uchee soils; have more clay in the subsoil and have gray mottles lower in the argillic horizon than the Slagle soils; do not have the thick, sandy surface layer that is

characteristic of the Uchee soils; and have gray mottles lower in the subsoil than the Craven soils.

Typical pedon of Caroline loam, 2 to 6 percent slopes, about 1,300 feet south of the junction of VA-618 and the Interstate 64 overpass, and 100 feet west of VA-618:

A—0 to 3 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; very friable, slightly sticky, nonplastic; many fine and medium and few coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

E—3 to 8 inches; yellowish brown (10YR 5/4) loam; moderate medium granular structure; very friable, slightly sticky, nonplastic; many fine and medium and common coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

BE—8 to 11 inches; yellowish brown (10YR 5/4) loam; moderate medium granular structure; very friable, sticky, slightly plastic; common fine and medium and few coarse roots; common fine and medium tubular pores; few very faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt1—11 to 14 inches; yellowish brown (10YR 5/8) loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; common distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—14 to 28 inches; yellowish red (5YR 5/8) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles and common medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and few medium roots; common fine tubular pores; many distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt3—28 to 52 inches; yellowish red (5YR 5/8) clay loam; common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse platy structure parting to moderate medium subangular and angular blocky; firm, sticky, plastic; few medium roots; few fine tubular pores; common distinct clay films on faces of peds; strongly acid; gradual smooth boundary.

Bt4—52 to 64 inches; mottled yellowish red (5YR 5/8), yellowish brown (10YR 5/8), and light brownish gray (10YR 6/2) clay; weak coarse platy structure parting to moderate fine angular and subangular blocky; firm, sticky, plastic; few fine tubular pores; many distinct clay films on faces of peds; very strongly acid.

The solum thickness is 60 inches or more. Reaction in unlimed areas ranges from extremely acid to strongly acid. Rock fragments of ironstone and quartz gravel make up 0 to 10 percent of the volume of the soil.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 through 5. The E horizon has hue of 10YR, value of 5 through 7, and chroma of 3 through 6. Some pedons do not have an E horizon. The A and E horizons are sandy loam, fine sandy loam, or loam.

The BE horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8. It is loam, clay loam, or sandy clay loam. Some pedons do not have a BE horizon.

The Bt horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 6 or 8. The amount of high or low chroma mottles is few to many in the Bt horizon, and the lower part of the Bt horizon is variegated or mottled with high and low chroma without dominant matrix hue. The Bt horizon is clay loam, sandy clay, or clay.

Some pedons have a C horizon that has colors similar to those of the lower part of the Bt horizon. It commonly is stratified and ranges from fine sandy loam to sandy clay.

Catpoint Series

The soils of the Catpoint series are very deep and somewhat excessively drained. They formed in sandy fluvial and marine sediments. They are on low stream terraces. Slopes range from 0 to 4 percent.

Catpoint soils commonly are near Bojac, Altavista, Seabrook, and Nimmo soils. The Catpoint soils have less clay in the subsoil than the Bojac or Altavista soils and do not have gray colors or gray mottles as close to the surface as the Seabrook and Nimmo soils.

Typical pedon of Catpoint fine sand, 0 to 4 percent slopes, about 250 feet southwest of the junction of John Smith Trail and Colonial Trail in The Colonies subdivision, 1,400 feet north of the Chickahominy River:

A—0 to 7 inches; dark grayish brown (10YR 4/2) fine sand; weak fine granular structure; very friable; many fine and medium roots and common coarse roots; many fine and medium pores; very strongly acid; clear smooth boundary.

Bw—7 to 24 inches; yellowish brown (10YR 5/6) fine sand; weak coarse granular structure; very friable; common fine and medium roots and few coarse roots; many fine and medium pores; strongly acid; gradual smooth boundary.

E—24 to 39 inches; brownish yellow (10YR 6/6) fine sand; few pale brown (10YR 6/3) mottles; single grain; loose; few fine and medium roots; many fine and medium pores; few fine flakes of mica; strongly acid; gradual smooth boundary.

E/Bt—39 to 72 inches; brownish yellow (10YR 6/6) and light yellowish brown (10YR 6/4) fine sand (E); single grain; loose; few fine and medium roots; few fine flakes of mica; yellowish brown (10YR 5/8) fine sandy loam lamellae (Bt) each 6 to 25 mm thick and totaling 55 to 100 mm thick; weak fine subangular

blocky structure; very friable; many distinct clay films and clay bridges on sand grains; strongly acid.

The thickness of sandy material exceeds 80 inches. Reaction in unlimed areas is very strongly acid to slightly acid. Quartz gravel makes up 0 to 5 percent of the volume above a depth of 40 inches and 0 to 15 percent below a depth of 40 inches. Lamellae of loamy sand, sandy loam, or fine sandy loam are above a depth of 60 inches. They have hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 8.

The Ap or A horizon has hue of 7.5YR through 2.5Y, value of 3 through 5, and chroma of 1 through 4. Where the moist color value is 3, the horizon is less than 10 inches thick. The A horizon is sand, fine sand, loamy sand, or loamy fine sand.

The Bw horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. It is sand, fine sand, loamy sand, or loamy fine sand. Some pedons do not have a Bw horizon.

The E horizon and E part of the E/Bt horizon have hue of 10YR or 2.5Y, value of 6 through 8, and chroma of 2 through 6. They are sand, fine sand, loamy sand, or loamy fine sand.

Conetoe Series

The soils of the Conetoe series are very deep and well drained. They formed in fluvial sediments. Conetoe soils are on low stream terraces. Slopes range from 0 to 4 percent.

Conetoe soils are near the State, Pamunkey, Bojac, Tarboro, Munden, Altavista, and Seabrook soils. The Conetoe soils have a thicker and sandier surface layer than the State, Pamunkey, Bojac, Munden, or Altavista soils; have less clay in the subsoil than the Tarboro and Seabrook soils; and do not have the gray mottles that are characteristic of the Munden, Altavista, and Seabrook soils.

Typical pedon of Conetoe loamy sand, 0 to 4 percent slopes, about 1,000 feet northwest of the junction of VA-614 and VA-608, 5,550 feet south of the Pamunkey River, 300 feet northeast of VA-608:

A—0 to 5 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; common fine medium and coarse roots; common fine tubular pores; strongly acid; clear smooth boundary.

E1—5 to 10 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; common fine medium and few coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

E2—10 to 25 inches; brownish yellow (10YR 6/6) loamy sand; few fine faint pale brown (10YR 6/3) sand stripping; single grain; loose, nonsticky, nonplastic; few fine and medium roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1—25 to 31 inches; yellowish brown (10YR 5/6) fine sandy loam; weak medium and fine granular structure; very friable, slightly sticky, nonplastic; few fine and medium roots; common fine and medium tubular pores; many distinct clay films and clay bridges on sand grains; strongly acid; clear smooth boundary.

Bt2—31 to 46 inches; yellowish brown (10YR 5/6) loamy sand; weak coarse subangular blocky structure; friable, slightly sticky, nonplastic; few fine and medium roots; few fine and medium tubular pores; many distinct clay films and clay bridges on sand grains; very strongly acid; gradual smooth boundary.

BC—46 to 55 inches; yellowish brown (10YR 5/6) sand; weak medium granular structure; very friable, nonsticky, nonplastic; few fine roots; few very faint clay films and bridging on sand grains; few flakes of mica; strongly acid; gradual wavy boundary.

C—55 to 72 inches; yellowish brown (10YR 5/8) sand; common medium faint light yellowish brown (10YR 6/4) mottles; single grain; loose, nonsticky, nonplastic; few fine flakes of mica; common black grains of sand; strongly acid.

The solum thickness ranges from 36 to 60 inches. Reaction in unlimed areas ranges from very strongly acid to moderately acid.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 1 through 3. It is sand or loamy sand.

The E horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 8. It is sand or loamy sand.

The Bt horizon has hue of 7.5YR or 10YR, value 5 through 7, and chroma of 6 or 8. The Bt horizon is typically sandy loam, fine sandy loam, or loamy sand. Some pedons have thin layers of sandy clay loam.

The BC horizon has colors similar to those of the Bt horizon. It is sand or loamy sand. Some pedons do not have a BC horizon.

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

Craven series

The soils of the Craven series are very deep and moderately well drained. They formed in clayey fluvial and marine sediments. They are on uplands. Slopes range from 2 to 10 percent.

Craven soils commonly are near Caroline, Emporia, Slagle, and Uchee soils. The Craven soils have gray mottles closer to the surface than do the Caroline soils; have more clay in the subsoil than the Emporia, Slagle,

or Uchee soils; and do not have the thick sandy surface layer that is characteristic of the Uchee soils.

Typical pedon of Craven loam, 2 to 6 percent slopes, about 200 feet west of the abandoned portion of VA-609, 1,500 feet south of the junction of VA-609 and VA-610:

A—0 to 4 inches; brown (10YR 5/3) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common coarse medium and fine roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

E—4 to 9 inches; light yellowish brown (10YR 6/4) loam; moderate medium granular and weak medium subangular blocky structure; friable, sticky, plastic; common fine and medium and few coarse roots; common fine and medium tubular pores; extremely acid; clear smooth boundary.

Bt1—9 to 14 inches; brownish yellow (10YR 6/6) clay loam; moderate medium and fine subangular blocky structure; friable, sticky, plastic; few medium and coarse roots; common fine roots; few fine tubular pores; many distinct clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2—14 to 20 inches; yellowish brown (10YR 5/8) clay; strong moderate and fine angular blocky structure; firm, sticky, plastic; few medium and coarse roots and common fine roots; few fine tubular pores; many distinct clay films on faces of peds; extremely acid; clear smooth boundary.

Bt3—20 to 27 inches; yellowish brown (10YR 5/8) clay; common medium distinct gray (10YR 6/1) mottles and few fine prominent strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6) mottles; strong fine angular blocky structure; firm, sticky, plastic; common fine and few medium roots; many distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

Bt4—27 to 40 inches; mottled strong brown (7.5YR 5/8), gray (10YR 6/1), and reddish yellow (7.5YR 6/6) clay loam; strong medium angular blocky structure; firm, sticky, plastic; few fine roots; few distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

BC—40 to 60 inches; mottled and streaked light gray (10YR 7/1), brownish yellow (10YR 6/6), and yellowish brown (10YR 5/6) clay loam; moderate coarse angular blocky structure; friable, sticky, plastic; few fine roots; extremely acid; gradual smooth boundary.

C—60 to 80 inches; streaked and mottled light gray (10YR 7/1), yellowish brown (10YR 5/6), and light olive brown (2.5Y 5/6) stratified sandy clay loam and clay loam; massive, friable, sticky, plastic; few fine roots; extremely acid.

The solum thickness is at least 40 inches. Reaction in unlimed areas ranges from extremely acid to strongly acid. Gravel-size rock fragments make up 0 to 2 percent of the volume of the soil.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 1 through 3. The E horizon has hue of 10YR through 5Y, value of 5 through 7, and chroma of 2 through 4. The A and E horizons are fine sandy loam, loam, or silt loam. Some pedons do not have an E horizon.

Some pedons have a BA or BE horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 8. They are loam, clay loam, or silty clay loam.

The upper part of the Bt horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 4 through 8. The lower part of the Bt horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 4 through 8. Mottles are in shades of red, brown, yellow, and gray. The Bt horizon is clay loam, silty clay loam, silty clay, or clay.

The BC horizon is mottled and has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 through 8. It is clay loam, sandy clay loam, or sandy clay.

The C horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 through 6. Mottles, streaks, and variegations are shades of red, brown, yellow, and gray. Texture ranges from loamy fine sand to sandy clay loam.

Dogue series

The soils of the Dogue series are very deep and moderately well drained. They formed in fluvial and marine sediments. They are on stream terraces. Slopes range from 0 to 2 percent.

Dogue soils are near Altavista, Roanoke, Wahee, Pamunkey, and Slagle soils. The Dogue soils have more clay in the subsoil than the Altavista or Slagle soils. The Dogue soils do not have gray mottles in the upper part of the argillic horizon or a gray matrix in the lower part of the argillic horizon as do the Wahee and Roanoke soils. The Dogue soils have more clay in the subsoil than the Pamunkey soils and, unlike the Pamunkey soils, have gray mottles in the argillic horizon.

Typical pedon of Dogue fine sandy loam, 0 to 2 percent slopes, 8,000 feet northwest of the mouth of Ware Creek, 5,000 feet east of the Mt. Olivet Baptist Church, 4,000 feet southwest of Terrapin Point on York River:

A—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; common fine tubular pores; very strongly acid; clear smooth boundary.

E—3 to 9 inches; pale brown (10YR 6/3) fine sandy loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few fine medium and

coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

BE—9 to 13 inches; light olive brown (2.5Y 5/4) and light yellowish brown (2.5Y 6/4) loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine medium and coarse roots; common fine and medium tubular pores; few very faint clay films on faces of peds; strongly acid; clear smooth boundary.

Bt1—13 to 24 inches; yellowish brown (10YR 5/4) clay; moderate medium and fine subangular blocky structure; firm, sticky, plastic; few fine and medium roots; common fine tubular pores; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—24 to 33 inches; yellowish brown (10YR 5/4) clay; common medium prominent gray (10YR 6/1) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; strong medium and fine subangular and angular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—33 to 43 inches; mottled gray (5YR 6/1), yellowish brown (10YR 5/4), and yellowish red (5YR 4/6) clay; strong coarse and medium angular blocky structure; firm, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

BC—43 to 60 inches; mottled gray (5YR 6/1), strong brown (7.5YR 5/6), and yellowish red (5YR 4/6) sandy clay loam; massive; firm, sticky, plastic; few fine roots along vertical clay flows; few thick vertical clay flows; common fine flakes of mica; few grains of feldspar; strongly acid.

The solum thickness is at least 40 inches. Reaction in unlimed areas is extremely acid to strongly acid. Quartz gravel makes up 0 to 15 percent of the volume of the soil. Few to common flakes of mica and grains of feldspar are in the B and C horizons.

The A or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 through 4. The E horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 6. The A and E horizons are fine sandy loam, loam, or silt loam.

The BE horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma or 4 or 6. It is loam, clay loam, or sandy clay loam. Some pedons do not have a BE horizon.

The upper part of the Bt horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. The lower part of the Bt horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 1 through 8, or it is mottled in these and other hues without a dominant matrix color. The Bt horizon is clay loam, sandy clay loam, sandy clay, or clay.

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

Some pedons have a C horizon with high and low chroma mottles. It commonly is stratified and ranges from sand to sandy clay loam.

Dragston Series

Soils of the Dragston series are very deep and somewhat poorly drained. They formed in loamy fluvial sediments. They are on low stream terraces. Slopes range from 0 to 2 percent.

Dragston soils commonly are near Altavista, Augusta, Nimmo, Seabrook, and Tomotley soils. The Dragston soils have gray mottles closer to the surface than the Altavista or Seabrook soils, have less clay in the subsoil than the Altavista soils and more clay than the Seabrook soils, have less clay than the Augusta soils, and are not as gray in the surface layer as the Nimmo and Tomotley soils.

Typical pedon of Dragston fine sandy loam, 0 to 2 percent slopes, about 750 feet southwest of VA-631, 150 feet east of the logging road, 2,500 feet northeast of the Chickahominy River and the C&O Railroad bridge:

Ap1—0 to 3 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak medium and fine granular structure; friable, slightly sticky; many fine medium and coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

Ap2—3 to 10 inches; olive brown (2.5Y 4/4) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and grayish brown (10YR 5/2) mottles; weak medium and fine granular structure; friable, slightly sticky; many fine medium and coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

E—10 to 17 inches; light gray (2.5Y 7/2) fine sandy loam; common fine distinct brownish yellow (10YR 6/6) mottles; weak fine granular structure; very friable, slightly sticky; few fine and medium roots; common fine medium and coarse tubular pores; very strongly acid; clear smooth boundary.

Bt1—17 to 25 inches; pale brown (10YR 6/3) and yellowish brown (10YR 5/6) fine sandy loam; common coarse distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine and medium roots; common fine medium and coarse tubular pores; few fine flakes of mica; few distinct clay films and clay bridges on sand grains; very strongly acid; gradual smooth boundary.

Bt2—25 to 40 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 6/1) fine sandy loam; friable,

slightly sticky, slightly plastic, few fine and medium roots, few fine and medium tubular pores, few distinct clay films and clay bridges on sand grains, very strongly acid, gradual smooth boundary

Btg—40 to 49 inches, gray (10YR 6/1) fine sandy loam, common medium distinct yellowish brown (10YR 5/6) mottles, friable, sticky, plastic, few fine roots, few fine and medium tubular pores, few distinct clay films and clay bridges on sand grains, very strongly acid, abrupt smooth boundary

Cg—49 to 60 inches, grayish brown (10YR 5/2) sand, common fine distinct yellowish brown (10YR 5/6) mottles, single grain, loose, common fine and very fine black mineral grains, very strongly acid

The solum thickness ranges from 25 to 50 inches The content of rock fragments is typically low but ranges from 0 to 2 percent in the solum and from 0 to 10 percent in the C horizon Reaction in unlimed areas mainly is very strongly acid or strongly acid In some pedons it ranges to slightly acid in the lower part of the Bt horizon and in the C horizon

The A or Ap horizon has hue of 10YR through 5Y, value of 2 through 5, and chroma of 1 through 4 Where value is less than 3 5, the horizon is less than 10 inches thick The E horizon has hue of 10YR through 5Y, value of 4 through 7, and chroma of 2 through 4 High and low chroma mottles are few to common The A and E horizons are fine sandy loam, sandy loam, loamy fine sand, loamy sand, or loam

The upper part of the Bt horizon, and in some pedons the BA or BE horizon, has hue of 10YR or 2 5Y, value of 4 through 6, chroma of 3 through 8, and few to common high and low chroma mottles The lower part of the Bt horizon and the BC horizon are neutral or have hue of 10YR through 5Y, value of 4 through 6, and chroma of 0 through 8, or they are mottled with these and other hues without a dominant matrix color The BA, Bt, and BC horizons are mainly fine sandy loam or sandy loam but range to loam Some pedons have a Bt subhorizon of sandy clay loam

The C or 2C horizon is mottled and neutral or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 0 through 8 High and low chroma mottles are in most pedons The horizon is loamy sand, loamy fine sand, fine sand, sand, or fine sandy loam

Emporia Series

The soils of the Emporia series are very deep and well drained They formed in stratified loamy and clayey fluvial and marine sediments They are on uplands Slopes range from 2 to 10 percent

Emporia soils commonly are near Caroline, Kempsville, Slagle, Suffolk, and Uchee soils The Emporia soils have less clay in the subsoil than Caroline soils, are firmer in the lower part of the argillic horizon than the Kempsville or Suffolk soils are, and do not have the thick, sandy surface layer characteristic of the Uchee soils The Emporia soils have gray mottles lower in the argillic horizon than the Slagle soils have

Typical pedon of Emporia fine sandy loam, 2 to 6 percent slopes, about 1 5 miles north of the intersection of US-60 and VA-615, 1,800 feet west of VA-615, 3,400 feet south of the junction of VA-615 and VA-609

A—0 to 2 inches, dark grayish brown (10YR 4/2) fine sandy loam, weak fine granular structure, very friable, nonsticky, nonplastic, many fine and medium roots and common coarse roots, few quartz gravel, very strongly acid, clear smooth boundary

E—2 to 12 inches, light yellowish brown (10YR 6/4) fine sandy loam, moderate medium granular structure, very friable, nonsticky, nonplastic, many fine and medium roots and common coarse roots; many fine and medium tubular pores, few quartz gravel, strongly acid, clear wavy boundary.

BE—12 to 16 inches, yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) loam, weak medium subangular blocky structure, friable, slightly sticky, slightly plastic, common fine and medium roots, common fine and medium tubular pores, few very faint clay films on faces of peds, few quartz gravel, moderately acid, clear wavy boundary

Bt1—16 to 30 inches, strong brown (7 5YR 5/6) loam, common medium distinct light yellowish brown (10YR 6/4) mottles, moderate medium subangular blocky structure, friable, sticky, slightly plastic; few fine and medium roots, few fine and medium tubular pores, common distinct clay films on faces of peds, few quartz gravel, moderately acid, gradual smooth boundary

Bt2—30 to 40 inches, yellowish red (5YR 5/8) clay loam, common medium prominent red (2 5YR 4/6) mottles, few fine roots, few fine and medium tubular pores, common distinct clay films on faces of peds, few quartz gravel, moderately acid, gradual smooth boundary

Bt3—40 to 50 inches, variegated red (2 5YR 4/8), yellowish red (5YR 5/8), yellowish brown (10YR 5/8), strong brown (7 5YR 5/8), and gray (10YR 6/1) sandy clay, moderate medium subangular blocky structure, friable, sticky, plastic, few fine roots, few fine tubular pores, many distinct clay films on faces of peds, few quartz gravel, moderately acid, gradual smooth boundary

BC—50 to 56 inches, variegated red (2 5YR 4/8), yellowish red (5YR 5/8), yellowish brown (10YR 5/8), and gray (10YR 6/1) sand clay loam, weak coarse subangular blocky structure, firm, sticky, plastic, few fine roots, few fine tubular pores, few quartz gravel, moderately acid, gradual wavy boundary

C—56 to 63 inches, variegated yellowish red (5YR 5/6), strong brown (7 5YR 5/8), yellowish brown (10YR

5/6), and gray (10YR 6/1) stratified sandy clay loam and sandy loam, massive, friable, sticky, plastic, few fine roots, few quartz gravel, moderately acid

The solum thickness ranges from 40 to 75 inches Reaction in unlimed areas is very strongly acid to moderately acid Gravel-size rock fragments make up 0 to 5 percent of the soil

The Ap or A horizon has hue of 10YR or 2 5Y, value of 4 through 6, and chroma of 2 through 4 The E horizon has hue of 10YR or 2 5Y, value of 5 or 6, and chroma of 3 or 4 The A and E horizons are sandy loam, fine sandy loam, or loam

The BA or BE horizon has hue of 7 5YR or 10YR, value of 5 or 6, and chroma of 4 or 6 It is sandy loam, fine sandy loam, or loam Some pedons do not have a BE or BA horizon

The upper part of the Bt horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 3 through 8 The lower part of the Bt horizon is neutral or has matrix hue of 2 5YR through 2 5Y, value of 4 through 6, and chroma of 0 through 8, or it is mottled without dominant matrix hue. Low chroma mottles commonly are below a depth of 36 inches. The Bt horizon commonly is sandy loam, loam, sandy clay loam, or clay loam, but the lower part ranges to sandy clay or clay

The BC horizon is similar in color and texture to the lower part of the Bt horizon

The C horizon is neutral or has matrix hue of 5YR through 5Y, value of 3 through 8, and chroma of 0 through 8 In most pedons it is mottled or variegated with high and low chroma mottles The C horizon ranges from sandy loam to clay

Johnston series

The soils of the Johnston series are very deep and very poorly drained They formed in loamy fluvial sediments They are on flood plains Slopes range from 0 to 2 percent

Johnston soils are near Bohicket, Lanexa, Mattan, Nimmo, and Tomotley soils The Johnston soils are frequently flooded from stream overflow, the Bohicket, Lanexa, and Mattan soils are flooded twice daily by tidal waters The Johnson soils have a thicker and darker surface layer than the Nimmo or Tomotley soils.

Typical pedon of Johnston mucky loam, 0 to 2 percent slopes, about 600 feet southeast of the junction of VA-628 and Diascund Creek

A—0 to 24 inches; black (10YR 2/1) mucky loam, weak medium granular structure, very friable, slightly sticky, slightly plastic, many fine and medium roots, very strongly acid, gradual wavy boundary

Cg1—24 to 30 inches, dark gray (10YR 4/1) sandy loam, massive, friable, slightly sticky, slightly plastic, few fine roots, very strongly acid, clear smooth boundary

Cg2—30 to 64 inches, dark grayish brown (10YR 4/2) loamy sand, massive, very friable, slightly sticky, nonplastic; few fine roots, strongly acid

Reaction is very strongly acid or strongly acid A few inches of recent alluvial sediments are on the A horizon of some pedons

The A horizon is neutral or has hue of 10YR through 5Y, value of 2 or 3, and chroma of 0 through 2 It is mucky loam, loam, sandy loam, or fine sandy loam

The Cg1 horizon is neutral or has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 0 through 2 It is loamy sand, sandy loam, fine sandy loam, or loam

The Cg2 horizon has hue of 10YR through 5Y, value of 4 through 7, and chroma of 1 or 2 It mainly is sand, loamy sand, sandy loam, or fine sandy loam In some pedons the Cg2 horizon is stratified with layers ranging from sand to sandy clay loam

Kempsville Series

The soils of the Kempsville series are very deep and well drained They formed in loamy fluvial and marine sediments Kempsville soils are on uplands Slopes range from 2 to 10 percent

Kempsville soils commonly are near Emporia, Slagle, Suffolk, and Uchee soils The Kempsville soils do not have the low chroma mottles in the lower part of the subsoil that are typical in the Emporia soils, do not have the thick, sandy surface layer that is typical of the Uchee soils, and do not have the gray mottles in the middle of the argillic horizon that are typical of the Slagle soils They have a thicker subsoil than the Suffolk soils

Typical pedon of Kempsville fine sandy loam, in an area of Kempsville-Emporia complex, 2 to 6 percent slopes, 4,000 feet south of the junction of VA-603 and VA-627, 100 feet west of VA-627 and 30 feet north of the field boundary, 900 feet south of the crossing of the Virginia Power transmission line and VA-627

Ap—0 to 11 inches, brown (10YR 5/3) fine sandy loam, weak fine granular structure; friable, nonsticky, nonplastic, few fine roots, common fine and few medium tubular pores, strongly acid, abrupt smooth boundary

BA—11 to 17 inches, yellowish brown (10YR 5/6) fine sandy loam, common medium faint light yellowish brown (10YR 6/4) mottles, weak medium subangular blocky structure, friable, sticky, slightly plastic, few fine roots, common fine and medium tubular pores, few very faint clay films and clay bridges on sand grains, strongly acid, clear smooth boundary

Bt1—17 to 30 inches, strong brown (7.5YR 5/6) sandy clay loam, common coarse distinct light yellowish

brown (10YR 6/4) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and few coarse tubular pores; common distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Bt2—30 to 39 inches; yellowish brown (10YR 5/8) fine sandy loam; common fine and medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; very friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; few distinct clay films on faces of peds and clay bridging between sand grains; very strongly acid; clear irregular boundary.

Bt3—39 to 53 inches; 60 percent yellowish brown (10YR 5/8) and 40 percent pale brown (10YR 6/3) fine sandy loam; weak coarse subangular blocky structure; yellowish brown portion is friable, slightly sticky, and slightly plastic; pale brown portion is firm and slightly compact in place; common fine vesicular pores in pale brown portion; common fine tubular pores in yellowish brown portion; many distinct clay films and bridges on sand grains in yellowish brown portion and common clean grains of sand in pale brown portion; very strongly acid; gradual irregular boundary.

Bt4—53 to 84 inches; yellowish red (5YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium tubular pores; few distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

C—84 to 90 inches; stratified yellowish red (5YR 5/8) sandy clay loam and strong brown (7.5YR 5/6) sandy loam; massive; friable, slightly sticky, slightly plastic; very strongly acid.

The solum thickness ranges from 50 to 85 inches. Reaction in unlimed areas is very strongly acid or strongly acid. Quartz gravel makes up 0 to 20 percent of the A and B horizons and 0 to 25 percent of the C horizon.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4. Some pedons have an E horizon. It has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The A and E horizons are sandy loam or fine sandy loam in the fine earth fraction.

The BA horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 6. It is sandy loam or fine sandy loam in the fine earth fraction.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8 in the upper part. The lower part of the Bt horizon of most pedons has hue of 5YR or 2.5YR, with value of 4 to 6, and chroma of 4 to 8. The Bt horizon is sandy loam, fine sandy loam, sandy clay loam, or loam in the fine earth fraction. Most pedons have a subhorizon of the Bt that is brittle and somewhat compact in up to 40 percent of the mass. This brittle and compact layer commonly has few to many pale brown, very pale brown, or light yellowish brown mottles or streaks and slightly lower clay content than the overlying and underlying horizons.

The C horizon has colors similar to those of the Bt horizon, or it is stratified or has high chroma mottles. It ranges from loamy sand to sandy clay loam in the fine earth fraction. High chroma mottles are in some pedons, and low chroma mottles are in some pedons below a depth of 50 inches.

Lanexa Series

The soils of the Lanexa series are very deep and very poorly drained. They formed in herbaceous organic materials over clayey fluvial sediments. They are in freshwater to slightly brackish marshes, creeks, and rivers and are inundated daily by freshwater and by slightly brackish water during periods of drought. Slopes are less than 1 percent.

Lanexa soils are near Altavista, Dragston, Johnston, Bohicket, Mattan, Nawney, State, and Tomotley soils. All of those except the Mattan soils are mineral. The Lanexa soils do not have as much woody materials in the organic layers as the Mattan soils.

Typical pedon of Lanexa mucky silty clay, 0 to 1 percent slopes, frequently flooded, 1.75 miles south of the junction of VA-627 and VA-1002, or 700 feet south of the junction of Captain Smith Road and Colonial Trail Road in the Colonies subdivision, 100 feet north of the marsh channel in the Chickahominy River:

A—0 to 15 inches; very dark grayish brown (10YR 3/2) mucky silty clay; massive; sticky, slightly plastic; soil flows easily between fingers when squeezed and leaves a small amount of residue and few fine fibrous roots; many fine live roots; moderate sulfur odor; extremely acid; clear smooth boundary.

Oa—15 to 40 inches; very dark grayish brown (2.5Y 3/2) muck (sapric material); about 5 percent fibers rubbed; massive; slightly sticky, slightly plastic; flows easily between fingers when squeezed; weak sulfur odor; common fine roots and fibers; common lenses and pockets of clay loam; very strongly acid; clear smooth boundary.

Cg—40 to 60 inches; very dark grayish brown (2.5Y 3/2) mucky silty clay; massive; sticky, slightly plastic; flows easily between fingers when squeezed and leaves a small amount of residue and few fine fibrous roots; common pockets of sapric and hemic material; extremely acid.

The thickness of the organic layers ranges from 16 to 51 inches. The soil ranges from extremely acid to strongly acid in the natural state. Upon drying, the soil generally is slightly more acid. The sulfur content ranges from 0.2 to 0.75 percent and generally decreases with depth. The n-value of the mineral and organic materials

in the control section ranges from 2 to 4. The organic materials are mostly from herbaceous plants. Thin lenses and strata of mineral soil materials are in the control section of most pedons.

The mineral and organic materials in the surface and subsurface tiers are neutral or have hue of 10YR through 5GY, value of 2 through 4, and chroma of 0 through 2. The organic material is dominantly sapric, but some pedons have a thin hemic surface layer. The mineral materials are mucky analogues of silt loam, silty clay loam, or silty clay.

The 2Cg horizon is neutral or has hue of 10YR through 5GY, value of 2 through 5, and chroma of 0 through 2. Texture is variable, and the horizon commonly is stratified, but the weighted average clay content in the particle-size control section is greater than 35 percent.

Mattan Series

The soils of the Mattan series are very deep and very poorly drained. They formed in herbaceous and woody organic materials over loamy fluvial sediments. They are along freshwater creeks and rivers and in backwater swamps that are subject to daily ponding or flooding, or both. These waters become brackish along the streams during long droughty periods. Slopes are less than 1 percent.

Mattan soils are near Altavista, Bohicket, Dragston, Johnston, Lanexa, Nawney, State, and Tomotley soils. All of those except the Lanexa soils are mineral soils. The Mattan soils have more woody fragments in the organic layers and support more trees than do the Lanexa soils.

Typical pedon of Mattan muck, 0 to 1 percent slopes, frequently flooded, about 0.5 mile north of the junction of VA-608 and VA-609, 0.75 mile south of the Pamunkey River, 50 feet east of a private road to Big Island:

Oa1—0 to 14 inches; gray (5Y 5/1) muck (sapric material); about 15 percent fiber rubbed; massive; many fine and medium roots; flows easily between the fingers when squeezed; weak sulfur odor; extremely acid; gradual smooth boundary.

Oa2—14 to 40 inches; very dark grayish brown (10YR 3/2) muck (sapric material); about 10 percent fiber rubbed; massive; flows easily between fingers when squeezed; slight sulfur odor; common large pieces of fibrous woody materials; very strongly acid; gradual smooth boundary.

2Cg1—40 to 48 inches; very dark grayish brown (10YR 3/2) loamy sand; massive; slightly sticky, nonplastic; flows easily between fingers when squeezed; common fine roots and fibers; very strongly acid; clear smooth boundary.

2Cg2—48 to 60 inches; dark gray (5Y 4/1) sandy clay loam; massive; slightly plastic; flows easily between the fingers when squeezed; very strongly acid.

The thickness of the organic layers ranges from 16 to 51 inches. The soil ranges from extremely acid to strongly acid in the natural state. Upon drying, it is slightly more acid. The sulfur content is as much as about 0.5 percent in the organic layers. The n-value of the organic materials ranges from 2 to 5.5. The organic materials are from a mixture of herbaceous and woody plants. Large pieces of logs and limbs that can be penetrated with an auger are in most pedons. Mineral strata less than 12 inches thick are in some pedons in the control section.

The organic material in the surface tier is neutral or has hue of 10YR through 5Y, value of 2 through 5, and chroma of 0 through 3. It is commonly sapric material but is hemic in some pedons. The surface layer of some pedons is the mucky analogue of loam, silt loam, clay loam, or silty clay loam.

The organic material in the subsurface tier is neutral or has hue of 7.5YR through 5GY, value of 2 through 4, and chroma of 0 through 4. It is dominantly sapric material, but thin layers of hemic material are in some pedons.

The 2Cg horizon is neutral or has hue of 10YR through 5GB, value of 2 through 5, and chroma of 0 through 2. It is commonly stratified and ranges from loamy sand to silty clay loam or the mucky analogues of these textures. The upper 12 inches has a weighted average clay content of 12 to 35 percent.

Munden Series

The soils of the Munden series are very deep and moderately well drained. They formed in loamy fluvial sediments. They are on stream terraces on the Coastal Plain. Slopes range from 0 to 2 percent.

Munden soils are near Altavista, Dragston, Nimmo, Tomotley, Seabrook, and Augusta soils. The Munden soils have less clay in the subsoil than the Altavista soils and more clay than the Seabrook soils. Munden soils have gray mottles lower in the subsoil than the Dragston and Augusta soils and have less gray in the upper part of the subsoil than the Nimmo and Tomotley soils.

Typical pedon of Munden sandy loam, 0 to 2 percent slopes, about 400 feet east of Osborn Landing, 3,300 feet south of the junction of US-60 and VA-647, 200 feet east-southeast of an unpaved road:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine and medium roots and few coarse roots; common fine medium and coarse tubular pores; strongly acid; clear smooth boundary.

E—10 to 18 inches; yellowish brown (10YR 5/4) fine sandy loam; common fine faint light yellowish brown (10YR 6/4) mottles; weak fine and medium granular structure; very friable, slightly sticky, slightly plastic;

few fine and medium roots; common fine medium and coarse tubular pores; slightly acid; clear smooth boundary.

Bt1—18 to 24 inches; mottled yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) fine sandy loam; weak fine and medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine and medium roots; common fine medium and coarse tubular pores; few distinct clay films on faces of peds and common clay bridging between sand grains; slightly acid; clear smooth boundary.

Bt2—24 to 35 inches; mottled light yellowish brown (10YR 6/4) and pale brown (10YR 6/3) sandy clay loam; many coarse faint grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) mottles; weak coarse and medium subangular blocky structure; very friable, sticky, plastic; few fine and medium roots; common fine medium and coarse tubular pores; few distinct clay films on faces of peds and common clay bridging between sand grains; few fine flakes of mica; moderately acid; clear smooth boundary.

C—35 to 65 inches; stratified pale brown (10YR 6/3) and yellowish brown (10YR 5/6) loamy sand; massive; very friable; moderately acid.

The solum thickness ranges from 25 to 45 inches. Reaction in unlimed areas ranges from very strongly acid to moderately acid.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 1 through 4. It is loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam.

The E horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 2 through 6. The E horizon is loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam.

Some pedons have a BA or BE horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 through 6. It is sandy loam, fine sandy loam, or loam.

The Bt horizon has hue of 7.5YR through 2.5Y, value of 3 through 6, and chroma of 4 through 8. It mainly is sandy loam, fine sandy loam, or loam. In some subhorizons the range extends to sandy clay loam.

Some pedons have a BC horizon that has colors similar to those of the Bt horizon, or it is mottled with those or other colors without dominant matrix hue. It is sandy loam, fine sandy loam, loam, or loamy sand.

The C horizon has hue of 7.5YR through 5Y, value of 5 through 7, and chroma of 2 through 8, or it is mottled with these or other colors without dominant matrix hue. It mainly is loamy sand, loamy fine sand, sand, or fine sand. Some pedons contain thin strata ranging from sandy loam to silty clay.

Nawney Series

The soils of the Nawney series are very deep and very poorly drained. They formed in loamy fluvial sediments. They are on narrow to broad flood plains and basins. Slopes range from 0 to 2 percent.

Nawney soils are near Altavista, Augusta, Dragston, Johnston, Nimmo, and Seabrook soils. The surface layer in the Nawney soils is not as thick nor as dark as in the Johnston soils. The Nawney soils have more gray throughout than the Altavista, Augusta, Dragston, and Seabrook soils and have more clay in the subsoil than the Nimmo soils.

Typical pedon of Nawney silt loam, 0 to 2 percent slopes, ponded, about 2,000 feet south of intersection of US-60 and VA-618, 500 feet west of VA-618 and 1,500 feet north of the Chickahominy River:

A1—0 to 4 inches; dark gray (5Y 4/1) silt loam; moderate medium granular structure; very friable, sticky, plastic; many fine medium and coarse roots; few fine flakes of mica; very strongly acid; gradual smooth boundary.

A2—4 to 7 inches; dark grayish brown (2.5Y 4/2) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; moderate medium granular structure; very friable, sticky, plastic; common fine and medium roots; common fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg1—7 to 17 inches; gray (5Y 5/1) clay loam; many medium prominent strong brown (7.5YR 5/8) mottles; massive; friable, sticky, plastic; common fine and medium roots; common fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg2—17 to 36 inches; greenish gray (5BG 5/1) silty clay loam; many medium prominent strong brown (7.5YR 5/6) mottles; massive; friable, sticky, plastic; few fine medium, and coarse roots; few fine tubular pores; few fine flakes of mica; few fine black mineral stains; strongly acid; gradual smooth boundary.

Cg3—36 to 41 inches; greenish gray (5GY 5/1) clay loam; common fine prominent dark yellowish brown (10YR 4/4) mottles; massive; friable, sticky, plastic; few fine medium and coarse roots; few fine tubular pores; few fine flakes of mica; strongly acid; clear wavy boundary.

Cg4—41 to 65 inches; dark greenish gray (5BG 4/1) stratified sand to silty clay loam; massive; friable, slightly sticky, slightly plastic, few fine roots; few fine flakes of mica; few fine black mineral stains; slightly acid.

The loamy horizons extend to a depth of 40 to 60 inches. Reaction to a depth of 40 inches ranges from extremely acid to strongly acid. At a depth of more than

40 inches it ranges from extremely acid to slightly acid. Gravel-size rock fragments commonly make up 0 to 2 percent of the soil, but below a depth of about 40 inches the range is as much as 15 percent.

The A horizon is neutral or has hue of 7.5YR through 5Y, value of 2 through 5, and chroma of 0 through 2. Value of 3 or less is limited to horizons less than 6 inches thick. Some pedons have high chroma mottles. The A horizon commonly is silt loam, loam, fine sandy loam, or sandy loam, but it ranges to loamy sand, sandy clay loam, clay loam, and silty clay loam.

The C horizon is neutral or has hue of 10YR through 5BG, value of 4 through 7, and chroma of 0 through 2. Some pedons have high chroma mottles, and some pedons are highly variegated with high and low chroma mottles. The C horizon above a depth of about 40 inches commonly is sandy loam, fine sandy loam, loam, sandy clay loam, clay loam, or silty clay loam. Pockets or strata of coarser or finer textured soil are in some pedons. Below a depth of about 40 inches the horizon commonly is highly stratified and ranges from sand to clay in the fine earth fraction.

Nevarc Series

The soils of the Nevarc series are very deep and moderately well drained. They formed in clayey fluvial and marine sediments. They are on side slopes. Slopes range from 6 to 60 percent.

Nevarc soils are near Caroline, Emporia, Slagle, Craven, Kempsville, Dogue, Uchee, Johnston, Suffolk, and Orangeburg soils. The Nevarc soils have gray mottles closer to the surface than the Caroline and Emporia soils and, unlike the Kempsville, Suffolk, and Orangeburg soils, have gray mottles in the argillic horizon. The Nevarc soils have more clay in the subsoil than the Slagle soils, do not have the thick sandy surface layer that is characteristic of the Uchee soils, are steeper than the Craven and Dogue soils, and are not as gray as the Johnston soils.

Typical pedon of Nevarc loam, in an area of Nevarc-Remlik complex, 25 to 60 percent slopes, 1,200 feet southeast of the Diascund Creek bridge on VA-628, 500 feet south of Diascund Creek:

A—0 to 4 inches; dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; many fine common medium and few coarse roots; common fine and medium tubular pores; extremely acid; clear smooth boundary.

BA—4 to 8 inches; light yellowish brown (10YR 6/4) clay loam; moderate medium and fine subangular blocky structure; friable, sticky, plastic; common fine and medium and few coarse roots; common fine and medium pores; few very faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt1—8 to 23 inches; reddish yellow (7.5YR 6/6) clay; moderate and strong subangular and angular blocky structure; firm, sticky, plastic; common fine and medium and few coarse roots; common fine tubular pores; many distinct clay films on faces of peds; extremely acid; clear smooth boundary.

Bt2—23 to 32 inches; reddish yellow (7.5YR 6/6) clay; common medium distinct light gray (10YR 7/1) mottles and common fine faint strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky, plastic; common fine and medium roots; common fine and medium tubular pores; common distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

Bt3—32 to 41 inches; mottled and streaked light gray (10YR 7/1), yellowish red (5YR 5/8), and strong brown (7.5YR 5/8) sandy clay loam; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; extremely acid; abrupt smooth boundary.

C—41 to 55 inches; strong brown (7.5YR 5/6) sandy clay loam; common coarse prominent light gray (10YR 7/1) mottles; massive; compact in place; friable, sticky, plastic; few fine tubular pores; common fragments of ironstone and thin discontinuous ironstone layer; extremely acid; abrupt wavy boundary.

2C—55 to 72 inches; light gray (10YR 7/2) and brownish yellow (10YR 6/6) sand; single grain; loose; very strongly acid.

The solum thickness is at least 30 inches. Reaction ranges from extremely acid to moderately acid. The content of gravel-size quartz pebbles ranges from 0 to 2 percent throughout the soil.

The A horizon has hue of 7.5YR through 2.5Y, value of 2 through 5, and chroma of 2 through 4. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 8. The A horizon and E horizon are very fine sandy loam, fine sandy loam, sandy loam, loam, or silt loam.

The BA or BE horizon has hue of 7.5YR or 10YR, value of 4 through 7, and chroma of 4 through 8. It is loam or clay loam. Some pedons do not have a BA or BE horizon.

The upper part of the Bt horizon has hue of 5YR through 10YR, value of 4 through 7, and chroma of 4 through 8. The lower part of the Bt horizon has hue of 5YR through 2.5Y, value of 4 through 7, and chroma of 1 through 8, or it is mottled with these or other colors without dominant matrix hue. In the lower part of the Bt horizon of some profiles, the amount of high and low chroma mottles ranges from few to many. The Bt horizon is sandy clay loam, clay loam, sandy clay, silty clay loam, silty clay, or clay.

Some pedons have a BC or CB horizon with colors and textures similar to those of the lower part of the Bt horizon.

The C and 2C horizons are variable in color and commonly are mottled in shades of gray, brown, yellow, and red. The C horizon is variable in texture and commonly is stratified or contains pockets of contrasting textures. It ranges from sand to clay.

Nimmo Series

The soils of the Nimmo series are very deep and poorly drained. They formed in loamy fluvial sediments over sandy sediments. They are on low flats and in natural drainageways. Slopes range from 0 to 2 percent.

Nimmo soils are near Altavista, Augusta, Bojac, Dragston, Seabrook, and Tomotley soils. Nimmo soils are grayer in the upper part of the solum than the Altavista, Augusta, Bojac, Dragston, or Seabrook soils and have less clay than the Tomotley soils.

Typical pedon of Nimmo fine sandy loam, 0 to 2 percent slopes, about 1,000 feet southwest of VA-631 and 600 feet west of the logging road, 2,000 feet northeast of the C&O Railroad bridge over the Chickahominy River:

A1—0 to 5 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; common fine medium and coarse roots; common fine and medium and few coarse tubular pores; 2 percent rounded quartz gravel; strongly acid; clear smooth boundary.

A2—5 to 8 inches; gray (10YR 5/1) fine sandy loam; few fine distinct dark yellowish brown (10YR 4/6) mottles; weak fine granular structure; very friable, slightly sticky, nonplastic; common fine medium and coarse roots; common fine medium and coarse tubular pores; 2 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

E—8 to 14 inches; gray (10YR 6/1) loamy sand; few fine distinct dark yellowish brown (10YR 4/6) mottles; weak fine granular structure; very friable, slightly sticky, nonplastic; few fine medium and coarse roots; common fine medium and coarse tubular pores; 2 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

Btg1—14 to 21 inches; gray (10YR 6/1) fine sandy loam; moderate medium and fine granular structure; friable, slightly sticky, slightly plastic; few fine and coarse roots; common fine medium and coarse tubular pores; common distinct clay films and clay bridges on sand grains; few fine black mineral grains; few feldspar grains; very strongly acid; gradual smooth boundary.

Btg2—21 to 43 inches; gray (10YR 6/1) fine sandy loam; many coarse distinct yellowish brown (10YR 5/8) mottles; weak fine and medium subangular blocky structure; friable, sticky, plastic; few fine and coarse roots; few fine medium and coarse tubular pores; common distinct clay films on faces of peds and many faint clay films and clay bridges on sand grains; few feldspar grains; 5 percent rounded quartz gravel; very strongly acid; clear smooth boundary.

Cg—43 to 65 inches; gray (10YR 6/1) loamy sand; massive; very friable; few fine black mineral grains; 10 percent rounded quartz gravel; very strongly acid.

The solum thickness ranges from 25 to 45 inches. Reaction in unlimed areas ranges from extremely acid to strongly acid. Rounded gravel makes up 0 to 3 percent of the volume of the solum and up to 20 percent of the substratum.

The A or Ap horizon has hue of 10YR through 5Y, value of 2 through 5, and chroma of 1 or 2. The E horizon has hue of 10YR through 5Y, value of 4 through 7, and chroma of 1 or 2. The A and E horizons are loamy sand, loamy fine sand, or fine sandy loam.

The Btg horizon has hue of 10YR through 5Y, value of 4 through 6, and chroma of 1 or 2 but dominantly of 1. It commonly has high chroma mottles. It commonly is fine sandy loam, but some pedons have layers of sandy clay loam.

The 2C or C horizon is neutral or has hue of 10YR through 5Y, value of 4 through 6, and chroma of 0 through 2. It mainly is sand, fine sand, loamy sand, or loamy fine sand in the fine earth fraction but commonly has strata of finer textures.

Norfolk Series

The soils of the Norfolk series are very deep and well drained. They formed in loamy fluvial and marine sediments. They are on broad uplands. Slopes range from 2 to 6 percent.

Norfolk soils are near Emporia, Kempsville, Orangeburg, and Slagle soils. The Norfolk soils have a thicker subsoil than the Emporia, Kempsville, or Slagle soils, do not have gray mottles as close to the surface as the Slagle soils have, and are not as red in the subsoil as the Orangeburg soils.

Typical pedon of Norfolk fine sandy loam, 2 to 6 percent slopes, 500 feet southeast of the junction of VA-613 and VA-611 and 200 feet north of VA-249:

Oi—2 inches to 0; partially decomposed pine needles, hardwood leaves, and twigs.

A—0 to 3 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; many fine and medium and few coarse tree roots; common fine and medium tubular pores; very strongly acid: clear smooth boundary.

E—3 to 14 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; very friable, slightly sticky, slightly plastic; common fine

and medium and few coarse roots; common fine and medium tubular pores; very strongly acid; clear smooth boundary.

BE—14 to 17 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky and moderate medium granular structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; few very faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt1—17 to 22 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; common faint clay films on faces of peds; 2 percent ironstone fragments and rounded quartz gravel; very strongly acid; clear smooth boundary.

Bt2—22 to 39 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) mottles; common medium faint pale brown (l0YR 6/3) mottles and few fine prominent yellowish red (5YR 5/8) mottles, weak coarse angular and subangular blocky structure; compact in place, friable, sticky, plastic; few fine roots; few fine tubular and common fine vesicular pores; common distinct clay films on faces of peds; 2 percent ironstone fragments and rounded quartz gravel; very strongly acid; gradual smooth boundary.

Bt3—39 to 47 inches; yellowish brown (10YR 5/8) sandy clay loam; common medium prominent strong brown (7.5YR 5/8) and yellowish red (5YR 5/8) mottles; weak coarse angular and subangular blocky structure; compact in place, friable, sticky, plastic; few fine roots; common fine vesicular pores; common distinct clay films on faces of peds; 5 percent rounded quartz gravel and ironstone fragments; very strongly acid; gradual smooth boundary.

Bt4—47 to 65 inches; variegated yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), yellowish red (5YR 5/8), and gray (10YR 6/1) sandy clay loam; weak coarse angular blocky structure; firm, sticky, plastic; common fine vesicular pores; common distinct clay films on faces of peds; 5 percent rounded quartz gravel; very strongly acid.

The solum thickness ranges from 60 to 90 inches. Reaction in unlimed areas is very strongly acid or strongly acid. Gravel-size rock fragments make up 0 to 5 percent of the volume of the soil.

The A or Ap horizon has hue of 10YR, value of 4 through 6, and chroma of 2 through 4. The E horizon has hue of 10YR, value of 5 or 6, chroma of 3 or 4. The A and E horizons are sandy loam or fine sandy loam.

The BE horizon has hue of 10YR, value of 5, and chroma of 4 through 8. It is fine sandy loam or sandy clay loam.

The upper part of the Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 through 8. It has high and low chroma mottles in the lower part. The lower part of the Bt horizon, or in some pedons the BC horizon, is mottled or variegated in brown, yellow, red, and gray. The Bt and BC horizons are sandy loam, sandy clay loam, or clay loam.

Some pedons have a C horizon that commonly is mottled or variegated strong brown, red, gray, or yellow. It ranges from sandy loam to clay.

Orangeburg Series

The soils of the Orangeburg series are very deep and well drained. They formed in fluviomarine sediments. They are on medium-size to broad ridges on the uplands. Slopes range from 2 to 6 percent.

Orangeburg soils are near Kempsville, Suffolk, Norfolk, Emporia, and Slagle soils. The Orangeburg soils have a thicker solum than the Kempsville, Suffolk, or Emporia soils; have a redder subsoil than the Norfolk soils; and do not have gray mottles in the subsoil, as do the Slagle soils.

Typical pedon of Orangeburg fine sandy loam, 2 to 6 percent slopes, about 800 feet southwest of VA-629, and 200 feet east of a horse barn, 800 feet southeast of the crossing of a Virginia Power transmission line and VA-629:

Ap—0 to 11 inches; dark brown (7.5YR 4/2) fine sandy loam; moderate medium and fine granular structure; friable, slightly sticky, slightly plastic; common fine and medium roots; few medium tubular pores; slightly acid; abrupt smooth boundary.

Bt1—11 to 24 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium and fine subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium and few coarse tubular pores; common faint clay films on faces of peds and many distinct clay bridges on sand grains; slightly acid; gradual smooth boundary.

Bt2—24 to 47 inches; red (2.5YR 4/6) sandy clay loam; weak fine and medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium tubular pores; common distinct clay films on faces of peds; common medium distinct mineral staining and weakly developed mineral concretions; strongly acid; gradual smooth boundary.

Bt3—47 to 64 inches; red (2.5YR 4/6) sandy clay loam; weak medium and fine subangular blocky structure; friable, sticky, plastic; few fine and medium roots; few fine tubular pores; common distinct clay films on faces of peds and many distinct clay bridges on sand grains; strongly acid.

The solum thickness ranges from 60 to 90 inches. In unlimed areas reaction is very strongly acid to moderately acid in the Ap horizon and upper part of the Bt horizon and very strongly acid or strongly acid in the lower part of the Bt horizon.

The Ap or A horizon has hue of 7.5YR or l0YR, value of 4 or 5, and chroma of 2 through 4. Some pedons have an E horizon that has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. The A and E horizons are sandy loam or fine sandy loam.

Some pedons have a BA or BE horizon that has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. They are sandy loam, fine sandy loam, or sandy clay loam.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. It is fine sandy loam or sandy clay loam in the upper part and sandy clay loam in the lower part.

Pamunkey Series

The soils of the Pamunkey series are very deep and well drained. They formed in loamy fluvial sediments. They are on stream terraces. Slopes range from 0 to 6 percent.

Pamunkey soils are near Altavista, Dogue, Tetotum, Munden, Bojac, and Tarboro soils. The Pamunkey soils do not have the gray mottles in the argillic horizon that are typical in the Altavista, Dogue, Tetotum, and Munden soils; have more clay in the subsoil than the Bojac or Tarboro soils; and have less clay in the subsoil than the Dogue soils.

Typical pedon of Pamunkey fine sandy loam, 2 to 6 percent slopes, about 600 feet south of the Pamunkey River, 1.25 miles southeast of the Southern Railroad bridge at White House, 3,500 feet west of the mouth of White House Creek:

Ap—0 to 10 inches; brown (10YR 4/3) fine sandy loam; weak fine and medium granular structure; very friable, slightly sticky, slightly plastic; many fine roots; common fine and medium tubular pores; slightly acid; clear smooth boundary.

Bt1—10 to 17 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common fine and medium tubular pores; common fine flakes of mica; common distinct clay films on faces of peds and clay bridges on sand grains; moderately acid; clear smooth boundary.

Bt2—17 to 28 inches; strong brown (7.5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine roots; common fine and medium tubular pores; common distinct clay films on faces of peds; common fine flakes of mica; common medium prominent dark brown (7.5YR 3/2) mineral stains; moderately acid; clear smooth boundary.

Bt3—28 to 36; strong brown (7.5YR 5/6) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common very fine roots; common fine and medium tubular pores; common fine and medium flakes of mica; common distinct clay films on faces of peds; slightly acid; gradual wavy boundary.

Bt4—36 to 46 inches; yellowish red (5YR 5/6) fine sandy loam; weak medium subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; common fine and medium flakes of mica; common distinct clay films on faces of peds; slightly acid; gradual smooth boundary.

2C1—46 to 57 inches; strong brown (7.5YR 5/6) sand; single grain; loose; few fine roots; common fine and medium flakes of mica; slightly acid; clear wavy boundary.

2C2—57 to 80 inches; yellowish brown (10YR 5/6) sand; single grain; loose; common fine and medium flakes of mica; slightly acid.

The solum thickness ranges from 40 to 60 inches. Reaction ranges from strongly acid through neutral in the A and Bt horizons and from moderately acid to neutral in the substratum. Quartz gravel makes up 0 to 5 percent of the soil.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma of 2 through 4. Some pedons have an E horizon that has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 through 4. The A and E horizons are fine sandy loam, sandy loam, loam, or silt loam.

Some pedons have a BA or BE horizon that has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 8. They are fine sandy loam, sandy loam, or loam.

The Bt horizon has hue of 5YR through 10YR, value of 4 through 6, and chroma of 3 through 8. It is fine sandy loam, loam, silt loam, sandy clay loam, clay loam, or silty clay loam. The amount of flakes of mica ranges from few to many.

Some pedons have a BC horizon that has colors similar to those of the Bt horizon. It is sandy loam, fine sandy loam, or loam.

The 2C or C horizon has colors similar to those of the Bt horizon. It is sand or loamy sand. Some profiles are stratified and cross-bedded and contain thin, finer textured strata.

Remlik Series

The soils of the Remlik series are very deep and well drained. They formed in sandy and loamy sediments on side slopes. Slopes range from 6 to 60 percent.

Remlik soils are near Caroline, Emporia, Slagle, Craven, Kempsville, Dogue, Suffolk, Orangeburg,

Johnston, and Uchee soils. The Remlik soils have a thicker, sandier surface layer and less clay in the subsoil than Caroline, Emporia, Slagle, Craven, Kempsville, Dogue, Suffolk, or Orangeburg soils; do not have the gray mottles in the upper part that are typical in the Slagle and Johnston soils; and have less clay in the subsoil than the Uchee soils.

Typical pedon of Remlik loamy sand, in an area of Nevarc-Remlik complex, 15 to 25 percent slopes, 500 feet west of VA-628 and 500 feet south of Diascund Creek:

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

E—4 to 22 inches; light yellowish brown (10YR 6/4) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; common fine roots; common fine and few medium tubular pores; extremely acid; clear smooth boundary.

EB—22 to 27 inches; yellowish brown (10YR 5/6) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; slightly compact in place; common fine and few medium roots; common fine and medium tubular pores; few very faint clay films and bridges on sand grains; few clean sand grains (stripings); extremely acid; clear smooth boundary.

Bt—27 to 43 inches; strong brown (7.5YR 5/6) fine sandy loam; weak fine and medium subangular blocky and common medium granular structure; very friable, slightly sticky, slightly plastic; common fine and few medium roots; common fine medium and coarse tubular pores; few faint clay films on faces of peds and clay bridging between sand grains; very strongly acid; gradual smooth boundary.

C—43 to 72 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few discontinuous strong brown (7.5YR 5/6) lamellae up to 4 mm thick; very strongly acid.

The solum thickness is at least 30 inches. Reaction ranges from extremely acid to moderately acid.

The A horizon has hue of 10YR or 2.5Y, value of 2 through 5, and chroma of 2 through 4. The E horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 3 through 8. The A and E horizons are fine sand, loamy sand, or loamy fine sand.

The EB horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. It is loamy sand or loamy fine sand.

The Bt horizon has hue mainly of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. In some pedons the lower part of the Bt horizon is mottled and includes matrix hue of 2.5Y. The Bt horizon is sandy loam, fine sandy loam, or sandy clay loam.

Some pedons have a BC horizon that has colors similar to those of the Bt horizon. It is loamy sand, loamy fine sand, sandy loam, or fine sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 2 through 8, or it is mottled with these or other colors without dominant matrix hue. The C horizon is sand or loamy sand and commonly contains lamellae of sandy loam.

Roanoke Series

The soils of the Roanoke series are very deep and poorly drained. They formed in clayey fluvial sediments. They are on low and intermediate river terraces along the Chickahominy, York, and Pamunkey Rivers. Slopes range from 0 to 2 percent.

Roanoke soils are near Altavista, Augusta, Dogue, Wahee, and Tetotum soils. The Roanoke soils have more gray color closer to the surface and more clay in the subsoil than the Altavista, Augusta, and Tetotum soils. They are grayer and have more silt in the subsoil than the Dogue soils and are grayer in the upper part of the subsoil than the Wahee soils.

Typical pedon of Roanoke silt loam, 0 to 2 percent slopes, about 250 feet south of US-33, 800 feet south of the borrow pit, and 1,000 feet northeast of the crossing of the Virginia Power transmission line and US-33:

A—0 to 3 inches; very dark brown (10YR 2/2) silt loam; moderate medium granular structure; very friable, slightly sticky, slightly plastic; many fine medium and coarse roots; common fine and medium tubular pores; extremely acid; abrupt smooth boundary.

BA—3 to 8 inches; dark grayish brown (10YR 4/2) silt loam; weak medium and fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine medium and few coarse roots; few fine and medium tubular pores; very few faint clay films on faces of peds; extremely acid; abrupt smooth boundary.

Btg1—8 to 17 inches; gray (5Y 5/1) clay; common medium distinct light olive brown (2.5Y 5/6) mottles; strong medium angular blocky structure; firm, sticky, plastic; few fine and medium roots; many distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg2—17 to 33 inches; dark gray (N 4/0) clay; common medium distinct light olive brown (2.5Y 5/6) mottles; strong medium and coarse angular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films on faces of peds; extremely acid; gradual smooth boundary.

Btg3—33 to 50 inches; dark gray (N 4/0) clay; few fine distinct light olive brown (2.5Y 5/6) mottles; strong medium and fine angular blocky structure; firm, sticky, plastic; few fine roots; many distinct clay films

on faces of peds; extremely acid; gradual wavy boundary.

BCg—50 to 55 inches; mottled dark gray (N 4/0) and gray (5Y 5/1) sandy clay loam; moderate medium subangular and angular blocky structure; friable, sticky, plastic; very few faint clay films on faces of peds; extremely acid; clear wavy boundary.

2Cg—55 to 65 inches; light brownish gray (10YR 6/2) sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; extremely acid.

The solum thickness ranges from 40 to 60 inches. Rounded quartz gravel makes up 0 to 10 percent, by volume, of the solum and 0 to 15 percent of the substratum. Reaction in unlimed areas is extremely acid through strongly acid.

The Ap or A horizon has hue of 10YR through 5Y, value of 2 through 6, and chroma of 1 or 2. Some pedons have an E horizon that has hue of 10YR through 5Y, value of 5 or 6, and chroma of 1 or 2. Texture of the A and E horizons is silt loam, loam, or fine sandy loam.

The BA or BE horizon has hue of 10YR through 5Y, value of 4 through 7, and chroma of 1 or 2. They are silt loam, loam, or silty clay loam.

The Btg horizon is neutral or has hue of 10YR through 5Y, value of 4 through 6, and chroma of 0 through 2. Olive brown, yellow, brown, and red mottles are common. The Btg horizon is clay, silty clay, silty clay loam, or clay loam.

The BCg horizon has the same color range as the Btg horizon. The BCg horizon is clay loam, silty clay loam, or sandy clay loam.

The C or 2C horizon is variable in color and texture. It commonly is stratified and ranges from sand to clay.

Seabrook Series

The soils of the Seabrook series are very deep and moderately well drained. They formed in sandy fluvial sediments. They are on low stream terraces. Slopes range from 0 to 2 percent.

Seabrook soils are near Altavista, Bojac, Catpoint, Dragston, and Tomotley soils. The Seabrook soils have less clay than any of those soils except Catpoint soils. They have gray mottles closer to the surface than the Bojac and Catpoint soils, and they do not have gray mottles as close to the surface as the Dragston and Tomotley soils.

Typical pedon of Seabrook loamy sand, 0 to 2 percent slopes, about 300 feet east of the camp pavilion in the Chickahominy Outpost Campsite, approximately 800 feet southeast of Walkers Dam pump station, and 3,500 feet west of the junction VA-627 and the C&O Railroad crossing:

A—0 to 5 inches; very dark grayish brown (10YR 3/2) loamy sand; weak fine granular structure; very friable; common fine and medium roots; many fine tubular pores; very strongly acid; gradual smooth boundary.

C1—5 to 11 inches; light olive brown (2.5Y 5/4) loamy sand; single grain; loose; common fine and medium roots; many fine tubular pores; very strongly acid; gradual smooth boundary.

C2—11 to 25 inches; light olive brown (2.5Y 5/6) loamy sand; few fine faint yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles; single grain; loose; common medium roots; common fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

C3—25 to 37 inches; mottled yellowish brown (10YR 5/8), pale brown (10YR 6/3), and light gray (10YR 7/2) loamy sand; single grain; loose; few fine and medium roots; few fine tubular pores; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Cg—37 to 72 inches; light gray (5Y 7/2) sand; common coarse prominent yellowish brown (10YR 5/8) mottles; single grain; loose; few fine flakes of mica; very strongly acid.

The thickness of the sandy horizons is more than 72 inches. Some pedons have concretions and loamy bodies up to 2 inches in diameter throughout the soil. Reaction ranges from very strongly through slightly acid, unless the soil is limed.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 2 or 3. It is loamy sand or loamy fine sand.

The upper part of the C horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 3 through 8. The lower part of the C horizon has hue of 2.5Y or 5Y, value of 6 or 7, and chroma of 1 or 2, or it is mottled without dominant matrix color. The C horizon is sand, loamy sand, or loamy fine sand.

Slagle Series

The soils of the Slagle series are very deep and moderately well drained. They formed in loamy fluvial sediments. They are on uplands. Slopes range from 0 to 6 percent.

Slagle soils are near Emporia, Craven, Kempsville, Suffolk, Caroline, Norfolk, and Uchee soils. The Slagle soils have gray mottles in the middle part of the Bt horizon; the gray mottles in the Emporia, Caroline, Uchee, and Norfolk soils are in the lower part of the Bt horizon. The Suffolk and Kempsville soils do not have gray in the solum. The Slagle have less clay in the subsoil than the Craven soils.

Typical pedon of Slagle fine sandy loam, 0 to 2 percent slopes, about 3,000 feet southwest of the junction of VA-615 and VA-609, and 800 feet south of VA-609:

Ap—0 to 10 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable, slightly sticky, nonplastic; common fine roots; common fine and medium tubular pores; 2 percent rounded quartz gravel; strongly acid; abrupt smooth boundary.

E—10 to 16 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine and medium granular structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium tubular pores; 2 percent rounded quartz gravel; strongly acid; gradual smooth boundary.

Bt1—16 to 21 inches; yellowish brown (10YR 5/4) sandy clay loam; common fine faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; common medium and fine tubular pores; few distinct clay films on faces of peds and clay bridges on sand grains; 2 percent rounded quartz gravel; strongly acid; gradual smooth boundary.

Bt2—21 to 28 inches; yellowish brown (10YR 5/8) sandy clay loam; common fine faint pale brown (10YR 6/3) and light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine and medium tubular pores; many distinct clay films on faces of peds and clay bridges on sand grains; 2 percent rounded quartz gravel; strongly acid; clear smooth boundary.

Bt3—28 to 40 inches; yellowish brown (10YR 5/8) sandy clay loam; common coarse distinct light brownish gray (10YR 6/2) mottles and few fine prominent yellowish red (5YR 5/8) mottles; weak coarse to fine subangular and angular blocky structure; friable, sticky, slightly plastic; few fine roots; few fine and medium tubular pores; common distinct clay films on faces of peds; less than 2 percent rounded quartz gravel; strongly acid; gradual smooth boundary.

BC—40 to 51 inches; mottled light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), pale brown (10YR 6/3), and strong brown (7.5YR 5/6) sandy loam; weak coarse angular blocky structure; friable, slightly sticky, nonplastic; slightly compact in place; few fine tubular pores and few fine vesicular pores; less than 2 percent rounded quartz gravel; very strongly acid; gradual smooth boundary.

C—51 to 65 inches; mottled and streaked light brownish gray (10YR 6/2), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) fine sandy loam; massive; friable, slightly sticky, nonplastic; compact in place; few fine vesicular and tubular pores; less than 2 percent rounded quartz gravel; extremely acid.

The solum thickness is at least 40 inches. Rounded quartz gravel makes up 0 to 5 percent of the volume of the soil. Reaction in unlimed areas ranges from extremely acid to strongly acid.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 through 6, and chroma of 1 through 4. The E horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. The A and E horizons are sandy loam, fine sandy loam, or loam. Some pedons do not have an E horizon.

Some pedons have a BE or BA horizon that has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 3 through 6. They are sandy loam, fine sandy loam, or loam.

The upper part of the Bt horizon has matrix hue of 5YR through 10YR, value of 5 through 7, and chroma of 3 through 8 and commonly has high chroma mottles. The lower part of the Bt horizon has matrix hue of 7.5YR through 5Y, value of 4 through 7, and chroma of 1 through 8, or it is mottled, streaked, or variegated in these or other hue without dominant matrix color. The Bt horizon is sandy loam, fine sandy loam, sandy clay loam, loam, or clay loam. The lower part of the Bt horizon ranges to sandy clay or clay in some pedons.

The BC horizon has the same range in color and texture as the lower part of the Bt horizon. Some part of the Bt or BC horizon of most pedons is firm or very firm in place.

The C horizon is variable in color and texture. It is gray or is mottled, variegated, or streaked in shades of red, yellow, brown, olive, and gray. It ranges from loamy sand to clay. In some pedons it is stratified.

State Series

The soils of the State series are very deep and well drained. They formed in loamy fluvial sediments. They are on low stream terraces. Slopes range from 0 to 2 percent.

State soils commonly are near Altavista, Augusta, Dogue, Dragston, Pamunkey, and Tetotum soils. The gray mottles in the State soils are deeper than those in the Altavista, Augusta, Dogue, Dragston, and Tetotum soils and generally are shallower in the substratum than those in the Pamunkey soils. The State soils have less clay in the subsoil than the Dogue soils and more clay than the Dragston soils.

Typical pedon of State very fine sandy loam, 0 to 2 percent slopes, rarely flooded, about 8,000 feet north of the junction of VA-607 and VA-606, 1,200 feet west of the Pamunkey River:

Ap—0 to 9 inches; brown (7.5YR 4/2) very fine sandy loam; moderate medium granular structure; very friable, slightly sticky, nonplastic; many fine roots; common fine and medium tubular pores; few rounded quartz gravel; strongly acid; abrupt smooth boundary.

Bt1—9 to 15 inches; brown (7.5YR 5/4) very fine sandy loam; weak medium and fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine roots; common fine and medium tubular pores; common fine flakes of mica; common

faint clay films on faces of peds; few rounded quartz gravel; strongly acid; clear smooth boundary.

Bt2—15 to 29 inches; brown (7.5YR 4/4) sandy clay loam; moderate medium subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine roots; common fine and medium tubular pores; common fine flakes of mica; many distinct clay films on faces of peds; few rounded quartz gravel; strongly acid; clear smooth boundary.

Bt3—29 to 36 inches; brown (7.5YR 4/4) sandy clay loam; weak coarse subangular blocky structure; very friable, slightly sticky, slightly plastic; few fine roots; common fine and medium pores; common fine flakes of mica; common distinct clay films on faces of peds; few rounded quartz gravel; strongly acid; clear smooth boundary.

BC—36 to 47 inches; yellowish brown (10YR 5/6) very fine sandy loam; weak moderate and fine subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine and medium pores; common fine flakes of mica; few clay bridges on sand grains; few rounded quartz gravel; moderately acid; gradual smooth boundary.

C—47 to 60 inches; yellowish brown (10YR 5/6) very fine sandy loam; common medium prominent light brownish gray (10YR 6/2) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; massive; very friable; nonsticky, nonplastic; few rounded quartz gravel; common fine flakes of mica; strongly acid.

The solum thickness ranges from 40 to 60 inches. In unlimed areas reaction is very strongly acid or strongly acid in the A and Bt horizons and ranges from very strongly acid to moderately acid in the BC and C horizons. Rounded quartz gravel makes up 0 to 2 percent of the solum and up to 15 percent of the C horizon. Flakes of mica are in the solum and C horizon of most pedons.

The Ap or A horizon has hue of 7.5YR through 2.5Y, value of 3 through 5, and chroma of 2 through 4. Some pedons have an E horizon. It has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 through 6. The A and E horizons are very fine sandy loam, fine sandy loam, loam, or silt loam.

Some pedons have a BA or BE horizon that has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 6. They are fine sandy loam, very fine sandy loam, or loam.

The Bt horizon has hue mainly of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 through 6. In some pedons the lower part of the Bt horizon is mottled or has matrix hue of 2.5Y. The Bt horizon is loam, clay loam, or sandy clay loam and very fine sandy loam or silt loam.

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

The C or 2C horizon has hue of 7.5YR through 2.5Y, value of 4 through 7, and chroma of 2 through 8, or it is mottled without dominant matrix hue. It is sand, loamy sand, or sandy loam.

Suffolk Series

The soils of the Suffolk series are very deep and well drained. They formed in loamy fluvial and marine sediments. They are on uplands. Slopes range from 2 to 6 percent.

Suffolk soils commonly are near Emporia, Kempsville, and Uchee soils. The Suffolk soils have are more friable in the lower part of the subsoil than the Emporia soils and have a thinner subsoil than the Emporia or Kempsville soils. The Suffolk soils do not have the thick, sandy surface layer that is characteristic of the Uchee soils.

Typical pedon of Suffolk fine sandy loam, 2 to 6 percent slopes, about 4,500 feet northeast of the intersection of VA-635 and VA-600 and 2,000 feet west of VA-600, 3,000 feet south-southwest of VA-600, which is the dam of Goddins Pond:

Ap—0 to 7 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine medium and coarse roots; common fine and medium tubular pores; strongly acid; clear smooth boundary.

Bt1—7 to 11 inches; brown (7.5YR 5/4) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; common fine and medium tubular pores; few distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—11 to 22 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine medium and coarse roots; common medium tubular pores; common distinct clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—22 to 36 inches; brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and few medium roots; common fine and medium tubular pores; common faint clay films on faces of peds; strongly acid; gradual smooth boundary.

BC—36 to 45 inches; strong brown (7.5YR 5/6) loamy sand; weak medium subangular blocky structure parting to weak fine and medium granular; very friable, slightly sticky, nonplastic; few fine roots; common fine and medium tubular pores; very few clay bridges on sand grains; strongly acid; gradual wavy boundary.

C—45 to 60 inches; strong brown (7.5YR 5/6) loamy sand; massive; very friable, nonsticky, nonplastic; few fine roots; common fine medium and coarse

tubular pores; few ironstone concretions; strongly acid.

The solum thickness ranges from 30 to 50 inches. In unlimed areas reaction in the A horizon and upper part of the Bt horizon ranges from extremely acid to strongly acid. It ranges from extremely acid to moderately acid in the lower part of the Bt horizon and in the C horizon. Quartz pebbles and ferricrete fragments make up 0 to 10 percent of the soil.

The Ap or A horizon has hue of 10YR, value of 3 through 6, and chroma of 2 through 4. Some pedons have an E horizon that has hue of 10YR, value of 5 or 6, and chroma of 3 through 6. The A and E horizons are loamy sand or fine sandy loam.

Some pedons have a BA horizon. This horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 6. It is sandy loam or fine sandy loam.

The Bt horizon has hue mainly of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 through 8. Some pedons have a subhorizon of 5YR. The Bt horizon is sandy loam, fine sandy loam, or sandy clay loam.

The BC horizon has colors similar to those of the Bt horizon. It is loamy sand, sandy loam, or fine sandy loam.

The C horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 2 through 8. The lower part of the C horizon of some pedons has high and low chroma mottles. The C horizon is sand, fine sand, loamy sand, or loamy fine sand.

Tarboro Series

The soils of the Tarboro series are very deep and somewhat excessively drained. They formed in sandy fluvial sediments. They are on intermediate river terraces. Slopes range from 0 to 4 percent.

Tarboro soils are near Bojac, Conetoe, Munden, Seabrook, Altavista, and Dragston soils. Tarboro soils have less clay in the subsoil than all of those soils except Seabrook soils. The Tarboro soils do not have the gray mottles that are typical in the Munden, Seabrook, Altavista, and Dragston soils.

Typical pedon of Tarboro loamy sand, 0 to 4 percent slopes, about 400 feet north of the junction of the farm lane to Poplar Grove Mansion and the Southern Railroad, 100 feet east of the farm lane, 4,200 feet north of the junction VA-608 and VA-614.

Ap—0 to 9 inches; dark brown (10YR 4/3) loamy sand; weak fine granular structure; very friable, nonsticky, nonplastic; many fine common medium and few coarse roots; common fine and medium tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

C1—9 to 22 inches; strong brown (7.5YR 5/6) loamy sand; weak medium granular structure; very friable, nonsticky, nonplastic; common fine medium and few coarse roots; common fine and medium tubular pores; few fine flakes of mica; strongly acid; gradual smooth boundary.

C2—22 to 39 inches; strong brown (7.5YR 5/6) loamy sand; massive; very friable, nonsticky, nonplastic; common fine and medium roots; few fine flakes of mica; strongly acid; gradual smooth boundary.

C3—39 to 62 inches; yellowish brown (10YR 5/6) sand; common fine faint light yellowish brown (10YR 6/4) stripping; single grain; loose; common fine and medium roots; few fine and medium flakes of mica; strongly acid; gradual smooth boundary.

C4—62 to 80 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few fine roots; few fine and medium flakes of mica; strongly acid.

The thickness of the sandy material exceeds 80 inches. Reaction in unlimed areas is strongly acid to slightly acid.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 through 5, and chroma 2 through 5. The Ap or A horizon is sand or loamy sand.

The C horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 3 through 8. The color generally is paler with increasing depth. The horizon mainly is sand or loamy sand, but coarse sand and gravelly layers are in the substratum of some pedons.

Tetotum Series

The soils of the Tetotum series are very deep and moderately well drained. They formed in loamy fluvial sediments. They are on stream terraces. Slopes range from 0 to 2 percent.

Tetotum soils are near Dogue, Roanoke, Wahee, Altavista, State, and Pamunkey soils. The Tetotum soils have less clay in the subsoil than the Dogue, Roanoke, or Wahee soils; do not have as much gray in the subsoil as the Roanoke or Wahee soils; have more silt in the subsoil than the Altavista soils; and, unlike the State and Pamunkey soils, have gray mottles in the subsoil.

Typical pedon of Tetotum loam, 0 to 2 percent slopes, about 250 feet southeast of the farm gate at the end of state maintenance on VA-625, 1,300 feet south of the Pamunkey River and 5,700 feet northeast of the junction of VA-623 and VA-625:

Ap—0 to 13 inches; dark grayish brown (10YR 4/2) loam; moderate medium granular structure; friable, slightly sticky, slightly plastic; few fine roots; common fine and medium and few large tubular pores; few fine flakes of mica; moderately acid; clear smooth boundary.

BA—13 to 18 inches; mixed light yellowish brown (10YR 6/4) and brown (10YR 5/3) fine sandy loam; weak medium and fine subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine

and medium tubular pores; very few clay bridges on sand grains; few fine flakes of mica: moderately acid; clear smooth boundary.

Bt1—18 to 27 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; common fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2—27 to 40 inches; mottled yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) loam; moderate medium subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; many distinct clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual smooth boundary.

Bt3—40 to 52 inches; mottled light gray (10YR 7/1), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/8) sandy clay loam; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; few fine tubular pores; few distinct clay films on faces of peds; common fine and medium flakes of mica; very strongly acid; abrupt wavy boundary.

2C—52 to 75 inches; light yellowish brown (10YR 6/4) sand; common medium faint yellowish brown (10YR 5/6) mottles; single grain; loose; common fine medium and large tubular pores; common fine flakes of mica; very strongly acid.

The solum thickness ranges from 40 to 60 inches. Reaction in unlimed areas ranges from extremely acid to strongly acid. Rounded quartz gravel makes up 0 to 2 percent of the soil.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. The A and E horizons are fine sandy loam, loam, or silt loam.

The BA or BE horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 3 through 8. It is fine sandy loam, loam, or silt loam.

The upper part of the Bt horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 4 through 6. The lower part of the Bt horizon has matrix hue of 7.5YR through 5Y, value of 5 through 7, and chroma of 1 through 8, or it is mottled with these or other hue without dominant matrix color. The Bt horizon typically is sandy clay loam, clay loam, or loam, but some pedons have silt loam or silty clay loam in some subhorizons.

Some pedons have a BC horizon that has colors similar to those of the lower part of the Bt horizon. The BC horizon is fine sandy loam, loam, or sandy clay loam.

The 2C or C horizon has matrix colors and mottles similar to those of the lower part of the Bt horizon. The horizon ranges from sand to clay loam and is commonly stratified.

Tomotley Series

The soils of the Tomotley series are very deep and poorly drained. They formed in loamy fluvial sediments. They are on low flats and in old stream channels. Slopes range from 0 to 2 percent.

Tomotley soils are near Altavista, Augusta, Bojac, Dragston, Seabrook, and Nimmo soils. Tomotley soils are grayer in the upper part of the solum than the Altavista, Augusta, Bojac, Dragston, and Seabrook soils. They have more clay in the subsoil than the Nimmo or Seabrook soils.

Typical pedon of Tomotley loam, 0 to 2 percent slopes, about 1,000 feet north of a road in Virginia Division of Forestry pine seedling nursery and 2,000 feet south of US-60:

A—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, moderate medium granular structure; very friable, slightly sticky, slightly plastic; many fine and medium roots and common coarse roots; common fine and medium tubular pores; few fine flakes of mica; very strongly acid; clear smooth boundary.

E—7 to 17 inches; dark grayish brown (10YR 4/2) fine sandy loam; moderate medium and fine granular structure; very friable, slightly sticky, nonplastic; common fine and medium roots and few coarse roots; common fine medium and few coarse tubular pores; very strongly acid; gradual smooth boundary.

Btg1—17 to 31 inches; dark gray (10YR 4/1) sandy clay loam; common fine distinct yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; friable, sticky, plastic; common fine and few medium roots; common fine and medium tubular pores; many distinct clay films and bridges on sand grains; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; clear smooth boundary.

Btg2—31 to 40 inches; dark gray (10YR 4/1) sandy clay loam; common medium distinct gray (10YR 6/1) mottles; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium roots; common fine and medium tubular pores; many distinct clay films and bridges on sand grains; common distinct clay films on faces of peds; few fine flakes of mica; moderately acid; gradual wavy boundary.

2Cg—40 to 65 inches; gray (10YR 5/1) stratified coarse sand and sand; single grain; loose; few fine flakes of mica; few fine black mineral grains; few fine weathered feldspar crystals; 5 percent rounded gravel; moderately acid.

The solum thickness is at least 30 inches. Reaction in unlimed areas ranges from extremely acid to strongly acid in the upper part of the soil. In the lower part it

ranges from extremely acid to moderately acid. Rounded quartz gravel makes up 0 to 5 percent of the volume of the soil. Few to common fine flakes of mica and fine black minerals are in the lower part of the B horizon and the C horizons of some pedons.

The Ap or A horizon is neutral or has hue of 10YR through 5Y, value of 2 through 4, chroma of 0 through 2. The E horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 1 or 2. The A and E horizons commonly are loam, fine sandy loam, loamy fine sand, or loamy sand.

The Btg horizon is neutral or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 0 through 2. Few to many mottles in shades of olive, yellow, or brown are in some pedons. The Btg horizon commonly is sandy clay loam, clay loam, loam, or fine sandy loam.

The C or 2C horizon is neutral or has hue of 10YR through 5Y, 5BG, or 5GY, value of 5 through 7, and chroma of 0 through 2. The C or 2C horizon is variable in texture, ranging from sand to clay, and commonly has pockets and strata of contrasting textures.

Uchee Series

The soils of the Uchee series are very deep and well drained. They formed in loamy fluvial and marine sediments. They are on upland ridges and side slopes. Slopes range from 2 to 6 percent.

Uchee soils are near Emporia, Kempsville, Slagle, and Suffolk soils but have a thicker, sandier surface layer than those soils

Typical pedon of Uchee loamy fine sand, 2 to 6 percent slopes, about 4,400 feet south of the junction of VA-30 and VA-634, or 2,900 feet north of the junction of VA-633 and VA-30, and 100 feet east of VA-30:

Ap—0 to 11 inches; brown (10YR 5/3) loamy fine sand;weak fine granular structure; very friable, nonsticky, nonplastic; few fine and common roots; common fine and medium and few large tubular pores; strongly acid; abrupt smooth boundary.

E—11 to 25 inches; pale brown (10YR 6/3) loamy fine sand; single grain; very friable, nonsticky, nonplastic; few fine roots; common fine and medium and few large tubular pores; few discontinuous yellowish brown (10YR 5/6) loamy fine sand lamellae 1/8 inch thick; strongly acid; clear smooth boundary.

Bt1—25 to 35 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine and medium roots; common fine and medium and few large tubular pores; many distinct clay films and bridges on sand grains; few faint clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—35 to 50 inches; yellowish brown (10YR 5/6) sandy clay loam; few medium faint brownish yellow (10YR 6/8) mottles, common medium distinct gray (10YR 6/1) mottles, and common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse angular blocky structure; compact in place, friable, sticky, plastic; few fine roots; few fine and medium tubular pores; common distinct clay films on faces of peds; very strongly acid; clear wavy boundary.

C—50 to 63 inches; mottled gray (10YR 6/1), light yellowish brown (10YR 6/4), and brownish yellow (10YR 6/8) fine sandy loam; massive; compact in place, firm, slightly sticky, slightly plastic; few fine tubular pores; very strongly acid.

The solum thickness ranges from 40 to 60 inches. Reaction in unlimed areas is very strongly acid or strongly acid. Gravel and ferricrete fragments make up to 0 to 15 percent of the soil.

The Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 through 4. Some pedons have a thin A horizon with hue of 10YR, value of 3 or 4, and chroma of 1 or 2. The E horizon has hue of 10YR, value of 4 through 7, and chroma of 3 through 6. The A and E horizons are sand, loamy sand, or loamy fine sand.

Some pedons have a BE horizon. It and the upper part of the Bt horizon have hue of 7.5YR or 10YR, value of 5 through 7, and chroma of 4 through 8. The BE horizon is sandy loam or sandy clay loam. The lower part of the Bt horizon has colors similar to those of the upper part. It has few to many high and low chroma mottles, or it is mottled without dominant matrix hue. It is sandy clay loam, sandy clay, or clay.

The C horizon is mottled or variegated in shades of yellow, brown, red, or gray. It mainly is fine sandy loam, sandy loam, or sandy clay loam. Many pedons have pockets or strata of sand or clay.

Udorthents

Udorthents in this survey area consist of deep, excessively drained to moderately well drained soils mostly in areas that have been quarried for sand, gravel, or roadfill. They have been excavated to a depth of about 30 feet. Some areas have been filled by earthy and nonearthy material. The soils formed mostly in loamy fluvial and marine sediments. Udorthents are mainly on ridgetops and side slopes along drainageways. Slopes are mostly from 0 to 4 percent, but the range is as much as about 70 percent.

Udorthents commonly are near Emporia, Kempsville, Slagle, and Suffolk soils, all of which have a well-defined subsoil.

Because of the variability of Udorthents, a typical pedon is not given. The soils range from extremely acid to strongly acid. Quartz pebbles make up 0 to 50 percent of some pedons. Thin discontinuous ironstone fragments make up 0 to 50 percent of some pedons. Common fine flakes of mica are in some pedons.

The surface layer has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 or 3. It is loamy sand, sandy

loam, clay loam, or gravelly sandy loam. The surface layer ranges from about 2 to 10 inches in thickness, but it commonly is about 2 to 5 inches thick.

The lower layers to a depth of more than 60 inches mainly have hue of 2.5YR through 10YR, value of 3 through 7, and chroma of 4 through 8. They range from fine sandy loam to clay loam. Mottles that have hue of 5YR through 2.5Y, value of 3 through 8, and chroma of 1 through 8 are in some pedons.

Wahee Series

The soils of the Wahee series are very deep and somewhat poorly drained. They formed in clayey fluvial sediments on intermediate river terraces along the Chickahominy, York, and Pamunkey Rivers. Slopes range from 0 to 2 percent.

Wahee soils are near Altavista, Augusta, Dogue, Roanoke, and Tetotum soils. The Wahee soils have more clay in the subsoil than the Altavista, Augusta, or Tetotum soils; are brighter colored in the upper part of the subsoil than the Roanoke soils; and are grayer closer to the surface than the Dogue soils.

Typical pedon of Wahee silt loam, 0 to 2 percent slopes, about 4,500 feet southwest of the junction of VA-33 and VA-(273)30, 800 feet south of US-33 at Green's Restaurant (abandoned) in the Eltham area, and 200 feet south of the logging road:

1A—0 to 2 inches; grayish brown (10YR 5/2) silt loam; moderate medium granular structure; very friable, slightly sticky, slightly plastic; many fine and medium and few coarse roots; few fine tubular pores; very strongly acid; clear smooth boundary.

E—2 to 5 inches; mottled light olive brown (2.5Y 5/4), yellowish brown (10YR 5/4), and light brownish gray (2.5Y 6/2) silt loam; weak medium subangular blocky structure; very friable, slightly sticky, slightly plastic; common fine and medium and few coarse roots; few fine tubular pores; very strongly acid; clear smooth boundary.

Bt1—5 to 9 inches; mottled pale brown (10YR 6/3), light olive brown (2.5Y 5/4), and gray (10YR 6/1) silty clay loam; moderate medium subangular blocky structure; friable, sticky, plastic; common fine and medium and few coarse roots; few fine tubular pores; many distinct clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—9 to 17 inches; mottled brown (10YR 5/3), grayish brown (10YR 5/2), yellowish brown (10YR 5/6), and light brownish gray (10YR 6/2) clay; strong fine and medium angular blocky structure; firm, sticky, plastic; common fine medium roots; many distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg1—17 to 29 inches; gray (5Y 5/1) clay; common medium prominent yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; strong fine angular blocky structure; firm, sticky, plastic; common medium and few fine and coarse roots; many distinct clay films on faces of peds; very strongly acid; gradual smooth boundary.

Btg2—29 to 41 inches; gray (N 5/0) clay; common fine and medium prominent yellowish red (5YR 5/8), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/8) mottles; strong fine and medium angular blocky structure; firm, sticky, plastic; few fine medium and coarse roots; many distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual smooth boundary.

Btg3—41 to 56 inches; gray (5Y 6/1) clay; common fine prominent yellowish brown (10YR 5/8) mottles; strong medium and fine angular blocky structure; firm, sticky, plastic; few fine medium and coarse roots; many distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; abrupt smooth boundary.

2Cg—56 to 70 inches; stratified light gray (10YR 7/1) sand and pale brown (10YR 6/3) loamy sand; massive; very friable; few medium roots; few fine flakes of mica; common fine and very fine black mineral grains; strongly acid.

The solum thickness ranges from 40 to 80 inches. Reaction in unlimed areas is extremely acid through acid throughout the profile.

The A or Ap horizon is neutral or has hue of 10YR or 2.5Y, value of 2 through 5, and chroma of 0 through 3. The E horizon has hue of 10YR through 5Y, value of 5 through 7, and chroma of 2 through 4. The A and E horizons are loam, silt loam, very fine sandy loam, fine sandy loam, or sandy loam.

The upper part of the Bt horizon has hue of 10YR through 5Y, value of 5 through 7, and chroma of 3 through 8. It is mottled in shades of gray, yellow, brown, or red. The lower part of the Bt horizon is neutral or has hue of 10YR through 5Y, value of 4 through 7, and chroma of 2 or less and has mottles in shades of yellow, brown, or red. The Bt horizon is clay, sandy clay, clay loam, silty clay loam, or silty clay.

Some pedons have a BC horizon that is neutral or has hue of 10YR through 5Y, value of 5 through 7, and chroma of 2 or less and has mottles in shades of yellow, brown, or red. It is sandy clay loam or fine sandy loam.

The C or 2C horizon is neutral or has hue of 10YR through 5Y, value of 5 through 7, and chroma of 2 or less. Mottles in shades of yellow, brown, or red are in some pedons. Texture is variable.

Formation of the Soils

In this section the factors and processes that have affected the formation and morphology of the soils in New Kent County are described.

Factors of Soil Formation

The characteristics of the soil at any given point depend upon the interaction of parent material, climate, plants and animals, relief, and time.

Climate, plants, and animals are the active forces of soil formation. They act on the plant material accumulated through the deposition of sediments and slowly change it into soil. Although all the factors affect the formation of every soil, the relative importance of each factor differs from place to place. In extreme cases one factor may dominate in the formation of a soil and fix most of its properties. In general, however, the combined action of the five factors affects the character of each soil.

Parent Material

The unconsolidated mass from which a soil is formed is parent material. It is largely responsible for the chemical and mineralogical composition of the soil and the rate at which soil-forming processes take place.

The parent materials in this survey area are alluvial and have been transported and deposited by marine and fluvial action. However, deposition has occurred during different periods and the deposited material is from different sources, resulting in four distinct areas of soils in the county.

The largest and oldest area consists of upland ridges and side slopes. This area is at the highest elevations in the survey area and is dominated by Emporia, Kempsville, and Slagle soils and other loamy soils and by Caroline and Craven soils and other clayey soils.

The second distinct area is at intermediate elevations in the survey area and consists mostly of upland ridges and steep side slopes. This area is dominated by loamy Kempsville, Suffolk, and Emporia soils and clayey Craven and Caroline soils, but it consists of some gravelly areas in the southwest and northwest parts of the survey area.

The third area is fluvial terraces primarily along the major rivers. These are flats, but not marshes, at some of the lower elevations in the county, and they are mainly loamy Tomotley, Dragston, Altavista, and Seabrook soils. Some of the clayey soils in this area, such as Dogue, Wahee, and Roanoke soils, are along the Chickahominy River, but the larger percentage of these clayey soils is along the York River and the eastern part of the Pamunkey River. Some of the western part of the fluvial terraces along the rivers are mainly Pamunkey and Tetotum soils.

The fourth area is mostly Johnston and Newney soils on the flood plains and Bohicket and Lanexa soils in the marshes along the major streams and rivers. The Bohicket soils are mineral but have a thin layer of organic matter on the surface in many places. The Lanexa soils are organic soils. They vary considerably in texture, are poorly developed, and are mostly continuously wet or flooded.

Climate

Climate affects the physical, chemical, and biological relationships in soils, principally through the influence of precipitation and temperature. Water dissolves minerals, supports biological activity, and transports mineral and organic residue through the solum. Temperature determines the type and speed of physical, chemical, and biological activities.

Because precipitation exceeds evapotranspiration in the growing season, the humid climate has caused the soils to be leached. Much of the soluble materials originally in the soil or released through weathering have been removed. Exceptions to this are alluvial soils, for example, Johnston soils, which are recharged with eroded sediments from surrounding uplands. Precipitation is mainly responsible for the subsoil that characterizes most soils in the survey area. In addition to leaching soluble materials, water that percolates through the soil moves clay from the surface layer to the subsoil. Except for soils formed in recent alluvium or sand or on very steep slopes, the soils of the survey area typically have a subsoil that contains more clay than the surface layer.

Also influenced by climate is the formation of blocky structure in the subsoil of well developed soils. The development of peds (aggregates) in the subsoil is caused partly by changes in volume of the soil mass that are primarily the result of alternate wetting and drying.

Plant and Animal Life

Micro-organisms, vegetation, animals, and man are major factors in the formation of soils. Vegetation is generally responsible for the amount of organic matter, the color of the surface layer, and the amounts of nutrients. Earthworms, cicada, and burrowing animals help keep the soil open and porous. Micro-organisms decompose the vegetation and dead animal matter, thus releasing nutrients for plant food. Man has changes the soil by mixing the upper layers.

Before settlement by man, native vegetation, mainly oaks, hickories, and pines, was the major living organism affecting soil development. Most hardwoods use a large amount of the available calcium and other bases and constantly recycle them through leaf fall and decay. This has prevented the soils in the survey area from becoming as leached as they would have been under a coniferous forest cover. Also, since the soils formed under forest vegetation, rapid decay of organic matter and constant recycling of nutrients have prevented organic matter accumulation in large quantities. In addition the climate favors rapid decay of plant materials, oxidation of organic matter, and leaching of nutrients.

Man has influenced soil development by clearing forests, cultivating crops, introducing new plants, and changing natural drainage. The most important changes caused by man were mixing the upper layers of the soils to form a plow layer, accelerated erosion caused by cultivating steep soils, and applying lime and fertilizer to change the fertility of the soils.

Relief

The underlying geologic formations, the geologic history of the general region, and the effects of dissection by rivers and streams largely determine the relief of an area. Relief affects the formation of soils by influencing the quantity of infiltrating water, the rate of surface water runoff, the rate of drainage in the soil, the soil temperature, and the rate of geologic erosion. Relief can alter the effects of climate on the parent material to the extent that several different kinds of soils may form from the same kind of parent material. Relief also affects the amount of radiant energy absorbed by the soils, which in turn affects the type of native vegetation on the soils.

Relief in the survey area ranges from nearly level to very steep. The nearly level soils are common on upland flats, on flood plains of streams, and in marshes. Most of the nearly level soils are often wet because of frequent flooding or a seasonal high water table, and the surface water runoff is usually slow. The soils typically have a subsoil or substratum that is gray or mottled gray, and the soils are somewhat poorly drained or poorly drained. Roanoke, Johnston, and Bohicket are examples of such soils.

The gently sloping to very steep soils generally are well drained or moderately well drained. On the gently sloping and sloping soils, geologic erosion is slight, surface water runoff is medium to rapid, and water infiltration is optimum. Translocation of bases and clay has usually occurred downward through the soil. However, on the steeper soils, surface runoff is very rapid, water infiltration and translocation of clay and bases through the soil are reduced, and the erosion hazard is severe.

In most upland areas the parent materials and other soil-forming factors are essentially the same and relief, or topography, has modified the effects of the other soil-forming factors. For example, Emporia and Slagle soils formed from similar parent materials, yet Emporia soils, being slightly higher on the landscape, are well drained while adjacent Slagle soils are moderately well drained.

Time

As a factor of soil formation, time generally is related to the degree of development or degree of horizon differentiation within the soil. A soil that has little or no horizon development is considered a young soil, and one that has strongly developed horizons is considered an old or mature soil.

The oldest soils in the survey area are those formed on well drained uplands at higher elevations. These older soils, such as Norfolk and Emporia soils, have a strong degree of horizon differentiation. Conversely, Johnston and Nawney soils, for instance, formed in recent alluvium and show little or no horizon development. They are commonly stratified and have an irregular distribution of organic matter in the profile.

Morphology of the Soils

The results of the soil-forming factors are shown by the different layers, or soil horizons, in a soil profile. The soil profile extends from the surface down to materials that are little altered by the soil-forming processes.

Most soils have three major horizons called A, B, and C horizons. These major horizons may be further subdivided by the use of numbers and letters to indicate changes within a horizon. An example would be the Bt horizon, a B horizon that has an accumulation of clay.

The A horizon is the surface layer. An A1 horizon is that part of the surface layer that has the largest accumulation of organic matter. The A horizon is also the layer of maximum leaching and eluviation of clay and iron. If considerable leaching has taken place and organic matter has not darkened the material, this horizon is called an E horizon.

The B horizon underlies the A horizon and is commonly called the subsoil. It is the horizon of maximum accumulation, or illuviation, of clay, iron, aluminum, or other compounds leached from the surface layer. In some soils the B horizon formed by alteration in

place rather than by illuviation. The alteration can be caused by oxidation and reduction of iron or by the weathering of clay minerals. The B horizon commonly has blocky or prismatic structure, and it generally is firmer and lighter in color than the A horizon but darker than the C horizon.

The C horizon is below the B horizon or, in some cases, below the A horizon. It consists of materials that are little altered by the soil-forming processes, but it can be modified by weathering.

Processes of Soil Horizon Differentiation

In this survey area several processes are involved in the formation of soil horizons. Among these are the accumulation of organic matter, the leaching of soluble salts, the reduction and transfer of iron, the formation of soil structure, and the formation and translocation of clay minerals. These processes are continually taking place, generally at the same time throughout the profile. Such processes have been going on for thousands of years.

The accumulation and incorporation of organic matter take place with the decomposition of plant residue. These additions darken the surface layer and help to form the A horizon. In many places, much of the surface layer has been eroded away or has been mixed with materials from underlying layers through cultivation. Organic matter, once lost, normally takes a long time to replace. In New Kent County the organic matter content of the surface layer ranges from low in sandy soils, such as Seabrook soils, to high in fine-textured marsh soils, such as Bohicket soils. A low to medium amount of organic matter is dominant for most soils in the county.

For soils to have distinct subsoil horizons, some of the lime and soluble salts probably must be leached before the translocation of clay minerals. Among the factors that affect this leaching are the kinds of salts originally present, the depth to which the soil solution percolates, and the texture of the soil profile.

Well drained and moderately well drained soils in the survey area have a yellowish brown to yellowish red subsoil. These colors are caused mainly by thin coatings of iron oxides on sand and silt grains, although in some soils the colors are inherited from the materials in which they formed. The structure is weak to moderate subangular blocky, and the subsoil contains more clay than the overlying surface horizons.

The reduction and transfer of iron, called gleying, takes place mainly in the wetter, more poorly drained soils. Moderately well drained to somewhat poorly drained soils, such as Slagle and Augusta soils, have yellowish brown and strong brown mottles, which indicate the segregation of iron. In poorly drained soils, such as Tomotley and Roanoke soils, the subsoil and underlying materials are grayish which indicates reduction and transfer of iron by removal in solution.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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

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

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 40-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	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.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

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

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

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

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

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

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

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

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

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

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

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

Conservation tillage. A tillage and planting system in which crop residue covers at least 30 percent of the soil surface after planting. Where soil erosion by wind is the main concern, the system leaves the equivalent of at least 1,000 pounds per acre of flat small-grain residue on the surface during the critical erosion period.

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

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

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

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

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

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

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

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

Cemented.—Hard; little affected by moistening.

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

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

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

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

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

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

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

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

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

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically 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.

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 the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

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, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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.

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.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

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. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

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 (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying 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, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated 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.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

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.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low

0.75 to 1.25.....moderate
1.25 to 1.75..... moderately high
1.75 to 2.5.....high
More than 2.5.....very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

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. (See Conservation tillage.)

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and 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 colored, 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 of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

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.

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 affecting 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 downward 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. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

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.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
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

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

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.

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.

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.

Seepage (in tables). The movement of water through the soil. Seepage 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 substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. 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.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05

millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
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

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.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. 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 grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

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.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

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 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.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

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.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

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.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Data recorded in the period 1946-78 at Richmond, Va.)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	47.4	27.1	37.3	74	3	96	3.00	1.55	4.16	6	4.9
February----	50.3	28.9	39.6	76	8	105	3.03	1.87	4.37	6	3.8
March-------	58.3	35.6	47.0	84	19	252	3.48	2.66	4.00	7	3.1
April-------	70.3	44.8	57.6	92	27	527	2.73	1.76	3.57	6	.1
May---------	77.7	54.2	66.0	94	37	802	3.56	2.44	4.27	7	.0
June--------	84.9	62.5	73.7	98	46	1,011	3.65	2.40	5.26	6	.0
July--------	88.3	67.3	77.8	100	54	1,172	5.25	2.63	6.69	7	.0
August------	86.9	66.3	76.6	97	54	1,133	5.11	2.31	7.20	7	.0
September---	80.7	58.9	69.8	95	40	894	3.33	1.78	4.81	5	.0
October-----	70.7	47.1	58.9	88	27	586	3.57	1.55	5.35	5	.0
November----	60.6	37.3	49.0	82	17	286	3.00	1.74	5.30	5	.5
December----	50.0	29.4	39.7	74	10	116	3.47	2.56	4.51	6	2.3
Yearly:											
Average---	69.0	46.7	57.9	---	---	---	---	---	---	---	---
Extreme---	---	---	---	105	-1	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,980	43.18	25.25	58.78	63	14.7

* 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 (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Data recorded in the period 1949-78 at Richmond, Va.)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 26	Apr. 11	Apr. 15
2 years in 10 later than--	Mar. 19	Apr. 5	Apr. 14
5 years in 10 later than--	Mar. 11	Mar. 23	Apr. 8
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 6	Oct. 24	Oct. 18
2 years in 10 earlier than--	Nov. 16	Oct. 31	Oct. 20
5 years in 10 earlier than--	Nov. 26	Nov. 8	Oct. 28

TABLE 3.--GROWING SEASON

(Data recorded in the period 1949-78 at Richmond, Va.)

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	231	206	180
8 years in 10	244	212	190
5 years in 10	253	223	202
2 years in 10	277	236	210
1 year in 10	279	250	220

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1A	Altavista fine sandy loam, 0 to 2 percent slopes	3,137	2.2
2A	Altavista-Dogue complex, 0 to 2 percent slopes	2,693	1.9
3A	Augusta fine sandy loam, 0 to 2 percent slopes	727	0.5
4A	Bohicket muck, 0 to 1 percent slopes, frequently flooded	4,005	2.8
5A	Bojac loamy sand, 0 to 2 percent slopes	701	0.5
6B	Caroline loam, 2 to 6 percent slopes	482	0.3
7B	Caroline-Emporia complex, 2 to 6 percent slopes	9,464	6.7
7C	Caroline-Emporia complex, 6 to 10 percent slopes	1,723	1.2
8A	Catpoint fine sand, 0 to 4 percent slopes	533	0.4
9A	Conetoe loamy sand, 0 to 4 percent slopes	567	0.4
10B	Craven loam, 2 to 6 percent slopes	444	0.3
10C	Craven loam, 6 to 10 percent slopes	2,064	1.5
11B	Craven-Caroline complex, 2 to 6 percent slopes	1,942	1.4
12B	Craven-Uchee complex, 2 to 6 percent slopes	231	0.2
13A	Dogue fine sandy loam, 0 to 2 percent slopes	2,138	1.5
14A	Dragston fine sandy loam, 0 to 2 percent slopes	442	0.3
15B	Emporia fine sandy loam, 2 to 6 percent slopes	1,691	1.2
16A	Johnston mucky loam, 0 to 2 percent slopes, frequently flooded	5,890	4.2
17B	Kempsville fine sandy loam, 2 to 6 percent slopes	1,396	1.0
18B	Kempsville gravelly fine sandy loam, 2 to 6 percent slopes	376	0.3
19B	Kempsville-Emporia complex, 2 to 6 percent slopes	10,536	7.4
19C	Kempsville-Emporia complex, 6 to 10 percent slopes	740	0.5
20B	Kempsville-Suffolk complex, 2 to 6 percent slopes	2,278	1.6
21A	Lanexa mucky silty clay, 0 to 1 percent slopes, frequently flooded	4,650	3.3
22A	Mattan muck, 0 to 1 percent slopes, frequently flooded	3,680	2.6
23A	Munden sandy loam, 0 to 2 percent slopes	444	0.3
24A	Nawney silt loam, 0 to 2 percent slopes, frequently flooded	1,106	0.8
25A	Nawney silt loam, 0 to 2 percent slopes, ponded	911	0.6
26D	Nevarc-Remlik complex, 6 to 15 percent slopes	22,891	16.3
26E	Nevarc-Remlik complex, 15 to 25 percent slopes	18,140	12.8
26F	Nevarc-Remlik complex, 25 to 60 percent slopes	11,980	8.5
27A	Nimmo fine sandy loam, 0 to 2 percent slopes	232	0.2
28B	Norfolk fine sandy loam, 2 to 6 percent slopes	369	0.3
29B	Orangeburg fine sandy loam, 2 to 6 percent slopes	386	0.3
30A	Pamunkey fine sandy loam, 0 to 2 percent slopes	207	0.1
30B	Pamunkey fine sandy loam, 2 to 6 percent slopes	1,387	1.0
31A	Roanoke silt loam, 0 to 2 percent slopes	1,842	1.3
32A	Seabrook loamy sand, 0 to 2 percent slopes	1,207	0.9
33A	Slagle fine sandy loam, 0 to 2 percent slopes	1,371	1.0
34B	Slagle-Emporia complex, 2 to 6 percent slopes	3,881	2.7
35A	State very fine sandy loam, 0 to 2 percent slopes, rarely flooded	903	0.6
36B	Suffolk fine sandy loam, 2 to 6 percent slopes	326	0.2
37A	Tarboro loamy sand, 0 to 4 percent slopes	332	0.2
38A	Tetotum loam, 0 to 2 percent slopes	587	0.4
39A	Tomotley loam, 0 to 2 percent slopes	1,883	1.3
40B	Uchee loamy fine sand, 2 to 6 percent slopes	313	0.2
41B	Udorthents, loamy, gently sloping	931	0.7
42A	Wahee silt loam, 0 to 2 percent slopes	1,155	0.8
	Water	6,126	4.3
	Total	141,440	100.0

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
1A	Altavista fine sandy loam, 0 to 2 percent slopes
2A	Altavista-Dogue complex, 0 to 2 percent slopes
3A	Augusta fine sandy loam, 0 to 2 percent slopes (where drained)
6B	Caroline loam, 2 to 6 percent slopes
7B	Caroline-Emporia complex, 2 to 6 percent slopes
10B	Craven loam, 2 to 6 percent slopes
11B	Craven-Caroline complex, 2 to 6 percent slopes
13A	Dogue fine sandy loam, 0 to 2 percent slopes
14A	Dragston fine sandy loam, 0 to 2 percent slopes (where drained)
15B	Emporia fine sandy loam, 2 to 6 percent slopes
17B	Kempsville fine sandy loam, 2 to 6 percent slopes
19B	Kempsville-Emporia complex, 2 to 6 percent slopes
20B	Kempsville-Suffolk complex, 2 to 6 percent slopes
23A	Munden sandy loam, 0 to 2 percent slopes
27A	Nimmo fine sandy loam, 0 to 2 percent slopes (where drained)
28B	Norfolk fine sandy loam, 2 to 6 percent slopes
29B	Orangeburg fine sandy loam, 2 to 6 percent slopes
30A	Pamunkey fine sandy loam, 0 to 2 percent slopes
30B	Pamunkey fine sandy loam, 2 to 6 percent slopes
33A	Slagle fine sandy loam, 0 to 2 percent slopes
34B	Slagle-Emporia complex, 2 to 6 percent slopes
35A	State very fine sandy loam, 0 to 2 percent slopes, rarely flooded
36B	Suffolk fine sandy loam, 2 to 6 percent slopes
38A	Tetotum loam, 0 to 2 percent slopes
39A	Tomotley loam, 0 to 2 percent slopes (where drained)

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Tall fescue	Grass-legume hay	Grass-clover	Barley
		Bu	Bu	Bu	AUM*	Tons	AUM*	Bu
1A--Altavista	IIw	125	55	45	5.0	4.0	6.5	60
2A--Altavista-Dogue	IIw	124	58	45	4.0	3.5	6.0	60
3A--Augusta	IIIw	100	30	40	7.0	6.0	10.0	35
4A--Bohicket	VIIIw	---	---	---	---	---	---	---
5A--Bojac	IIs	90	40	30	2.0	1.5	2.5	50
6B--Caroline	IIe	110	60	40	3.0	2.5	4.0	65
7B--Caroline-Emporia	IIe	105	56	35	5.4	4.5	7.0	60
7C--Caroline-Emporia	IIIe	90	50	28	4.0	3.5	5.5	50
8A--Catpoint	IIIs	60	25	20	4.0	3.5	5.5	40
9A--Conetoe	IIs	75	40	25	4.0	3.0	4.5	40
10B--Craven	IIe	105	50	40	4.0	3.0	4.5	50
10C--Craven	IVe	---	---	---	2.0	2.0	3.0	---
11B--Craven-Caroline	IIe	105	55	40	3.0	2.5	4.0	55
12B--Craven-Uchee	IIIe	90	40	35	5.0	4.0	6.5	45
13A--Dogue	IIw	125	60	45	4.0	3.5	5.5	60
14A--Dragston	IIIw	100	40	30	4.0	3.0	4.5	---
15B--Emporia	IIe	100	50	30	7.0	6.0	10.0	60
16A--Johnston	VIIw	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Tall fescue	Grass-legume hay	Grass-clover	Barley
		Bu	Bu	Bu	AUM*	Tons	AUM*	Bu
17B--Kempsville	IIe	145	50	40	4.2	3.5	5.6	60
18B--Kempsville	IIe	90	40	28	3.6	3.0	4.8	50
19B--Kempsville-Emporia	IIe	129	51	36	3.6	3.0	4.8	60
19C--Kempsville-Emporia	IIIe	113	42	29	3.6	3.0	4.8	50
20B--Kempsville-Suffolk	IIe	135	48	38	4.2	3.5	5.6	55
21A--Lanexa	VIIIw	---	---	---	---	---	---	---
22A--Mattan	VIIw	---	---	---	---	---	---	---
23A--Munden	IIw	130	50	40	3.0	2.5	4.0	45
24A, 25A--Nawney	VIIw	---	---	---	---	---	---	---
26D--Nevarc-Remlik	IVe	---	---	---	1.8	1.5	2.4	---
26E--Nevarc-Remlik	VIe	---	---	---	---	---	---	---
26F--Nevarc-Remlik	VIIe	---	---	---	---	---	---	---
27A--Nimmo	IVw	---	---	---	---	---	---	---
28B--Norfolk	IIe	100	55	35	7.2	6.0	9.6	60
29B--Orangeburg	IIe	120	55	45	7.2	6.0	9.6	60
30A--Pamunkey	I	130	75	45	4.8	4.0	6.4	75
30B--Pamunkey	IIe	125	75	40	4.8	4.0	6.4	75
31A--Roanoke	IVw	---	---	---	2.4	2.0	3.2	---
32A--Seabrook	IIIs	75	45	30	3.0	2.5	4.0	45

See footnote at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Wheat	Soybeans	Tall fescue	Grass-legume hay	Grass-clover	Barley
		Bu	Bu	Bu	AUM*	Tons	AUM*	Bu
33A---------- Slagle	IIw	125	45	40	6.0	5.0	8.0	50
34B---------- Slagle-Emporia	IIw	109	45	33	5.4	4.5	7.2	50
35A---------- State	I	130	60	45	6.1	5.1	8.2	65
36B---------- Suffolk	IIe	120	45	35	4.2	3.5	5.6	55
37A---------- Tarboro	IIIs	50	30	20	4.2	3.5	5.6	35
38A---------- Tetotum	IIw	150	45	40	3.6	3.0	4.8	50
39A---------- Tomotley	IVw	---	---	---	---	---	---	---
40B---------- Uchee	IIs	70	45	30	3.6	3.0	4.8	45
41B. Udorthents								
42A---------- Wahee	IIIw	110	35	45	8.4	7.0	11.2	40

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
1A---------- Altavista	9W	Slight	Moderate	Slight	Slight	Loblolly pine-------	91	9	Loblolly pine, yellow poplar, black walnut, sweetgum, American sycamore, cherrybark oak.
						Longleaf pine-------	84	8	
						Shortleaf pine------	77	9	
						Sweetgum-----------	84	6	
						White oak----------	---	---	
						Red maple----------	---	---	
						Yellow poplar-------	---	---	
						Southern red oak----	---	---	
						Northern red oak----	---	---	
						Water oak----------	---	---	
2A**:									
Altavista------	9W	Slight	Moderate	Slight	Slight	Loblolly pine-------	91	9	Loblolly pine, yellow poplar, black walnut, sweetgum, American sycamore, cherrybark oak.
						Longleaf pine-------	84	8	
						Shortleaf pine------	77	9	
						Sweetgum-----------	84	6	
						White oak----------	---	---	
						Red maple----------	---	---	
						Yellow poplar-------	---	---	
						Southern red oak----	---	---	
						Northern red oak----	---	---	
						Water oak----------	---	---	
Dogue----------	9W	Slight	Moderate	Slight	Slight	Loblolly pine-------	90	9	Loblolly pine.
						Southern red oak----	80	4	
						Sweetgum-----------	90	7	
						Yellow poplar-------	93	7	
						White oak----------	80	4	
3A---------- Augusta	9W	Slight	Moderate	Slight	Moderate	Loblolly pine-------	90	9	Loblolly pine, sweetgum, American sycamore, yellow poplar, cherrybark oak.
						Sweetgum-----------	90	7	
						American sycamore---	90	---	
						White oak----------	80	4	
						Southern red oak----	80	4	
						Water oak----------	---	---	
						Shortleaf pine------	---	---	
5A---------- Bojac	8S	Slight	Slight	Moderate	Slight	Loblolly pine-------	80	8	Loblolly pine, sweetgum.
						Southern red oak----	70	4	
						Virginia pine-------	75	8	
						Sweetgum-----------	80	6	
6B---------- Caroline	8A	Moderate	Slight	Slight	Slight	Loblolly pine-------	76	7	Loblolly pine.
						Shortleaf pine------	70	8	
						Virginia pine-------	70	8	
						Southern red oak----	70	4	
						White oak----------	75	4	
7B**, 7C**:									
Caroline-------	8A	Moderate	Slight	Slight	Slight	Loblolly pine-------	76	7	Loblolly pine.
						Shortleaf pine------	70	8	
						Virginia pine-------	70	8	
						Southern red oak----	70	4	
						White oak----------	75	4	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
7B**, 7C**:									
Emporia	7A	Slight	Slight	Slight	Slight	Loblolly pine	75	7	Loblolly pine, sweetgum.
						Southern red oak	70	4	
8A Catpoint	8S	Slight	Moderate	Moderate	Slight	Loblolly pine	80	8	Loblolly pine.
						Sweetgum	80	6	
						Water oak	70	4	
9A Conetoe	8S	Slight	Moderate	Moderate	Slight	Loblolly pine	80	8	Loblolly pine.
						Longleaf pine	65	5	
						Southern red oak	---	---	
						Post oak	---	---	
						White oak	---	---	
						Hickory	---	---	
						Sweetgum	---	---	
						Red maple	---	---	
						Shumard oak	---	---	
10B, 10C Craven	8W	Slight	Moderate	Slight	Slight	Loblolly pine	81	8	Loblolly pine.
						Longleaf pine	67	5	
						Water oak	---	---	
						Sweetgum	---	---	
						White oak	---	---	
						Southern red oak	---	---	
						Red maple	---	---	
						Blackgum	---	---	
						Yellow poplar	---	---	
11B**:									
Craven	8W	Slight	Moderate	Slight	Slight	Loblolly pine	81	8	Loblolly pine.
						Longleaf pine	67	5	
						Water oak	---	---	
						Sweetgum	---	---	
						White oak	---	---	
						Southern red oak	---	---	
						Red maple	---	---	
						Blackgum	---	---	
						Yellow poplar	---	---	
Caroline	8A	Moderate	Slight	Slight	Slight	Loblolly pine	76	7	Loblolly pine.
						Shortleaf pine	70	8	
						Virginia pine	70	8	
						Southern red oak	70	4	
						White oak	75	4	
12B**:									
Craven	8W	Slight	Moderate	Slight	Slight	Loblolly pine	81	8	Loblolly pine.
						Longleaf pine	67	5	
						Water oak	---	---	
						Sweetgum	---	---	
						White oak	---	---	
						Southern red oak	---	---	
						Red maple	---	---	
						Blackgum	---	---	
						Yellow poplar	---	---	
Uchee	8S	Slight	Moderate	Moderate	Slight	Loblolly pine	82	8	Loblolly pine.
						Longleaf pine	67	5	
						Shortleaf pine	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
13A---------- Dogue	9W	Slight	Moderate	Slight	Slight	Loblolly pine-------	90	9	Loblolly pine.
						Southern red oak----	80	4	
						Sweetgum------------	90	7	
						Yellow poplar-------	93	7	
						White oak-----------	80	4	
14A---------- Dragston	4W	Slight	Moderate	Slight	Slight	Southern red oak----	80	4	Loblolly pine, sweetgum, yellow poplar.
						Loblolly pine-------	86	9	
						Sweetgum------------	90	7	
						Yellow poplar-------	90	6	
						White oak-----------	---	---	
15B---------- Emporia	7A	Slight	Slight	Slight	Slight	Loblolly pine-------	75	7	Loblolly pine, sweetgum.
						Southern red oak----	70	4	
16A---------- Johnston	9W	Slight	Severe	Severe	Severe	Loblolly pine-------	90	9	Loblolly pine, baldcypress, American sycamore, sweetgum, green ash.
						Water tupelo--------	---	---	
						Swamp tupelo--------	---	---	
						Water oak-----------	---	---	
						Pond pine-----------	---	---	
						Baldcypress---------	---	---	
17B---------- Kempsville	8A	Slight	Slight	Slight	Slight	Loblolly pine-------	82	8	Loblolly pine.
						Southern red oak----	74	4	
						Virginia pine-------	74	8	
						Sweetgum------------	80	6	
						Yellow poplar-------	82	5	
18B---------- Kempsville	8A	Slight	Slight	Slight	Slight	Loblolly pine-------	80	8	Loblolly pine.
						Southern red oak----	70	4	
						Virginia pine-------	74	8	
						Sweetgum------------	80	6	
						Yellow poplar-------	80	5	
19B**, 19C**:									
Kempsville-----	8A	Slight	Slight	Slight	Slight	Loblolly pine-------	82	8	Loblolly pine.
						Southern red oak----	74	4	
						Virginia pine-------	74	8	
						Sweetgum------------	80	6	
						Yellow poplar-------	82	5	
Emporia--------	7A	Slight	Slight	Slight	Slight	Loblolly pine-------	75	7	Loblolly pine, sweetgum.
						Southern red oak----	70	4	
20B**:									
Kempsville-----	8A	Slight	Slight	Slight	Slight	Loblolly pine-------	82	8	Loblolly pine.
						Southern red oak----	74	4	
						Virginia pine-------	74	8	
						Sweetgum------------	80	6	
						Yellow poplar-------	82	5	
Suffolk--------	8A	Slight	Slight	Slight	Slight	Loblolly pine-------	82	8	Loblolly pine.
						Shortleaf pine------	72	8	
						Southern red oak----	70	4	
22A---------- Mattan	5W	Slight	Severe	Severe	Severe	Water tupelo--------	---	---	
						Baldcypress---------	---	---	
						Red maple-----------	---	---	
						Sweetgum------------	---	---	
						Green ash-----------	---	---	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
23A---------- Munden	9W	Slight	Moderate	Slight	Slight	Loblolly pine-------	90	9	Loblolly pine.
						Sweetgum----------	90	7	
						White oak----------	76	4	
24A---------- Nawney	8W	Slight	Severe	Severe	Severe	Sweetgum----------	94	8	Water tupelo.
						Baldcypress---------	---	---	
						Water tupelo--------	---	---	
						Water oak----------	---	---	
25A---------- Nawney	5W	Slight	Severe	Severe	Severe	Baldcypress---------	---	---	
						Water tupelo--------	---	---	
						Red maple----------	---	---	
						Sweetgum----------	---	---	
						Green ash----------	---	---	
26D**:									
Nevarc---------	7C	Moderate	Severe	Slight	Slight	Loblolly pine-------	77	7	Loblolly pine.
						Southern red oak----	70	4	
						White oak----------	70	4	
						Sweetgum----------	76	5	
						Yellow poplar-------	80	5	
Remlik---------	8S	Slight	Moderate	Moderate	Slight	Loblolly pine-------	80	8	Loblolly pine.
						Virginia pine-------	74	8	
						Yellow poplar-------	80	5	
						Southern red oak----	74	4	
26E**:									
Nevarc---------	7C	Moderate	Severe	Slight	Slight	Loblolly pine-------	77	7	Loblolly pine.
						Southern red oak----	70	4	
						White oak----------	70	4	
						Sweetgum----------	76	5	
						Yellow poplar-------	80	5	
Remlik---------	8R	Moderate	Moderate	Moderate	Slight	Loblolly pine-------	80	8	Loblolly pine.
						Virginia pine-------	74	8	
						Yellow poplar-------	80	5	
						Southern red oak----	74	4	
26F**:									
Nevarc---------	7R	Severe	Severe	Slight	Slight	Loblolly pine-------	77	7	Loblolly pine.
						Southern red oak----	70	4	
						White oak----------	70	4	
						Sweetgum----------	76	5	
						Yellow poplar-------	80	5	
Remlik---------	8R	Moderate	Severe	Moderate	Slight	Loblolly pine-------	80	8	Loblolly pine.
						Virginia pine-------	74	8	
						Yellow poplar-------	80	5	
						Southern red oak----	74	4	
27A---------- Nimmo	9W	Slight	Moderate	Moderate	Moderate	Loblolly pine-------	95	9	Loblolly pine, sweetgum.
						Sweetgum----------	95	8	
						White oak----------	80	4	
						Water oak----------	80	---	
						Red maple----------	---	---	
28B---------- Norfolk	9A	Slight	Slight	Slight	Slight	Loblolly pine-------	86	9	Loblolly pine.
						Longleaf pine-------	68	5	
						Slash pine----------	86	11	

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
29B---------- Orangeburg	8A	Slight	Slight	Slight	Slight	Loblolly pine------- Slash pine---------- Longleaf pine-------	80 86 77	8 11 7	Loblolly pine.
30A, 30B-------- Pamunkey	9A	Slight	Slight	Slight	Slight	Loblolly pine------- Southern red oak---- Yellow poplar------- Virginia pine------- Shortleaf pine------	86 80 90 80 80	9 4 6 8 9	Loblolly pine, black walnut, yellow poplar.
31A---------- Roanoke	7W	Slight	Severe	Severe	Slight	Sweetgum------------ Willow oak---------- White oak----------	90 76 75	7 4 4	Sweetgum.
32A---------- Seabrook	9S	Slight	Moderate	Moderate	Slight	Loblolly pine------- Slash pine---------- Longleaf pine-------	87 87 70	9 11 6	Loblolly pine.
33A---------- Slagle	9W	Slight	Moderate	Slight	Slight	Loblolly pine------- Sweetgum------------ Southern red oak---- Water oak---------- Yellow poplar-------	86 86 76 76 90	9 7 4 5 6	Loblolly pine, sweetgum, yellow poplar.
34B**: Slagle---------	9W	Slight	Moderate	Slight	Slight	Loblolly pine------- Sweetgum------------ Southern red oak---- Water oak---------- Yellow poplar-------	86 86 76 76 90	9 7 4 5 6	Loblolly pine, sweetgum, yellow poplar.
Emporia--------	7A	Slight	Slight	Slight	Slight	Loblolly pine------- Southern red oak----	75 70	7 4	Loblolly pine, sweetgum.
35A---------- State	10A	Slight	Slight	Slight	Slight	Loblolly pine------- Southern red oak---- Yellow poplar------- Virginia pine-------	95 85 100 85	10 5 8 9	Black walnut, yellow poplar, loblolly pine.
36B---------- Suffolk	8A	Slight	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak----	82 72 70	8 8 4	Loblolly pine.
37A---------- Tarboro	7S	Slight	Moderate	Moderate	Slight	Loblolly pine------- Longleaf pine-------	71 ---	7 ---	Loblolly pine.
38A---------- Tetotum	9W	Slight	Moderate	Slight	Slight	Loblolly pine------- Sweetgum------------ Southern red oak----	88 85 76	9 6 4	Loblolly pine.
39A---------- Tomotley	9W	Slight	Severe	Severe	Slight	Loblolly pine------- Slash pine---------- Sweetgum------------ Water tupelo--------	94 91 90 ---	9 12 7 ---	Loblolly pine, sweetgum, American sycamore.
40B---------- Uchee	8S	Slight	Moderate	Moderate	Slight	Loblolly pine------- Longleaf pine------- Shortleaf pine------	82 67 ---	8 5 ---	Loblolly pine.

See footnote at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
42A---------- Wahee	9W	Slight	Moderate	Moderate	Slight	Loblolly pine-------	86	9	Loblolly pine, sweetgum, American sycamore, water oak.
						Slash pine----------	86	11	
						Sweetgum----------	90	7	
						Blackgum----------	---	---	
						Water oak----------	---	---	
						Swamp chestnut oak--	---	---	
						Willow oak----------	---	---	
						Southern red oak----	---	---	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--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
1A Altavista	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
2A*: Altavista	Moderate: slope, wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
Dogue	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: small stones, wetness.	Moderate: wetness.	Moderate: wetness.
3A Augusta	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
4A Bohicket	Severe: flooding, ponding, percs slowly.	Severe: ponding, excess salt.	Severe: too clayey, ponding, flooding.	Severe: ponding, too clayey.	Severe: excess salt, excess sulfur, ponding.
5A Bojac	Slight	Slight	Slight	Slight	Moderate: droughty.
6B Caroline	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
7B*: Caroline	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
Emporia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
7C*: Caroline	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
Emporia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
8A Catpoint	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
9A Conetoe	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
10B---------- Craven	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
10C---------- Craven	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
11B*: Craven----------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
Caroline----------	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Slight.
12B*: Craven----------	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight----------	Slight.
Uchee----------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Moderate: droughty.
13A---------- Dogue	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: small stones, wetness.	Moderate: wetness.	Moderate: wetness.
14A---------- Dragston	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
15B---------- Emporia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight----------	Slight.
16A---------- Johnston	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding.
17B---------- Kempsville	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
18B---------- Kempsville	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, droughty.
19B*: Kempsville----------	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
19B*:					
Emporia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
19C*:					
Kempsville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Emporia	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
20B*:					
Kempsville	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Suffolk	Slight	Slight	Moderate: slope.	Slight	Slight.
21A Lanexa	Severe: flooding, ponding.	Severe: ponding, too clayey.	Severe: too clayey, ponding, flooding.	Severe: ponding, too clayey.	Severe: ponding, flooding.
22A Mattan	Severe: flooding, ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding, flooding.	Severe: ponding, excess humus.	Severe: ponding, flooding, excess humus.
23A Munden	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
24A Nawney	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.	Severe: wetness, flooding.
25A Nawney	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
26D*:					
Nevarc	Moderate: slope, wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: wetness, slope.
Remlik	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
26E*:					
Nevarc	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
Remlik	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
26F*: Nevarc	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
Remlik	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
27A Nimmo	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
28B Norfolk	Slight	Slight	Moderate: slope.	Slight	Slight.
29B Orangeburg	Slight	Slight	Moderate: slope.	Slight	Slight.
30A Pamunkey	Slight	Slight	Moderate: small stones.	Slight	Slight.
30B Pamunkey	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
31A Roanoke	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
32A Seabrook	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Severe: droughty.
33A Slagle	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
34B*: Slagle	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
Emporia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
35A State	Severe: flooding.	Slight	Slight	Slight	Slight.
36B Suffolk	Slight	Slight	Moderate: slope.	Slight	Slight.
37A Tarboro	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
38A Tetotum	Moderate: wetness.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness.	Moderate: wetness.
39A Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
40B---------- Uchee	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Moderate: droughty.
41B. Udorthents					
42A---------- Wahee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--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
1A---------- Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
2A*:										
Altavista---------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Dogue----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
3A---------- Augusta	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
4A---------- Bohicket	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
5A---------- Bojac	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
6B---------- Caroline	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7B*:										
Caroline----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Emporia----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7C*:										
Caroline----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Emporia----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8A---------- Catpoint	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
9A---------- Conetoe	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Fair	Very poor.
10B---------- Craven	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
10C---------- Craven	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
11B*:										
Craven----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Caroline----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
12B*:										
Craven----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
12B*: Uchee	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
13A Dogue	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
14A Dragston	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Fair.
15B Emporia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
16A Johnston	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
17B, 18B Kempsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
19B*: Kempsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Emporia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
19C*: Kempsville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Emporia	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
20B*: Kempsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Suffolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
21A Lanexa	Very poor.	Poor	Poor	Very poor.	Very poor.	Good	Good	Poor	Poor	Good.
22A Mattan	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
23A Munden	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
24A, 25A Nawney	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Good	Good	Very poor.	Very poor.	Good.
26D*: Nevarc	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Remlik	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
26E*: Nevarc	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Remlik	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
26F*: Nevarc	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Remlik	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Very poor.	Fair	Very poor.
27A Nimmo	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
28B Norfolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
29B Orangeburg	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
30A, 30B Pamunkey	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
31A Roanoke	Poor	Poor	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
32A Seabrook	Fair	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
33A Slagle	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
34B*: Slagle	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Emporia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
35A State	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
36B Suffolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
37A Tarboro	Poor	Fair	Fair	Poor	Poor	Very poor.	Very poor.	Fair	Poor	Very poor.
38A Tetotum	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
39A Tomotley	Very poor.	Very poor.	Poor	Fair	Fair	Good	Good	Very poor.	Poor	Good.
40B Uchee	Poor	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.

See footnote at end of table.

TABLE 9.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
41B. Udorthents										
42A---------- Wahee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--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
1A Altavista	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, low strength.	Moderate: wetness.
2A*: Altavista	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, low strength.	Moderate: wetness.
Dogue	Severe: cutbanks cave, wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
3A Augusta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
4A Bohicket	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, shrink-swell.	Severe: excess salt, excess sulfur, ponding.
5A Bojac	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
6B Caroline	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
7B*: Caroline	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
Emporia	Moderate: wetness.	Slight	Moderate: wetness, shrink-swell.	Moderate: slope.	Moderate: low strength.	Slight.
7C*: Caroline	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
Emporia	Moderate: slope, wetness.	Moderate: slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
8A Catpoint	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
9A Conetoe	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.

See footnote at end of table.

TABLE 10.--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
10B---------- Craven	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.
10C---------- Craven	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: slope.
11B*:						
Craven----------	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.
Caroline---------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Severe: low strength.	Slight.
12B*:						
Craven----------	Severe: wetness, cutbanks cave.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Slight.
Uchee----------	Severe: cutbanks cave.	Slight---------	Moderate: wetness, shrink-swell.	Moderate: slope.	Slight---------	Moderate: droughty.
13A---------- Dogue	Severe: cutbanks cave, wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength.	Moderate: wetness.
14A---------- Dragston	Severe: wetness, cutbanks cave.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
15B---------- Emporia	Moderate: wetness.	Slight---------	Moderate: wetness, shrink-swell.	Moderate: slope.	Moderate: low strength.	Slight.
16A---------- Johnston	Severe: cutbanks cave, excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding.
17B---------- Kempsville	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
18B---------- Kempsville	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Moderate: small stones, droughty.
19B*:						
Kempsville-------	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
Emporia----------	Moderate: wetness.	Slight---------	Moderate: wetness, shrink-swell.	Moderate: slope.	Moderate: low strength.	Slight.

See footnote at end of table.

TABLE 10.--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
19C*:						
Kempsville	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Emporia	Moderate: slope, wetness.	Moderate: slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
20B*:						
Kempsville	Slight	Slight	Slight	Moderate: slope.	Slight	Slight.
Suffolk	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Slight.
21A Lanexa	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding.
22A Mattan	Severe: excess humus, ponding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding.	Severe: flooding, ponding, low strength.	Severe: ponding, flooding.	Severe: ponding, flooding, excess humus.
23A Munden	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
24A Nawney	Severe: cutbanks cave, wetness, flooding.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
25A Nawney	Severe: cutbanks cave, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
26D*:						
Nevarc	Severe: cutbanks cave, wetness.	Moderate: wetness, shrink-swell, slope.	Severe: wetness.	Severe: slope.	Severe: low strength.	Moderate: wetness, slope.
Remlik	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
26E*, 26F*:						
Nevarc	Severe: cutbanks cave, wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Remlik	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 10.--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
27A---------- Nimmo	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
28B---------- Norfolk	Moderate: wetness.	Slight---------	Moderate: wetness.	Moderate: slope.	Slight---------	Slight.
29B---------- Orangeburg	Slight---------	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
30A---------- Pamunkey	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: low strength.	Slight.
30B---------- Pamunkey	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
31A---------- Roanoke	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
32A---------- Seabrook	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Severe: droughty.
33A---------- Slagle	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Moderate: low strength, wetness.	Moderate: wetness.
34B*: Slagle----------	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Moderate: low strength, wetness.	Moderate: wetness.
Emporia----------	Moderate: wetness.	Slight---------	Moderate: wetness, shrink-swell.	Moderate: slope.	Moderate: low strength.	Slight.
35A---------- State	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: low strength, flooding.	Slight.
36B---------- Suffolk	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
37A---------- Tarboro	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
38A---------- Tetotum	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
39A---------- Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
40B---------- Uchee	Severe: cutbanks cave.	Slight---------	Moderate: wetness, shrink-swell.	Moderate: slope.	Slight---------	Moderate: droughty.
41B. Udorthents						

See footnote at end of table.

TABLE 10.--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
42A---------- Wahee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--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
1A Altavista	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
2A*: Altavista	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: seepage, wetness.	Fair: wetness.
Dogue	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
3A Augusta	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness.
4A Bohicket	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
5A Bojac	Moderate: wetness.	Severe: seepage.	Severe: wetness, seepage.	Severe: seepage.	Fair: thin layer.
6B Caroline	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
7B*: Caroline	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
Emporia	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness.
7C*: Caroline	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
Emporia	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: slope, wetness, too clayey.	Moderate: slope.	Fair: slope, too clayey, wetness.
8A Catpoint	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 11.--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
9A---------- Conetoe	Slight----------	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
10B---------- Craven	Severe: wetness, percs slowly.	Moderate: slope, seepage.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
10C---------- Craven	Severe: wetness, percs slowly.	Severe: slope.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
11B*: Craven----------	Severe: wetness, percs slowly.	Moderate: slope, seepage.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Caroline----------	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight----------	Poor: too clayey, hard to pack.
12B*: Craven----------	Severe: wetness, percs slowly.	Moderate: slope, seepage.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
Uchee----------	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
13A---------- Dogue	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
14A---------- Dragston	Severe: wetness, poor filter.	Severe: wetness, seepage.	Severe: wetness, seepage.	Severe: wetness, seepage.	Poor: wetness, thin layer.
15B---------- Emporia	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness, too clayey.	Slight----------	Fair: too clayey, wetness.
16A---------- Johnston	Severe: flooding, ponding, poor filter.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, seepage, ponding.	Poor: ponding.
17B---------- Kempsville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
18B---------- Kempsville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Fair: small stones.

See footnote at end of table.

TABLE 11.--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
19B*:					
Kempsville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Emporia	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness.
19C*:					
Kempsville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
Emporia	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Moderate: slope, wetness, too clayey.	Moderate: slope.	Fair: slope, too clayey, wetness.
20B*:					
Kempsville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Good.
Suffolk	Slight	Severe: seepage.	Severe: seepage.	Slight	Poor: thin layer.
21A Lanexa	Severe: flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, ponding, excess humus.	Severe: flooding, ponding.	Poor: hard to pack, ponding, excess humus.
22A Mattan	Severe: flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, ponding, excess humus.	Severe: flooding, ponding.	Poor: ponding, excess humus.
23A Munden	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: wetness, thin layer.
24A Nawney	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: wetness.
25A Nawney	Severe: flooding, ponding.	Severe: seepage, flooding, ponding.	Severe: flooding, seepage, ponding.	Severe: flooding, ponding.	Poor: ponding.
26D*:					
Nevarc	Severe: wetness, percs slowly.	Severe: seepage, slope, wetness.	Severe: seepage, wetness.	Severe: seepage.	Poor: too clayey, hard to pack.
Remlik	Moderate: wetness, slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

See footnote at end of table.

TABLE 11.--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
26E*, 26F*: Nevarc	Severe: wetness, percs slowly, slope.	Severe: seepage, slope, wetness.	Severe: seepage, wetness, slope.	Severe: seepage, slope.	Poor: too clayey, hard to pack, slope.
Remlik	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
27A Nimmo	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
28B Norfolk	Moderate: wetness.	Moderate: seepage.	Severe: wetness.	Slight	Slight.
29B Orangeburg	Slight	Moderate: seepage, slope.	Slight	Slight	Good.
30A, 30B Pamunkey	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: too clayey, thin layer.
31A Roanoke	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
32A Seabrook	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
33A Slagle	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
34B*: Slagle	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
Emporia	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness.
35A State	Moderate: flooding, wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: flooding, wetness.	Fair: too clayey, thin layer.
36B Suffolk	Slight	Severe: seepage.	Severe: seepage.	Slight	Poor: thin layer.
37A Tarboro	Severe: poor filter.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: seepage.

See footnote at end of table.

TABLE 11.--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
38A---------- Tetotum	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, wetness.
39A---------- Tomotley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
40B---------- Uchee	Severe: wetness, percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
41B. Udorthents					
42A---------- Wahee	Severe: wetness, percs slowly.	Slight----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1A Altavista	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
2A*: Altavista	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Dogue	Fair: wetness.	Probable	Improbable: too sandy.	Poor: thin layer.
3A Augusta	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, too clayey.
4A Bohicket	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess salt, wetness, too clayey.
5A Bojac	Good	Probable	Improbable: too sandy.	Fair: too sandy.
6B Caroline	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
7B*: Caroline	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
7C*: Caroline	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
8A Catpoint	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
9A Conetoe	Good	Probable	Improbable: too sandy.	Fair: too sandy.
10B, 10C Craven	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
11B*: Craven	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
11B*:				
Caroline	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
12B*:				
Craven	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Uchee	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
13A Dogue	Fair: wetness.	Probable	Improbable: too sandy.	Poor: thin layer.
14A Dragston	Fair: wetness.	Probable	Improbable: too sandy.	Fair: thin layer.
15B Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
16A Johnston	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
17B Kempsville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
18B Kempsville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
19B*:				
Kempsville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
19C*:				
Kempsville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
20B*:				
Kempsville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Suffolk	Good	Probable	Improbable: too sandy.	Fair: small stones.
21A Lanexa	Poor: low strength, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
22A Mattan	Poor: low strength, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
23A---------- Munden	Fair: wetness.	Probable----------	Improbable: too sandy.	Fair: thin layer.
24A, 25A---------- Nawney	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
26D*:				
Nevarc----------	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Remlik----------	Good----------	Probable----------	Improbable: too sandy.	Fair: too sandy, slope.
26E*:				
Nevarc----------	Fair: wetness, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Remlik----------	Fair: slope.	Probable----------	Improbable: too sandy.	Poor: slope.
26F*:				
Nevarc----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, slope.
Remlik----------	Poor: slope.	Probable----------	Improbable: too sandy.	Poor: slope.
27A---------- Nimmo	Poor: wetness.	Probable----------	Improbable: too sandy.	Poor: thin layer, wetness.
28B---------- Norfolk	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
29B---------- Orangeburg	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
30A, 30B---------- Pamunkey	Fair: low strength.	Improbable: thin layer.	Improbable: thin layer, too sandy.	Poor: small stones, area reclaim.
31A---------- Roanoke	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
32A---------- Seabrook	Fair: wetness.	Probable----------	Improbable: too sandy.	Fair: too sandy, small stones.
33A---------- Slagle	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.

See footnote at end of table.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
34B*:				
Slagle	Fair: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
Emporia	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
35A State	Good	Probable	Improbable: too sandy.	Fair: too clayey.
36B Suffolk	Good	Probable	Improbable: too sandy.	Fair: small stones.
37A Tarboro	Good	Probable	Improbable: too sandy.	Fair: too sandy.
38A Tetotum	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
39A Tomotley	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
40B Uchee	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones.
41B. Udorthents				
42A Wahee	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--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--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
1A---------- Altavista	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable------	Wetness--------	Favorable.
2A*: Altavista--------	Moderate: seepage.	Moderate: wetness.	Moderate: deep to water.	Favorable------	Wetness--------	Favorable.
Dogue----------	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Favorable------	Wetness, soil blowing.	Favorable.
3A---------- Augusta	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable------	Wetness--------	Wetness.
4A---------- Bohicket	Slight---------	Severe: hard to pack, ponding, excess salt.	Severe: slow refill, salty water.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Wetness, excess salt.
5A---------- Bojac	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Soil blowing---	Droughty.
6B---------- Caroline	Moderate: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
7B*: Caroline---------	Moderate: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
Emporia----------	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Percs slowly.
7C*: Caroline---------	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Emporia----------	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, percs slowly.
8A---------- Catpoint	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy, soil blowing.	Droughty.
9A---------- Conetoe	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy------	Droughty.
10B---------- Craven	Moderate: seepage, slope.	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Wetness, percs slowly.	Percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
10C---------- Craven	Severe: slope.	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, percs slowly.
11B*:						
Craven----------	Moderate: seepage, slope.	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Wetness, percs slowly.	Percs slowly.
Caroline---------	Moderate: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Erodes easily, percs slowly.	Erodes easily, percs slowly.
12B*:						
Craven----------	Moderate: seepage, slope.	Severe: hard to pack.	Severe: slow refill, cutbanks cave.	Percs slowly, slope.	Wetness, percs slowly.	Percs slowly.
Uchee----------	Moderate: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy------	Droughty.
13A---------- Dogue	Moderate: seepage.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Favorable------	Wetness, soil blowing.	Favorable.
14A---------- Dragston	Severe: seepage.	Severe: piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, soil blowing.	Wetness, droughty.
15B---------- Emporia	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Percs slowly.
16A---------- Johnston	Severe: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, flooding.	Ponding--------	Wetness.
17B---------- Kempsville	Moderate: seepage, slope.	Slight---------	Severe: no water.	Deep to water	Soil blowing---	Favorable.
18B---------- Kempsville	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Favorable------	Droughty.
19B*:						
Kempsville-------	Moderate: seepage, slope.	Slight---------	Severe: no water.	Deep to water	Soil blowing---	Favorable.
Emporia----------	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Percs slowly.
19C*:						
Kempsville-------	Severe: slope.	Slight---------	Severe: no water.	Deep to water	Slope, soil blowing.	Slope.
Emporia----------	Severe: slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, percs slowly.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
20B*:						
Kempsville	Moderate: seepage, slope.	Slight	Severe: no water.	Deep to water	Soil blowing	Favorable.
Suffolk	Severe: seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Soil blowing	Favorable.
21A Lanexa	Slight	Severe: excess humus, ponding.	Slight	Ponding, flooding.	Ponding	Wetness, excess salt.
22A Mattan	Slight	Severe: excess humus, ponding.	Slight	Ponding, flooding.	Ponding	Wetness.
23A Munden	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Favorable.
24A Nawney	Severe: seepage.	Severe: wetness.	Slight	Flooding	Wetness	Wetness.
25A Nawney	Severe: seepage.	Severe: ponding.	Slight	Ponding, flooding.	Ponding	Wetness.
26D*, 26E*, 26F*:						
Nevarc	Severe: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
Remlik	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
27A Nimmo	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy.	Wetness, droughty.
28B Norfolk	Moderate: seepage, slope.	Moderate: piping.	Moderate: deep to water.	Deep to water	Favorable	Favorable.
29B Orangeburg	Moderate: seepage, slope.	Moderate: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
30A, 30B Pamunkey	Severe: seepage.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Favorable	Favorable.
31A Roanoke	Moderate: seepage.	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
32A Seabrook	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 13.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
33A---------- Slagle	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Severe: no water.	Percs slowly---	Wetness, percs slowly.	Percs slowly.
34B*: Slagle----------	Moderate: seepage, slope.	Moderate: thin layer, piping, wetness.	Severe: no water.	Percs slowly, slope.	Wetness, percs slowly.	Percs slowly.
Emporia----------	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Percs slowly.
35A---------- State	Severe: seepage.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing---	Favorable.
36B---------- Suffolk	Severe: seepage.	Severe: thin layer.	Severe: no water.	Deep to water	Soil blowing---	Favorable.
37A---------- Tarboro	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy------	Droughty.
38A---------- Tetotum	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Favorable------	Wetness--------	Favorable.
39A---------- Tomotley	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable------	Wetness--------	Wetness.
40B---------- Uchee	Moderate: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy------	Droughty.
41B. Udorthents						
42A---------- Wahee	Slight---------	Severe: wetness, hard to pack.	Severe: slow refill.	Percs slowly---	Wetness, percs slowly.	Wetness, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--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		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1A---------- Altavista	0-13	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4, A-2	0	95-100	90-100	65-99	35-60	<23	NP-7
	13-47	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	20-45	5-28
	47-74	Variable---------	---	---	---	---	---	---	---	---	---
2A*: Altavista-------	0-13	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4, A-2	0	95-100	90-100	65-99	35-60	<23	NP-7
	13-47	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	20-45	5-28
	47-74	Variable---------	---	---	---	---	---	---	---	---	---
Dogue----------	0-9	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0	95-100	75-100	50-100	20-50	<25	NP-10
	9-43	Clay loam, clay, sandy clay loam.	CL, CH, SC	A-6, A-7	0	95-100	75-100	65-100	40-90	35-60	16-40
	43-60	Stratified sand to sandy clay loam.	SM, SC, SP-SM, SM-SC	A-2, A-4, A-1	0	80-100	60-100	35-100	10-40	<30	NP-10
3A---------- Augusta	0-17	Fine sandy loam	SM, SM-SC, ML	A-2, A-4	0	90-100	75-100	50-98	30-60	<25	NP-7
	17-60	Sandy clay loam, clay loam, loam.	CL, CL-ML	A-4, A-6, A-7	0	90-100	75-100	75-100	51-80	20-45	5-25
	60-70	Variable---------	---	---	---	---	---	---	---	---	---
4A---------- Bohicket	0-9	Silty clay-------	CH, MH	A-7	0	100	99-100	90-100	80-100	60-100	15-60
	9-80	Silty clay, clay, sandy clay.	CH, MH	A-7	0	100	99-100	80-100	70-95	50-100	16-60
5A---------- Bojac	0-18	Loamy sand-------	SM	A-2	0	95-100	95-100	50-100	15-30	<20	NP
	18-52	Fine sandy loam, loam, sandy loam.	ML, SM	A-2, A-4	0	95-100	95-100	55-100	20-60	<35	NP-10
	52-70	Stratified loamy fine sand to coarse sand.	SM, SP, SW-SM	A-1, A-2, A-3	0	80-100	75-100	12-100	2-35	<20	NP
6B---------- Caroline	0-11	Loam-------------	ML, CL-ML	A-4	0	90-100	85-100	80-100	60-90	<28	NP-7
	11-64	Clay loam, clay, silty clay.	CL, CH	A-7	0	90-100	85-100	80-100	60-90	41-70	18-40
7B*, 7C*: Caroline--------	0-11	Loam-------------	ML, CL-ML	A-4	0	90-100	85-100	80-100	60-90	<28	NP-7
	11-64	Clay loam, clay, silty clay.	CL, CH	A-7	0	90-100	85-100	80-100	60-90	41-70	18-40
Emporia---------	0-12	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	12-40	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	40-56	Sandy clay loam, clay loam, sandy clay.	SC, CL, CH	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-55	8-30
	56-63	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
8A---------- Catpoint	0-7	Fine sand--------	SM, SP, SP-SM, SM-SC	A-1, A-2, A-3	0	85-100	75-100	40-70	4-35	<15	NP-5
	7-80	Sand, loamy fine sand, gravelly sand.	SM, SW, SW-SM, SM-SC	A-1, A-2, A-3	0	65-100	60-100	30-70	4-35	<15	NP-5
9A---------- Conetoe	0-25	Loamy sand-------	SM, SP-SM	A-2, A-3	0	100	100	50-99	5-30	<20	NP
	25-55	Sandy loam, sandy clay loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4	0	100	100	50-99	20-40	<30	NP-10
	55-72	Loamy sand, sand	SM, SP, SP-SM	A-2, A-3, A-1	0	100	100	40-99	4-30	<20	NP
10B, 10C---------- Craven	0-9	Loam----------	ML, CL, SM, SC	A-4, A-6	0	100	100	75-100	45-90	<35	NP-15
	9-60	Clay, silty clay, silty clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
	60-80	Sandy clay loam, sandy loam, loamy sand.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	50-100	15-49	<35	NP-15
11B*:											
Craven----------	0-9	Loam----------	ML, CL, SM, SC	A-4, A-6	0	100	100	75-100	45-90	<35	NP-15
	9-60	Clay, silty clay, silty clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
	60-80	Sandy clay loam, sandy loam, loamy sand.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	50-100	15-49	<35	NP-15
Caroline--------	0-11	Loam----------	ML, CL-ML	A-4	0	90-100	85-100	80-100	60-90	<28	NP-7
	11-64	Clay loam, clay, silty clay.	CL, CH	A-7	0	90-100	85-100	80-100	60-90	41-70	18-40
12B*:											
Craven----------	0-9	Loam----------	ML, CL, SM, SC	A-4, A-6	0	100	100	75-100	45-90	<35	NP-15
	9-60	Clay, silty clay, silty clay loam.	CH	A-7	0	100	100	90-100	65-98	51-70	24-43
	60-80	Sandy clay loam, sandy loam, loamy sand.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	50-100	15-49	<35	NP-15
Uchee----------	0-25	Loamy sand-------	SM	A-2, A-1-b	0	90-100	80-100	40-70	15-30	---	NP
	25-35	Sandy loam, sandy clay loam.	SC, SM-SC	A-2, A-4, A-6	0	90-100	80-100	50-80	25-50	20-40	6-20
	35-50	Sandy clay loam, sandy clay, clay.	MH, CH, CL, SC	A-7	0	90-100	80-100	65-90	40-70	41-70	18-38
	50-63	Sandy loam, sandy clay loam, sandy clay.	MH, CH, CL, SC	A-6, A-7, A-2-6, A-2-7	0	85-100	80-100	50-80	30-65	35-65	15-35

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
13A---------- Dogue	0-9	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0	95-100	75-100	50-100	20-50	<25	NP-10
	9-43	Clay loam, clay, sandy clay loam.	CL, CH, SC	A-6, A-7	0	95-100	75-100	65-100	40-90	35-60	16-40
	43-60	Stratified sand to sandy clay loam.	SM, SC, SP-SM, SM-SC	A-2, A-4, A-1	0	80-100	60-100	35-100	10-40	<30	NP-10
14A---------- Dragston	0-17	Fine sandy loam	SM, SC, SM-SC, CL-ML	A-2, A-4	0	100	95-100	60-85	30-60	<20	NP-8
	17-49	Fine sandy loam, sandy loam, loam.	SM, SC, SM-SC, CL-ML	A-2, A-4	0	100	95-100	60-85	30-60	<25	NP-10
	49-60	Sand, loamy sand, fine sandy loam.	SM, SP-SM, SM-SC	A-1, A-2, A-3	0	95-100	85-100	35-70	5-30	<18	NP-7
15B---------- Emporia	0-12	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	12-40	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	40-56	Sandy clay loam, clay loam, sandy clay.	SC, CL, CH	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-55	8-30
	56-63	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
16A---------- Johnston	0-24	Mucky loam-------	OL, ML, CL-ML	A-4, A-5, A-7-5	0	100	100	90-100	51-75	20-45	2-14
	24-30	Stratified loamy sand to sand.	SM, SP-SM	A-2, A-3	0	100	100	50-100	5-30	---	NP
	30-64	Stratified fine sandy loam to sandy loam.	SM	A-2, A-4	0	100	100	50-100	25-49	<35	NP-10
17B---------- Kempsville	0-11	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0-2	90-100	75-100	45-85	25-65	<18	NP-7
	11-17	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4	0-2	90-100	80-100	50-90	30-70	<22	NP-10
	17-84	Sandy clay loam, loam, fine sandy loam.	SC, CL	A-2, A-6	0-2	90-100	80-100	55-95	30-75	25-40	10-20
	84-90	Stratified loamy sand to sandy clay loam.	SC, SM, SM-SC	A-1, A-2, A-4, A-6	0-5	85-100	75-100	35-85	15-50	<30	NP-15

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
18B---------- Kempsville	0-11	Gravelly fine sandy loam.	GM, GM-GC, SM, SM-SC	A-1, A-2, A-4	0-2	65-80	50-75	20-60	15-45	<18	NP-12
	11-17	Gravelly sandy loam, gravelly fine sandy loam, gravelly loam.	GM, GC, SM, SC	A-1, A-2, A-4	0-2	65-80	50-75	25-70	20-50	<22	NP-10
	17-84	Gravelly sandy clay loam, gravelly fine sandy loam, gravelly loam.	SC, CL, GC	A-2, A-6	0-2	65-80	50-75	30-65	20-55	25-40	10-20
	84-90	Stratified gravelly loamy sand to gravelly sandy clay loam.	GM, GM-GC, SM, SM-SC	A-1, A-2, A-4, A-6	0-5	45-80	35-75	20-55	15-40	<30	NP-15
19B*, 19C*:											
Kempsville------	0-11	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0-2	90-100	75-100	45-85	25-65	<18	NP-7
	11-17	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4	0-2	90-100	80-100	50-90	30-70	<22	NP-10
	17-84	Sandy clay loam, loam, fine sandy loam.	SC, CL	A-2, A-6	0-2	90-100	80-100	55-95	30-75	25-40	10-20
	84-90	Stratified loamy sand to sandy clay loam.	SC, SM, SM-SC	A-1, A-2, A-4, A-6	0-5	85-100	75-100	35-85	15-50	<30	NP-15
Emporia---------	0-12	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	12-40	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	40-56	Sandy clay loam, clay loam, sandy clay.	SC, CL, CH	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-55	8-30
	56-63	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
20B*:											
Kempsville------	0-11	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0-2	90-100	75-100	45-85	25-65	<18	NP-7
	11-17	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4	0-2	90-100	80-100	50-90	30-70	<22	NP-10
	17-84	Sandy clay loam, loam, fine sandy loam.	SC, CL	A-2, A-6	0-2	90-100	80-100	55-95	30-75	25-40	10-20
	84-90	Stratified loamy sand to sandy clay loam.	SC, SM, SM-SC	A-1, A-2, A-4, A-6	0-5	85-100	75-100	35-85	15-50	<30	NP-15
Suffolk---------	0-7	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	90-100	50-80	25-60	<20	NP-7
	7-45	Sandy clay loam, clay loam, sandy loam.	SC, CL	A-2, A-6	0	95-100	90-100	50-95	25-75	20-40	10-25
	45-60	Loamy fine sand, fine sandy loam, gravelly sand.	SP, SM, SM-SC	A-1, A-2, A-3, A-4	0	75-100	60-100	30-80	3-50	<18	NP-7

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
21A	0-15	Mucky silty clay	CL, CH	A-7	0	100	95-100	85-100	75-90	40-75	15-45
Lanexa	15-40	Muck	PT	A-8	0	---	---	---	---	---	---
	40-60	Stratified silty clay loam to clay.	CL, CH	A-7	0	100	95-100	85-100	75-90	40-75	15-45
22A	0-14	Muck	PT	A-8	0	---	---	---	---	---	---
Mattan	14-40	Muck	PT	A-8	0	---	---	---	---	---	---
	40-60	Stratified loamy sand to silty clay loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	100	100	80-95	15-85	<40	NP-20
23A	0-18	Sandy loam	SM, SC, SM-SC	A-4	0	100	90-100	60-95	35-75	<22	NP-10
Munden	18-35	Sandy loam, loam, fine sandy loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	100	90-100	60-95	30-75	<30	NP-15
	35-65	Loamy sand, fine sand, sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	90-100	50-90	5-35	<18	NP-7
24A, 25A	0-7	Silt loam	CL	A-6, A-7	0	100	98-100	85-100	55-95	30-45	10-24
Nawney	7-41	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
	41-65	Variable	---	---	---	---	---	---	---	---	---
26D*, 26E*, 26F*:											
Nevarc	0-4	Loam	SM, SC, CL-ML	A-4	0	90-100	80-100	50-100	40-90	<30	NP-8
	4-41	Clay loam, clay, silty clay.	CL, CH	A-6, A-7	0	90-100	80-100	70-100	70-95	35-60	22-41
	41-72	Stratified loamy sand to sandy clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-2	70-100	55-100	30-90	20-60	<40	NP-25
Remlik	0-27	Loamy sand	SM, SW-SM, SM-SC	A-1, A-2	0	90-100	80-100	40-70	10-35	<15	NP-5
	27-43	Sandy loam, loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	98-100	95-100	60-95	30-75	<30	NP-15
	43-72	Stratified sand to loamy sand.	SM, SP-SM, SM-SC	A-2, A-3	0	95-100	95-100	50-90	5-35	<18	NP-7
27A	0-8	Fine sandy loam	SM, SC, SM-SC, ML	A-4	0	100	95-100	60-85	36-60	<22	NP-10
Nimmo	8-43	Loam, fine sandy loam, sandy loam.	SM, SC, ML, CL	A-2, A-4, A-6	0	100	95-100	60-95	30-75	<30	22-41
	43-65	Loamy sand, fine sand, sand.	SM, SP-SM, SM-SC	A-2, A-3	0	100	95-100	50-80	5-35	<18	NP-7
28B	0-14	Fine sandy loam	SM, SM-SC, SC	A-2	0	95-100	95-100	50-91	15-33	<25	NP-14
Norfolk	14-47	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL, CL-ML	A-2, A-4, A-6	0	95-100	91-100	70-96	30-63	20-38	4-15
	47-65	Sandy clay loam, clay loam, sandy clay.	SC, SM-SC, CL, CL-ML	A-4, A-6, A-7-6	0	100	98-100	65-98	36-72	20-52	4-23
29B	0-11	Fine sandy loam	SM	A-2	0	98-100	95-100	75-95	20-35	---	NP
Orangeburg	11-64	Sandy clay loam, sandy loam.	SC, CL, SM, SM-SC	A-6, A-4	0	98-100	95-100	71-96	38-58	22-40	3-19

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
30A, 30B--------- Pamunkey	0-10	Fine sandy loam	SM, ML, SP-SM, SM-SC	A-2, A-4	0	80-100	75-100	50-85	12-55	<20	NP-7
	10-46	Sandy clay loam, clay loam, loam.	CL, SC	A-2, A-6	0-5	80-100	75-100	70-95	30-75	30-40	10-20
	46-80	Stratified sandy loam to sand.	SW, SM, SW-SM, SM-SC	A-1, A-2, A-3	0-10	60-100	50-95	25-70	2-35	<20	NP-6
31A-------------- Roanoke	0-3	Silt loam---------	SM-SC, CL-ML, CL, SC	A-4, A-6	0	95-100	85-100	60-100	35-90	20-35	5-16
	3-8	Clay loam, silty clay loam.	CL	A-6, A-7	0	95-100	85-100	80-100	80-95	35-45	14-20
	8-50	Clay, silty clay, clay loam.	CH, CL	A-7	0	90-100	85-100	85-100	65-95	45-70	22-40
	50-65	Stratified sandy clay to clay.	CL-ML, GM-GC, CH, ML	A-2, A-4, A-6, A-7	0-5	40-100	35-100	25-95	15-90	10-60	NP-40
32A-------------- Seabrook	0-5	Loamy sand-------	SM, SP-SM	A-2, A-3	0	95-100	90-100	85-99	5-25	---	NP
	5-72	Loamy fine sand, fine sand, sand.	SM, SP-SM	A-2, A-3	0	95-100	90-100	85-100	5-25	---	NP
33A-------------- Slagle	0-10	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0-12	95-100	90-100	55-95	20-50	<25	NP-10
	10-16	Fine sandy loam, sandy clay loam, loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0-2	95-100	90-100	65-85	35-60	20-40	5-20
	16-40	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6, A-7	0-2	95-100	90-100	75-95	40-75	25-50	8-30
	40-65	Stratified loamy sand to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	90-100	75-100	40-90	20-70	<40	NP-25
34B*: Slagle----------	0-10	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0-12	95-100	90-100	55-95	20-50	<25	NP-10
	10-16	Fine sandy loam, sandy clay loam, loam.	SC, SM-SC, CL, CL-ML	A-4, A-6	0-2	95-100	90-100	65-85	35-60	20-40	5-20
	16-40	Sandy clay loam, loam, clay loam.	SC, CL	A-4, A-6, A-7	0-2	95-100	90-100	75-95	40-75	25-50	8-30
	40-65	Stratified loamy sand to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	90-100	75-100	40-90	20-70	<40	NP-25
Emporia----------	0-12	Fine sandy loam	CL, SC, SM, ML	A-2, A-4, A-6	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	12-40	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	25-70	20-50	8-30
	40-56	Sandy clay loam, clay loam, sandy clay.	SC, CL, CH	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-55	8-30
	56-63	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-1, A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25

See footnote at end of table.

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
35A---------- State	0-9	Loam----------	SM, SC, ML, CL	A-4, A-6	0	95-100	95-100	65-95	45-85	<28	NP-15
	9-47	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
	47-60	Stratified sand to fine sandy loam.	SM, SM-SC, SP-SM	A-1, A-2, A-3, A-4	0	85-100	75-100	40-90	5-50	<25	NP-7
36B---------- Suffolk	0-7	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	90-100	50-80	25-60	<20	NP-7
	7-45	Sandy clay loam, clay loam, sandy loam.	SC, CL	A-2, A-6	0	95-100	90-100	50-95	25-75	20-40	10-25
	45-60	Loamy fine sand, fine sandy loam, gravelly sand.	SP, SM, SM-SC	A-1, A-2, A-3, A-4	0	75-100	60-100	30-80	3-50	<18	NP-7
37A---------- Tarboro	0-9	Loamy sand--------	SM, SP-SM, SW-SM	A-2, A-3, A-1	0	95-100	95-100	40-99	8-35	---	NP
	9-80	Sand, coarse sand, loamy sand.	SP, SP-SM, SW-SM, SM	A-2, A-3, A-1	0	95-100	90-100	45-100	3-15	---	NP
38A---------- Tetotum	0-13	Loam----------	SM, SC, ML, CL	A-4, A-6	0	85-100	80-100	65-95	45-85	<30	NP-15
	13-52	Sandy clay loam, clay loam, silty clay loam.	SC, CL	A-6, A-7	0-2	85-100	80-100	60-95	35-85	30-45	10-20
	52-75	Stratified sandy clay loam to loamy fine sand.	SM, SC, ML, CL	A-2, A-4, A-6	0-2	80-100	75-100	50-95	15-75	<30	NP-15
39A---------- Tomotley	0-7	Loam----------	ML	A-4	0	98-100	95-100	75-100	51-98	<40	NP-10
	7-40	Fine sandy loam, sandy clay loam, clay loam.	SM-SC, SC, CL-ML, CL	A-2, A-4, A-6	0	98-100	95-100	75-98	30-70	20-40	6-18
	40-65	Variable---------	---	---	---	---	---	---	---	---	---
40B---------- Uchee	0-25	Loamy sand-------	SM	A-2, A-1-b	0	90-100	80-100	40-70	15-30	---	NP
	25-35	Sandy loam, sandy clay loam.	SC, SM-SC	A-2, A-4, A-6	0	90-100	80-100	50-80	25-50	20-40	6-20
	35-50	Sandy clay loam, sandy clay, clay.	MH, CH, CL, SC	A-7	0	90-100	80-100	65-90	40-70	41-70	18-38
	50-63	Sandy loam, sandy clay loam, sandy clay.	MH, CH, CL, SC	A-6, A-7, A-2-6, A-2-7	0	85-100	80-100	50-80	30-65	35-65	15-35
41B. Udorthents											
42A---------- Wahee	0-9	Silt loam--------	ML, CL-ML, CL	A-4	0	100	100	90-98	51-75	20-35	2-10
	9-56	Clay, clay loam, silty clay.	CL, CH	A-6, A-7	0	100	100	85-100	51-90	38-77	16-54
	56-70	Variable---------	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--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 "Wind erodibility group" and "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	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
1A	0-13	10-24	1.30-1.50	2.0-6.0	0.12-0.20	3.6-6.0	<2	Low	0.24	5	3	.5-3
Altavista	13-47	18-35	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.0	<2	Low	0.24			
	47-74	---	---	---	---	---	---	---	---			
2A*:												
Altavista	0-13	10-24	1.30-1.50	2.0-6.0	0.12-0.20	3.6-6.0	<2	Low	0.24	5	3	.5-3
	13-47	18-35	1.30-1.50	0.6-2.0	0.12-0.20	3.6-6.0	<2	Low	0.24			
	47-74	---	---	---	---	---	---	---	---			
Dogue	0-9	5-10	1.35-1.50	2.0-6.0	0.08-0.15	3.6-5.5	<2	Low	0.28	4	3	.5-1
	9-43	35-50	1.45-1.60	0.2-0.6	0.12-0.19	3.6-5.5	<2	Moderate	0.28			
	43-60	5-30	1.30-1.50	0.6-6.0	0.05-0.14	3.6-5.5	<2	Low	0.17			
3A	0-17	5-20	1.40-1.70	2.0-6.0	0.10-0.15	4.5-6.0	<2	Low	0.20	4	3	.5-2
Augusta	17-60	20-35	1.35-1.60	0.6-2.0	0.12-0.18	4.5-6.0	<2	Low	0.24			
	60-70	---	---	---	---	---	---	---	---			
4A	0-9	30-60	1.20-1.40	0.06-0.2	0.02-0.06	6.1-8.4	>8	High	0.28	5	4	5-25
Bohicket	9-80	35-60	1.30-1.60	<0.06	0.02-0.06	6.1-8.4	>8	High	0.24			
5A	0-18	3-8	1.20-1.50	6.0-20	0.05-0.10	3.6-6.5	<2	Low	0.17	3	2	.5-1
Bojac	18-52	11-16	1.35-1.55	2.0-6.0	0.08-0.16	3.6-6.5	<2	Low	0.17			
	52-70	1-8	1.30-1.50	6.0-20.0	0.02-0.07	4.5-6.0	<2	Low	0.17			
6B	0-11	15-25	1.35-1.45	0.6-2.0	0.14-0.20	3.6-5.5	<2	Low	0.43	5	4	.5-2
Caroline	11-64	35-55	1.40-1.50	0.06-0.6	0.14-0.22	3.6-5.5	<2	Moderate	0.32			
7B*, 7C*:												
Caroline	0-11	15-25	1.35-1.45	0.6-2.0	0.14-0.20	3.6-5.5	<2	Low	0.43	5	4	.5-2
	11-64	35-55	1.40-1.50	0.06-0.6	0.14-0.22	3.6-5.5	<2	Moderate	0.32			
Emporia	0-12	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-6.0	<2	Low	0.28	4	3	.5-2
	12-40	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-6.0	<2	Low	0.28			
	40-56	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-6.0	<2	Moderate	0.20			
	56-63	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-6.0	<2	Moderate	0.20			
8A	0-7	0-5	1.30-1.60	>6.0	0.04-0.08	4.5-6.5	<2	Low	0.10	5	1	.5-1
Catpoint	7-80	0-10	1.45-1.65	>6.0	0.02-0.10	4.5-6.5	<2	Low	0.10			
9A	0-25	2-10	1.60-1.75	6.0-20	0.05-0.10	4.5-6.0	<2	Low	0.15	5	2	.5-2
Conetoe	25-55	10-22	1.40-1.60	2.0-6.0	0.10-0.15	4.5-6.0	<2	Low	0.15			
	55-72	2-10	1.60-1.70	6.0-20	0.05-0.10	4.5-6.0	<2	Low	0.10			
10B, 10C	0-9	7-27	1.30-1.45	0.2-2.0	0.12-0.15	3.6-6.5	<2	Low	0.32	5	3	.5-2
Craven	9-60	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	<2	Moderate	0.32			
	60-80	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	<2	Low	0.32			
11B*:												
Craven	0-9	7-27	1.30-1.45	0.2-2.0	0.12-0.15	3.6-6.5	<2	Low	0.32	5	3	.5-2
	9-60	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	<2	Moderate	0.32			
	60-80	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	<2	Low	0.32			
Caroline	0-11	15-25	1.35-1.45	0.6-2.0	0.14-0.20	3.6-5.5	<2	Low	0.43	5	4	.5-2
	11-64	35-55	1.40-1.50	0.06-0.6	0.14-0.22	3.6-5.5	<2	Moderate	0.32			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
12B*:												
Craven	0-9	7-27	1.30-1.45	0.2-2.0	0.12-0.15	3.6-6.5	<2	Low	0.32	5	3	.5-2
	9-60	35-60	1.30-1.45	0.06-0.2	0.12-0.15	3.6-5.5	<2	Moderate	0.32			
	60-80	5-35	1.35-1.60	0.2-6.0	0.08-0.14	3.6-5.5	<2	Low	0.32			
Uchee	0-25	3-10	---	6.0-20	0.05-0.10	4.5-5.5	<2	Low	0.20	5	2	<1
	25-35	8-30	---	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low	0.24			
	35-50	25-50	---	0.2-0.6	0.10-0.16	4.5-5.5	<2	Moderate	0.28			
	50-63	15-40	---	0.2-2.0	0.10-0.16	4.5-5.5	<2	Moderate	0.28			
13A	0-9	5-10	1.35-1.50	2.0-6.0	0.08-0.15	3.6-5.5	<2	Low	0.28	4	3	.5-1
Dogue	9-43	35-50	1.45-1.60	0.2-0.6	0.12-0.19	3.6-5.5	<2	Moderate	0.28			
	43-60	5-30	1.30-1.50	0.6-6.0	0.05-0.14	3.6-5.5	<2	Low	0.17			
14A	0-17	4-12	1.20-1.50	2.0-6.0	0.08-0.15	4.5-5.5	<2	Low	0.20	4	3	1-2
Dragston	17-49	10-18	1.25-1.45	2.0-6.0	0.08-0.16	4.5-5.5	<2	Low	0.17			
	49-60	2-12	1.35-1.55	6.0-20.0	0.04-0.10	4.5-6.5	<2	Low	0.17			
15B	0-12	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-6.0	<2	Low	0.28	4	3	.5-2
Emporia	12-40	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-6.0	<2	Low	0.28			
	40-56	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-6.0	<2	Moderate	0.20			
	56-63	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-6.0	<2	Moderate	0.20			
16A	0-24	7-18	1.25-1.45	2.0-6.0	0.20-0.26	4.5-5.5	<2	Low	0.17	5	8	8-16
Johnston	24-30	2-12	1.55-1.65	6.0-20	0.02-0.07	4.5-5.5	<2	Low	0.17			
	30-64	.5-20	1.45-1.65	6.0-20	0.06-0.12	4.5-5.5	<2	Low	0.17			
17B	0-11	5-15	1.30-1.40	2.0-6.0	0.08-0.14	4.5-5.5	<2	Low	0.28	4	3	.5-2
Kempsville	11-17	12-24	1.30-1.45	2.0-6.0	0.12-0.18	4.5-5.5	<2	Low	0.24			
	17-84	18-35	1.35-1.65	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24			
	84-90	5-30	1.30-1.60	0.6-2.0	0.08-0.15	4.5-5.5	<2	Low	0.24			
18E	0-11	5-15	1.30-1.45	2.0-6.0	0.06-0.10	4.5-5.5	<2	Low	0.24	4	4	.5-2
Kempsville	11-17	12-24	1.30-1.50	2.0-6.0	0.08-0.12	4.5-5.5	<2	Low	0.24			
	17-84	18-35	1.35-1.70	0.6-2.0	0.08-0.12	4.5-5.5	<2	Low	0.24			
	84-90	5-30	1.30-1.65	0.6-2.0	0.05-0.10	4.5-5.5	<2	Low	0.24			
19B*, 19C*:												
Kempsville	0-11	5-15	1.30-1.40	2.0-6.0	0.08-0.14	4.5-5.5	<2	Low	0.28	4	3	.5-2
	11-17	12-24	1.30-1.45	2.0-6.0	0.12-0.18	4.5-5.5	<2	Low	0.24			
	17-84	18-35	1.35-1.65	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24			
	84-90	5-30	1.30-1.60	0.6-2.0	0.08-0.15	4.5-5.5	<2	Low	0.24			
Emporia	0-12	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-6.0	<2	Low	0.28	4	3	.5-2
	12-40	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-6.0	<2	Low	0.28			
	40-56	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-6.0	<2	Moderate	0.20			
	56-63	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-6.0	<2	Moderate	0.20			
20B*:												
Kempsville	0-11	5-15	1.30-1.40	2.0-6.0	0.08-0.14	4.5-5.5	<2	Low	0.28	4	3	.5-2
	11-17	12-24	1.30-1.45	2.0-6.0	0.12-0.18	4.5-5.5	<2	Low	0.24			
	17-84	18-35	1.35-1.65	0.6-2.0	0.12-0.18	4.5-5.5	<2	Low	0.24			
	84-90	5-30	1.30-1.60	0.6-2.0	0.08-0.15	4.5-5.5	<2	Low	0.24			
Suffolk	0-7	6-18	1.35-1.45	2.0-6.0	0.08-0.12	3.6-5.5	<2	Low	0.28	4	3	.5-2
	7-45	10-33	1.40-1.50	0.6-2.0	0.10-0.15	3.6-5.5	<2	Low	0.24			
	45-60	4-10	1.40-1.50	2.0-20	0.04-0.10	3.6-6.0	<2	Low	0.17			
21A	0-15	20-50	1.10-1.25	0.2-2.0	0.10-0.20	3.6-5.5	4-8	Low	0.32	---	8	12-22
Lanexa	15-40	---	0.20-0.80	0.6-2.0	0.22-0.26	3.6-5.5	2-4	Low	----			
	40-60	35-60	1.10-1.25	<0.6	0.12-0.18	3.6-5.5	<2	Low	----			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
22A----------	0-14	---	0.20-0.80	0.6-2.0	0.22-0.26	3.6-5.5	2-4	Low-------	----	---	8	20-65
Mattan	14-40	---	0.20-0.80	0.6-2.0	0.22-0.26	3.6-5.5	<2	Low-------	----			
	40-60	12-35	1.20-1.50	0.6-2.0	0.08-0.18	3.6-5.5	<2	Low-------	0.17			
23A----------	0-18	4-16	1.20-1.35	2.0-6.0	0.08-0.16	4.5-6.0	<2	Low-------	0.20	4	3	1-2
Munden	18-35	8-18	1.20-1.35	0.6-6.0	0.08-0.18	4.5-6.0	<2	Low-------	0.17			
	35-65	2-12	1.35-1.55	2.0-20.0	0.04-0.08	4.5-6.0	<2	Low-------	0.17			
24A, 25A-----	0-7	10-27	1.20-1.35	0.6-2.0	0.14-0.22	3.6-5.5	<2	Low-------	0.32	5	8	1-3
Nawney	7-41	18-35	1.25-1.50	0.6-2.0	0.10-0.22	3.6-5.5	<2	Moderate	0.28			
	41-65	---	---	---	---	---	---	----------	----			
26D*, 26E*, 26F*:												
Nevarc----------	0-4	10-25	1.20-1.30	0.6-2.0	0.10-0.15	3.6-6.0	<2	Low-------	0.37	3	5	.5-2
	4-41	35-55	1.30-1.50	0.06-0.2	0.10-0.17	3.6-6.0	<2	Moderate	0.24			
	41-72	10-35	1.30-1.50	0.6-6.0	0.06-0.12	3.6-6.0	<2	Low-------	0.20			
Remlik----------	0-27	0-10	1.20-1.50	>6.0	0.06-0.10	3.6-6.0	<2	Low-------	0.10	5	1	.5-1
	27-43	8-25	1.20-1.35	0.6-6.0	0.10-0.17	3.6-6.0	<2	Low-------	0.20			
	43-72	2-12	1.35-1.55	>6.0	0.04-0.10	3.6-6.0	<2	Low-------	0.17			
27A----------	0-8	4-14	1.20-1.35	2.0-6.0	0.08-0.16	3.6-5.5	<2	Low-------	0.20	4	4	1-3
Nimmo	8-43	8-18	1.20-1.35	0.6-2.0	0.08-0.18	3.6-5.5	<2	Low-------	0.17			
	43-65	1-8	1.35-1.55	2.0-20.0	0.04-0.08	3.6-5.5	<2	Low-------	0.17			
28B----------	0-14	5-18	1.45-1.65	2.0-6.0	0.10-0.15	4.5-6.0	<2	Low-------	0.20	5	3	.5-2
Norfolk	14-47	18-35	1.30-1.45	0.6-2.0	0.10-0.20	4.5-5.5	<2	Low-------	0.24			
	47-65	20-43	1.10-1.40	0.06-2.0	0.10-0.15	4.5-5.5	<2	Low-------	0.24			
29B----------	0-11	7-15	1.30-1.50	2.0-6.0	0.07-0.10	4.5-6.0	<2	Low-------	0.20	5	2	.5-2
Orangeburg	11-64	18-35	1.60-1.75	0.6-2.0	0.11-0.14	4.5-5.5	<2	Low-------	0.24			
30A, 30B-----	0-10	3-10	1.35-1.55	2.0-20	0.06-0.15	5.1-7.3	<2	Low-------	0.28	4	3	.5-2
Pamunkey	10-46	20-35	1.35-1.65	0.6-2.0	0.13-0.19	5.1-7.3	<2	Low-------	0.28			
	46-80	4-18	1.40-1.65	2.0-20	0.04-0.12	5.1-6.0	<2	Low-------	0.28			
31A----------	0-3	10-27	1.20-1.50	0.6-2.0	0.14-0.20	3.6-5.5	<2	Low-------	0.37	4	6	.5-2
Roanoke	3-8	20-35	1.20-1.50	<20	0.16-0.19	3.6-5.5	<2	Moderate	0.24			
	8-50	35-60	1.35-1.65	0.06-0.2	0.10-0.19	3.6-5.5	<2	Moderate	0.24			
	50-65	5-50	1.20-1.50	0.06-20	0.04-0.14	3.6-6.5	<2	Moderate	0.24			
32A----------	0-5	2-12	1.30-1.60	6.0-20	0.05-0.11	4.5-6.5	<2	Low-------	0.10	5	2	.5-2
Seabrook	5-72	2-12	1.30-1.60	6.0-20	0.02-0.09	4.5-6.5	<2	Low-------	0.10			
33A----------	0-10	8-18	1.30-1.45	2.0-6.0	0.10-0.14	3.6-5.5	<2	Low-------	0.28	3	3	.5-2
Slagle	10-16	12-35	1.30-1.45	0.6-2.0	0.10-0.18	3.6-5.5	<2	Low-------	0.24			
	16-40	18-40	1.35-1.60	0.06-0.6	0.12-0.18	3.6-5.5	<2	Moderate	0.24			
	40-65	5-32	1.35-1.50	0.2-6.0	0.08-0.15	3.6-5.5	<2	Low-------	0.24			
34B*:												
Slagle----------	0-10	8-18	1.30-1.45	2.0-6.0	0.10-0.14	3.6-5.5	<2	Low-------	0.28	3	3	.5-2
	10-16	12-35	1.30-1.45	0.6-2.0	0.10-0.18	3.6-5.5	<2	Low-------	0.24			
	16-40	18-40	1.35-1.60	0.06-0.6	0.12-0.18	3.6-5.5	<2	Moderate	0.24			
	40-65	5-32	1.35-1.50	0.2-6.0	0.08-0.15	3.6-5.5	<2	Low-------	0.24			
Emporia---------	0-12	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-6.0	<2	Low-------	0.28	4	3	.5-2
	12-40	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-6.0	<2	Low-------	0.28			
	40-56	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-6.0	<2	Moderate	0.20			
	56-63	5-40	1.45-1.60	0.06-2.0	0.08-0.18	4.5-6.0	<2	Moderate	0.20			

See footnote at end of table.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Salinity	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
									K	T		
	In	Pct	g/cc	In/hr	In/in	pH	mmhos/cm					Pct
35A	0-9	10-18	1.20-1.35	0.6-2.0	0.12-0.17	4.5-5.5	<2	Low	0.28	5	3	<2
State	9-47	18-34	1.35-1.50	0.6-2.0	0.14-0.19	4.5-5.5	<2	Low	0.28			
	47-60	2-15	1.35-1.50	>2.0	0.02-0.10	4.5-6.5	<2	Low	0.17			
36B	0-7	6-18	1.35-1.45	2.0-6.0	0.08-0.12	3.6-5.5	<2	Low	0.28	4	3	.5-2
Suffolk	7-45	10-33	1.40-1.50	0.6-2.0	0.10-0.15	3.6-5.5	<2	Low	0.24			
	45-60	4-10	1.40-1.50	2.0-20	0.04-0.10	3.6-6.0	<2	Low	0.17			
37A	0-9	3-12	1.60-1.75	6.0-20	0.05-0.09	4.5-6.5	<2	Low	0.10	5	2	.5-1
Tarboro	9-80	2-7	1.60-1.75	>20	0.02-0.06	4.5-6.5	<2	Low	0.10			
38A	0-13	10-22	1.20-1.35	0.6-2.0	0.14-0.19	3.6-5.5	<2	Low	0.37	4	3	.5-2
Tetotum	13-52	18-35	1.25-1.45	0.6-2.0	0.14-0.19	3.6-5.5	<2	Low	0.32			
	52-75	5-30	1.25-1.45	0.6-20	0.06-0.15	3.6-5.5	<2	Low	0.32			
39A	0-7	5-27	1.20-1.40	2.0-6.0	0.12-0.18	3.6-5.5	<2	Low	0.24	5	5	1-6
Tomotley	7-40	18-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-5.5	<2	Low	0.20			
	40-65	---	---	---	---	---	---	---	---			
40B	0-25	3-10	---	6.0-20	0.05-0.10	4.5-5.5	<2	Low	0.20	5	2	<1
Uchee	25-35	8-30	---	0.6-2.0	0.10-0.15	4.5-5.5	<2	Low	0.24			
	35-50	25-50	---	0.2-0.6	0.10-0.16	4.5-5.5	<2	Moderate	0.28			
	50-63	15-40	---	0.2-2.0	0.10-0.16	4.5-5.5	<2	Moderate	0.28			
41B. Udorthents												
42A	0-9	10-27	1.20-1.50	0.2-2.0	0.15-0.20	4.5-6.0	<2	Low	0.28	5	5	.5-5
Wahee	9-56	35-60	1.40-1.60	0.06-0.2	0.12-0.20	3.6-5.5	<2	Moderate	0.28			
	56-70	---	---	---	---	---	<2	---	---			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "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			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
1A---------- Altavista	C	None--------	---	---	1.5-2.5	Apparent	Dec-Mar	Moderate	Moderate.
2A*:									
Altavista--------	C	None--------	---	---	1.5-2.5	Apparent	Dec-Mar	Moderate	Moderate.
Dogue----------	C	None--------	---	---	1.5-3.0	Apparent	Jan-Mar	High-----	High.
3A---------- Augusta	C	None--------	---	---	1.0-2.0	Apparent	Jan-May	High-----	Moderate.
4A---------- Bohicket	D	Frequent----	Very brief	Jan-Dec	+3-0	Apparent	Jan-Dec	High-----	High.
5A---------- Bojac	B	None--------	---	---	4.0-6.0	Apparent	Nov-Apr	Low------	High.
6B---------- Caroline	C	None--------	---	---	>6.0	---	---	High-----	High.
7B*, 7C*:									
Caroline---------	C	None--------	---	---	>6.0	---	---	High-----	High.
Emporia----------	C	None--------	---	---	3.0-4.5	Perched	Nov-Apr	Moderate	High.
8A---------- Catpoint	A	None--------	---	---	4.0-6.0	Apparent	Feb-Apr	Low------	Moderate.
9A---------- Conetoe	A	None--------	---	---	>6.0	---	---	Low------	High.
10B, 10C---------- Craven	C	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	High-----	High.
11B*:									
Craven----------	C	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	High-----	High.
Caroline---------	C	None--------	---	---	>6.0	---	---	High-----	High.
12B*:									
Craven----------	C	None--------	---	---	2.0-3.0	Apparent	Dec-Apr	High-----	High.
Uchee----------	A	None--------	---	---	3.5-5.0	Perched	Jan-Apr	Low------	High.
13A---------- Dogue	C	None--------	---	---	1.5-3.0	Apparent	Jan-Mar	High-----	High.
14A---------- Dragston	C	None--------	---	---	1.0-2.5	Apparent	Nov-Apr	Low------	High.
15B---------- Emporia	C	None--------	---	---	3.0-4.5	Perched	Nov-Apr	Moderate	High.
16A---------- Johnston	D	Frequent----	Brief to long.	Nov-Jul	+1-1.5	Apparent	Nov-Jun	High-----	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
17B, 18B---------- Kempsville	B	None---------	---	---	>6.0	---	---	Low------	Moderate.
19B*, 19C*:									
Kempsville--------	B	None---------	---	---	>6.0	---	---	Low------	Moderate.
Emporia----------	C	None---------	---	---	3.0-4.5	Perched	Nov-Apr	Moderate	High.
20B*:									
Kempsville--------	B	None---------	---	---	>6.0	---	---	Low------	Moderate.
Suffolk----------	B	None---------	---	---	>6.0	---	---	Moderate	High.
21A---------- Lanexa	D	Frequent----	Very long	Jan-Dec	+2-0.5	Apparent	Jan-Dec	High-----	High.
22A---------- Mattan	D	Frequent----	Very long	Jan-Dec	+2-0.5	Apparent	Jan-Dec	High-----	High.
23A---------- Munden	B	None---------	---	---	1.5-2.5	Apparent	Dec-Apr	Low------	High.
24A---------- Nawney	D	Frequent----	Very long	Jan-Dec	0-0.5	Apparent	Jan-Dec	High-----	High.
25A---------- Nawney	D	Frequent----	Very long	Jan-Dec	+2-0.5	Apparent	Jan-Dec	High-----	High.
26D*, 26E*, 26F*:									
Nevarc----------	C	None---------	---	---	1.5-3.0	Perched	Dec-Apr	High-----	High.
Remlik----------	A	None---------	---	---	4.0-6.0	Perched	Dec-Mar	Low------	Moderate.
27A---------- Nimmo	D	None---------	---	---	0-1.0	Apparent	Dec-Apr	Low------	High.
28B---------- Norfolk	B	None---------	---	---	4.0-6.0	Apparent	Jan-Mar	Moderate	High.
29B---------- Orangeburg	B	None---------	---	---	>6.0	---	---	Moderate	Moderate.
30A, 30B---------- Pamunkey	B	None---------	---	---	>6.0	---	---	Moderate	Moderate.
31A---------- Roanoke	D	None---------	---	---	0-1.0	Apparent	Nov-May	High-----	High.
32A---------- Seabrook	C	None---------	---	---	2.0-4.0	Apparent	Dec-Mar	Low------	Moderate.
33A---------- Slagle	C	None---------	---	---	1.5-3.0	Perched	Nov-Apr	Moderate	High.
34B*:									
Slagle----------	C	None---------	---	---	1.5-3.0	Perched	Nov-Apr	Moderate	High.
Emporia----------	C	None---------	---	---	3.0-4.5	Perched	Nov-Apr	Moderate	High.
35A---------- State	B	Rare---------	Brief	Dec-Jun	4.0-6.0	Apparent	Dec-Jun	Moderate	High.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
36B---------- Suffolk	B	None--------	---	---	>6.0	---	---	Moderate	High.
37A---------- Tarboro	A	None--------	---	---	>6.0	---	---	Low------	Moderate.
38A---------- Tetotum	C	None--------	---	---	1.5-2.5	Apparent	Dec-Apr	High-----	High.
39A---------- Tomotley	B/D	None--------	---	---	0-1.0	Apparent	Dec-Mar	High-----	High.
40B---------- Uchee	A	None--------	---	---	3.5-5.0	Perched	Jan-Apr	Low------	High.
41B. Udorthents									
42A---------- Wahee	D	None--------	---	---	0.5-1.5	Apparent	Dec-Mar	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Augusta	Fine-loamy, mixed, thermic Aeric Ochraquults
Bohicket	Fine, mixed, nonacid, thermic Typic Sulfaquents
Bojac	Coarse-loamy, mixed, thermic Typic Hapludults
Caroline	Clayey, mixed, thermic Typic Paleudults
Catpoint	Thermic, coated Typic Quartzipsamments
Conetoe	Loamy, mixed, thermic Arenic Hapludults
Craven	Clayey, mixed, thermic Aquic Hapludults
Dogue	Clayey, mixed, thermic Aquic Hapludults
Dragston	Coarse-loamy, mixed, thermic Aeric Ochraquults
Emporia	Fine-loamy, siliceous, thermic Typic Hapludults
Johnston	Coarse-loamy, siliceous, acid, thermic Cumulic Humaquepts
Kempsville	Fine-loamy, siliceous, thermic Typic Hapludults
Lanexa	Clayey, mixed, euic, thermic Terric Medisaprists
Mattan	Loamy, mixed, euic, thermic Terric Medisaprists
Munden	Coarse-loamy, mixed, thermic Aquic Hapludults
Nawney	Fine-loamy, mixed, acid, thermic Typic Fluvaquents
Nevarc	Clayey, mixed, thermic Aquic Hapludults
Nimmo	Coarse-loamy, mixed, thermic Typic Ochraquults
Norfolk	Fine-loamy, siliceous, thermic Typic Paleudults
Orangeburg	Fine-loamy, siliceous, thermic Typic Paleudults
Pamunkey	Fine-loamy, mixed, thermic Ultic Hapludalfs
Remlik	Loamy, siliceous, thermic Arenic Hapludults
Roanoke	Clayey, mixed, thermic Typic Ochraquults
Seabrook	Mixed, thermic Aquic Udipsamments
Slagle	Fine-loamy, siliceous, thermic Aquic Hapludults
State	Fine-loamy, mixed, thermic Typic Hapludults
Suffolk	Fine-loamy, siliceous, thermic Typic Hapludults
Tarboro	Mixed, thermic Typic Udipsamments
Tetotum	Fine-loamy, mixed, thermic Aquic Hapludults
Tomotley	Fine-loamy, mixed, thermic Typic Ochraquults
Uchee	Loamy, siliceous, thermic Arenic Hapludults
Udorthents	Udorthents
Wahee	Clayey, mixed, thermic Aeric Ochraquults

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