United States
Department of
Agriculture

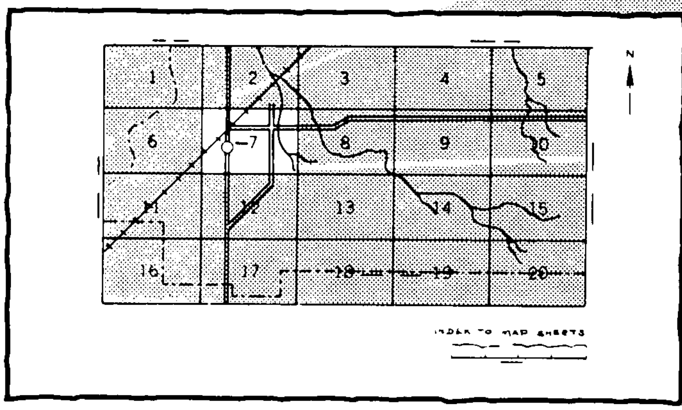
Soil
Conservation
Service

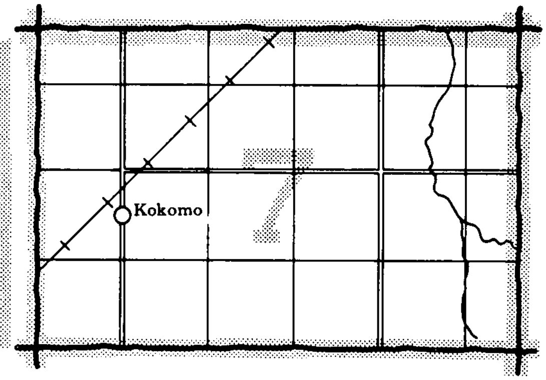
In cooperation with
Virginia Polytechnic
Institute
and State University

Soil Survey of Richmond County Virginia

HOW TO USE

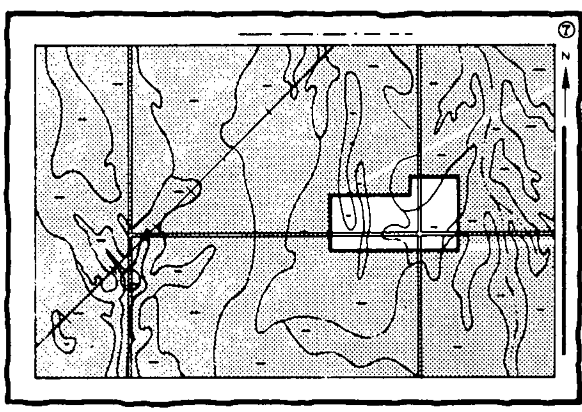
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

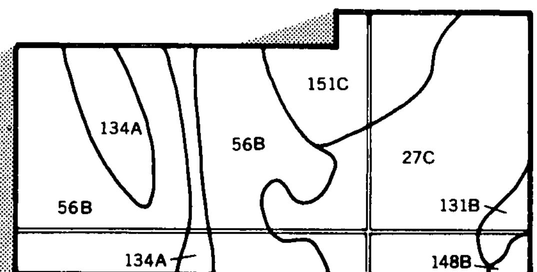




2. Note the number of the map sheet and turn to that sheet.

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





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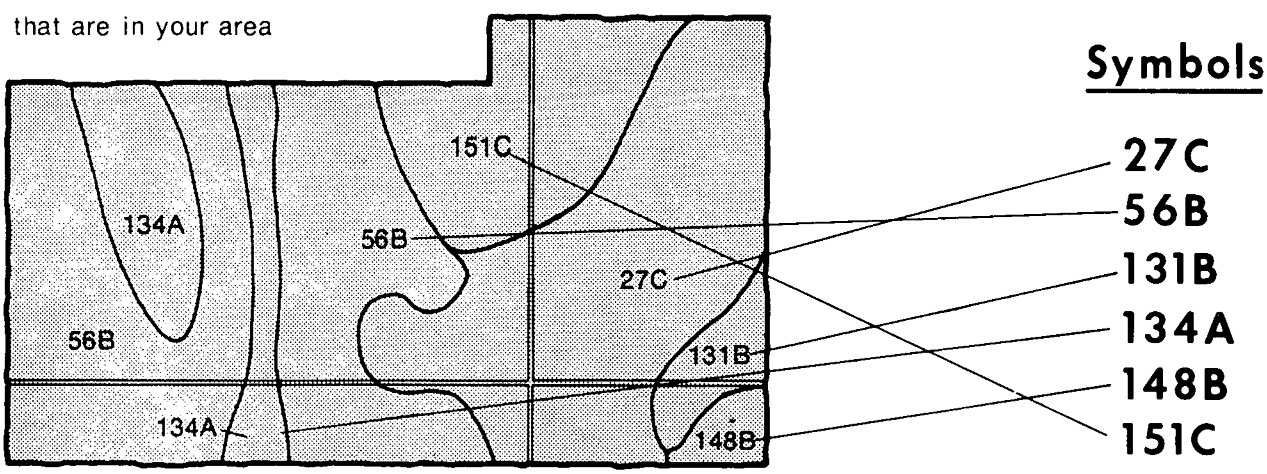
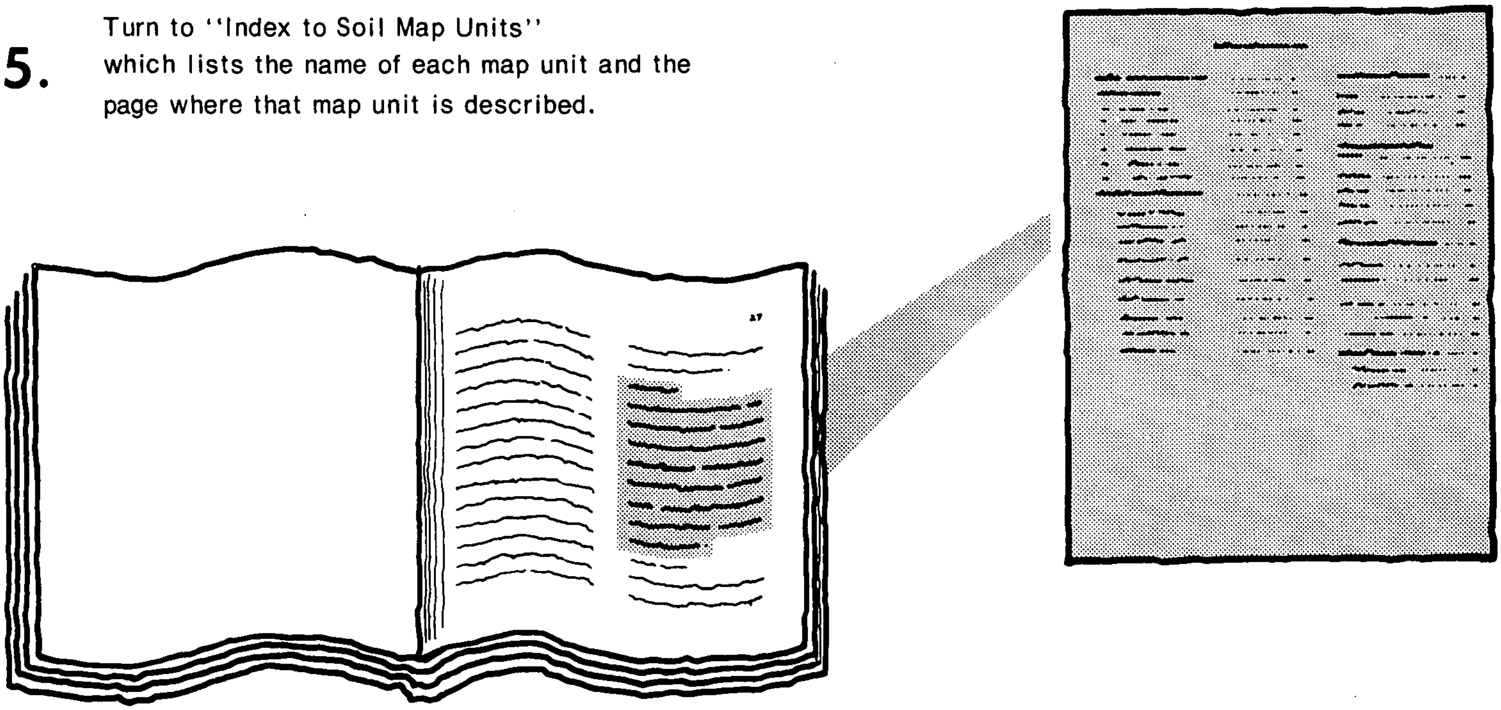
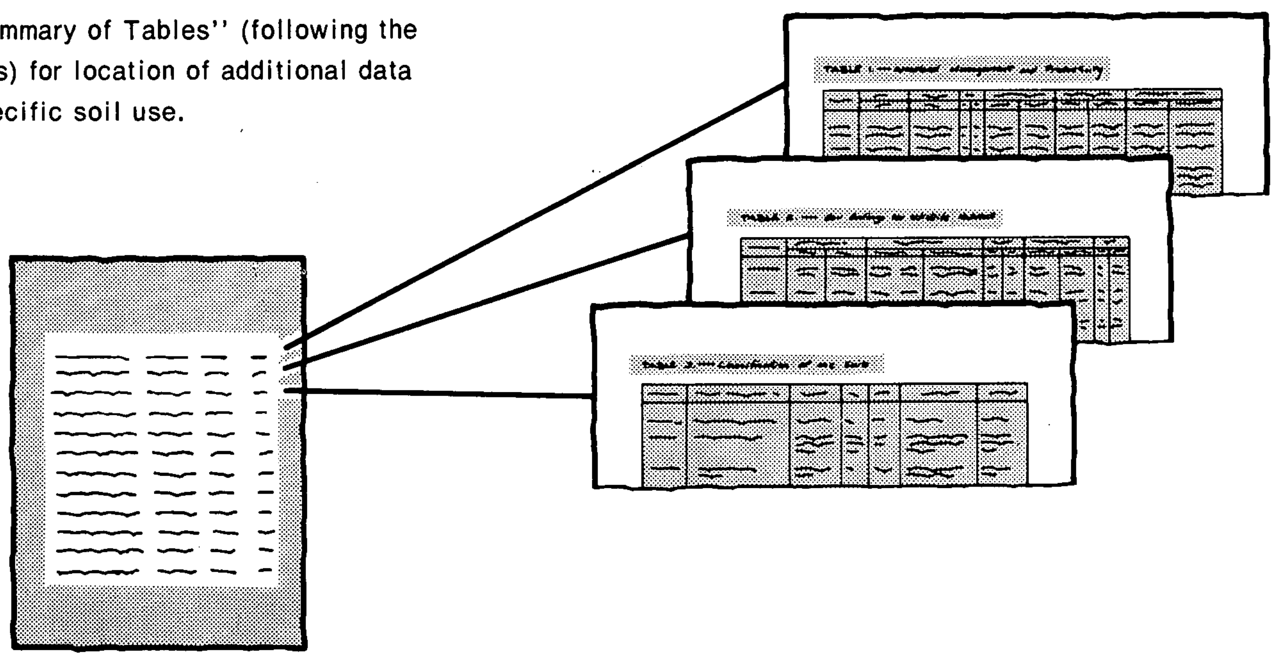


THIS SOIL SURVEY

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



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



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

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, or age.

Major fieldwork for this soil survey was performed in the period 1975-79. Soil names and descriptions were approved in 1980. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1979. This survey was made cooperatively by the Soil Conservation Service, the Virginia Polytechnic Institute and State University, and the Richmond County Board of Supervisors. The survey is part of the technical assistance furnished to the Northern Neck Conservation District.

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: A soybean stubble mulch on an area of Dogue fine sandy loam, 2 to 6 percent slopes.

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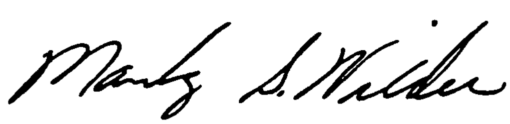
foreword

This soil survey contains information that can be used in land-planning programs in Richmond 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.

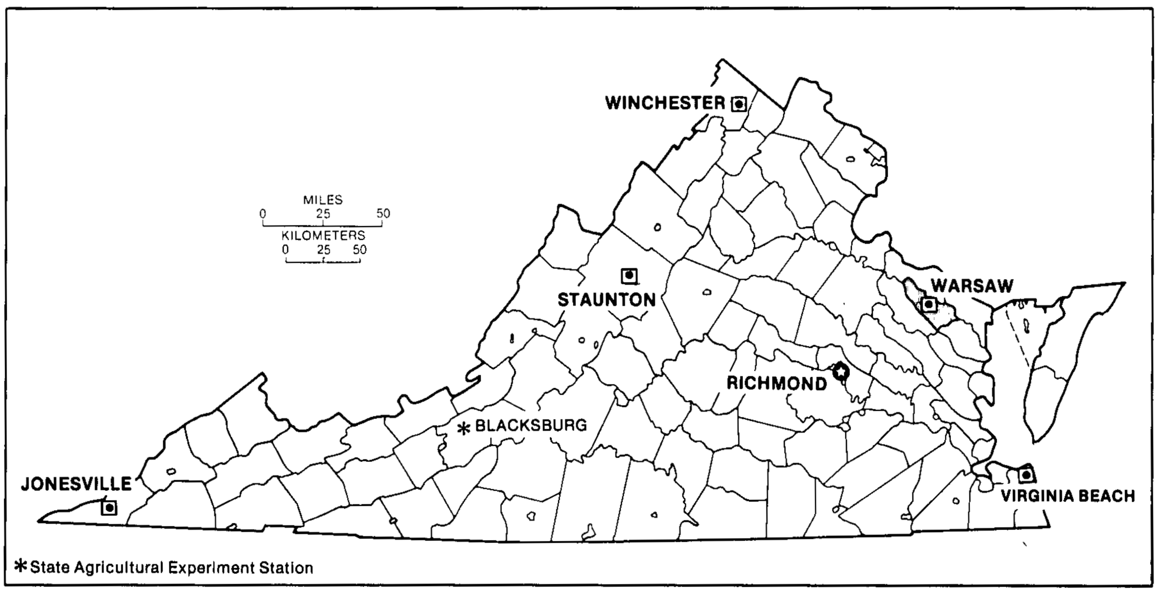
This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure 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 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.



Manly S. Wilder
State Conservationist
Soil Conservation Service



Location of Richmond County in Virginia.

soil survey of Richmond County, Virginia

By Carl E. Robinette and Diane A. S. Hoppe, Soil Conservation Service

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

RICHMOND COUNTY is in the Coastal Plain area of Virginia between the Potomac River and the Rappahannock River, on a peninsula known as the Northern Neck. The county has 122,880 land acres, or about 192 square miles, and 11 square miles of water. Warsaw, the county seat, is near the center of the county. According to the U. S. Bureau of the Census, the population of Richmond County in 1970 was about 6,500.

Cash-grain farming is the dominant enterprise in the county. The major crops are corn, soybeans, wheat, and barley. Some farms produce hogs and beef cattle and, to a limited extent, milk. Truck crops, primarily tomatoes and melons, are grown by many farmers.

The area that is now Richmond County was originally part of Lancaster County and then a part of "Old Rappahannock County" until 1692, when it was formed and named by the Assembly at Jamestown. The county seat was called Richmond Court House until it was renamed Warsaw in 1846.

The main automotive routes in Richmond County are U.S. Route 360 and Virginia State Highway 3. U.S. Route 360 runs east-west through Warsaw and provides direct access to the city of Richmond. Virginia State Highway 3 runs northwest-to-southeast and provides access to other Northern Neck counties.

Seafood processing, wood processing, and apparel manufacture are the major nonfarm industries in the county. The Rappahannock River supports the oystering and commercial fishing industries. The timberland provides a source of wood for pulp, poles, and pallets.

Most of the water supply for Richmond County is from shallow dug wells 10 to 80 feet below ground level and from artesian wells drilled to a depth of about 250 to 500 feet below sea level.

general nature of the survey area

This section provides information on the climate of Richmond County and describes the physiography, relief, and drainage of the area.

climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Warsaw in the period 1951 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 29 degrees. The lowest temperature on record, which occurred at Warsaw on January 28, 1961, is -4 degrees. In summer the average temperature is 76 degrees, and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred on June 30, 1959, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (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.

Of the total annual precipitation, 23 inches, or 50 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 19 inches. The heaviest 1-day rainfall during the period of record was 6.45 inches at Warsaw on August 12, 1955. Thunderstorms occur on about 40 days each year, and most occur in summer.

Average seasonal snowfall is 16 inches. The greatest snow depth at any one time during the period of record was 21 inches. On an average of 8 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 50 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 9 miles per hour, in spring.

physiography, relief and drainage

Richmond County is entirely within the southern Coastal Plain. The county has three physiographic areas: the coastal plain upland, the low marine terrace, and the fluvial river terrace. The locations of these physiographic areas and the soil associations of the county are shown in (fig. 1).

The Coastal Plain upland comprises slightly less than three-fourths of the county and ranges in elevation from about 90 to 170 feet above sea level. It is a nearly level to gently undulating plain with narrow to broad interstream divides and a well established, entrenched dendritic drainage system. The drainageways and their sloping and steep sidewalls cover about 45 to 50 percent of the upland area and are more dominant in the northwestern part of the county. The soils are dominantly well drained and sandy or loamy throughout.

The low marine terrace, locally known as the neckland, comprises slightly less than a fourth of the county and ranges in elevation from about 10 to 50 feet above sea level. This area parallels the Rappahannock River along the southwestern edge of the county and slopes gently toward the river. It is a nearly level area with a poorly established secondary drainage system. It is dissected by major tidal creeks which drain the upland.

The fluvial river terrace comprises a small portion of the county and ranges in elevation from sea level to about 10 feet above sea level. This area encompasses Mulberry Island, the island farm, and tidal marsh areas along the Rappahannock River and major creeks. It is a level area with a poorly established drainage system. The soils range from well drained to very poorly drained.

Richmond County is drained primarily by four major tributaries of the Rappahannock River: Cat Point Creek, Totuskey Creek, Farmham Creek, and Lancaster Creek. The Rappahannock, a brackish tidal river that empties into the Chesapeake Bay, flows toward the southeast and forms the southwestern boundary of the county.

how this survey was made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; and the kinds of native plants or crops. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in a soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

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

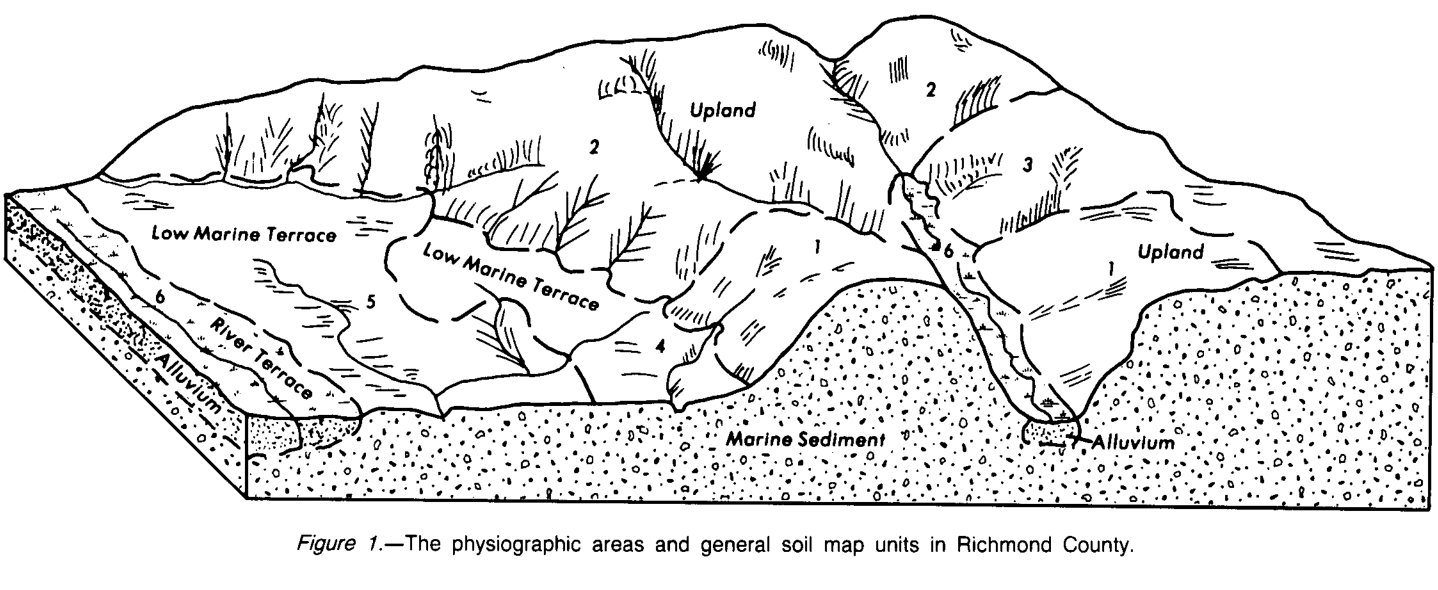


Figure 1.—The physiographic areas and general soil map units in Richmond County.

boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General soil map units" and "Detailed soil map units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, woodland managers, engineers, planners, developers and builders, home buyers, and others.

general soil map units

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

The general soil map 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 map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils on boundaries of the general soil map of Richmond County do not in all instances match the soils on the general soil maps of the adjacent counties, Northumberland County and Lancaster County. The differences in the maps are the result of differences in the methods of soil classification at the time each county was surveyed.

soil descriptions

1. Rumford-Kempsville-Suffolk association

Somewhat excessively drained and well drained, steep to nearly level, sandy and loamy soils on the Coastal Plain upland

This association consists of level to gently sloping, narrow to broad ridgetops and sloping and steep side slopes of drainageways that dissect the uplands. Elevations range from less than 50 feet in the drainageways to 170 feet on higher knolls of the ridges. Slopes range from 0 to 50 percent.

This association makes up about 6 percent of Richmond County. The association is about 51 percent Rumford soils, 20 percent Kempsville soils, 14 percent Suffolk soils, and 15 percent soils of minor extent.

The Rumford soils are on sloping and steep sides and heads of drainageways, commonly with areas of Tetotum soils. The Rumford soils are somewhat excessively drained and have moderately rapid permeability in the subsoil. They have a surface layer of loamy sand and a subsoil of sandy loam and loamy sand.

The Kempsville soils are on nearly level to gently sloping, slightly convex ridgetops. They are well drained and have moderate permeability in the lower part of the subsoil. The Kempsville soils have a surface layer of sandy loam to loam and a subsoil of loam, sandy loam, or sandy clay loam.

The Suffolk soils are on nearly level to gently sloping, broad to narrow, slightly convex ridgetops. They are well drained and mostly moderately permeable. The Suffolk soils have a surface layer of sandy loam. The subsoil is sandy loam and loam in the upper part. The lower part is sandy clay loam and has a slightly brittle and compact layer during dry periods.

The common minor soils are moderately well drained Tetotum soils on the lower part of side slopes, poorly drained and very poorly drained Bibb and Levy soils along drainageways, and well drained and moderately well drained Emporia and Savannah soils on gently sloping knolls on ridgetops.

Farmland comprises about 20 percent of the acreage of this association, mainly the nearly level and gently sloping areas. Most of the rest of the association is suited to and used for trees. Slope is the main limitation of most areas for nonfarm development.

2. Rumford-Emporia-Suffolk association

Somewhat excessively drained and well drained, steep to nearly level, sandy and loamy soils on the Coastal Plain upland

This association consists of nearly level to gently sloping, narrow to broad ridgetops and sloping and steep sides of intervening drainageways that dissect the uplands (fig. 2). Elevations range from less than 50 feet above sea level in the drainageways to 170 feet above sea level on higher knolls of the ridges. Slopes range from 0 to 50 percent.

This association makes up about 47 percent of Richmond County. The association is about 45 percent Rumford soils, 14 percent Emporia soils, 13 percent Suffolk soils, and 28 percent soils of minor extent.

The Rumford soils are on sloping and steep aides and heads of drainageways, commonly with areas of Tetotum soils. The Rumford soils are somewhat excessively drained and have moderately rapid permeability in the subsoil. They have a surface layer of loamy sand and a subsoil of sandy loam and loamy sand.

The Emporia soils are on gently sloping, slightly convex ridgetops. The soils are well drained and have

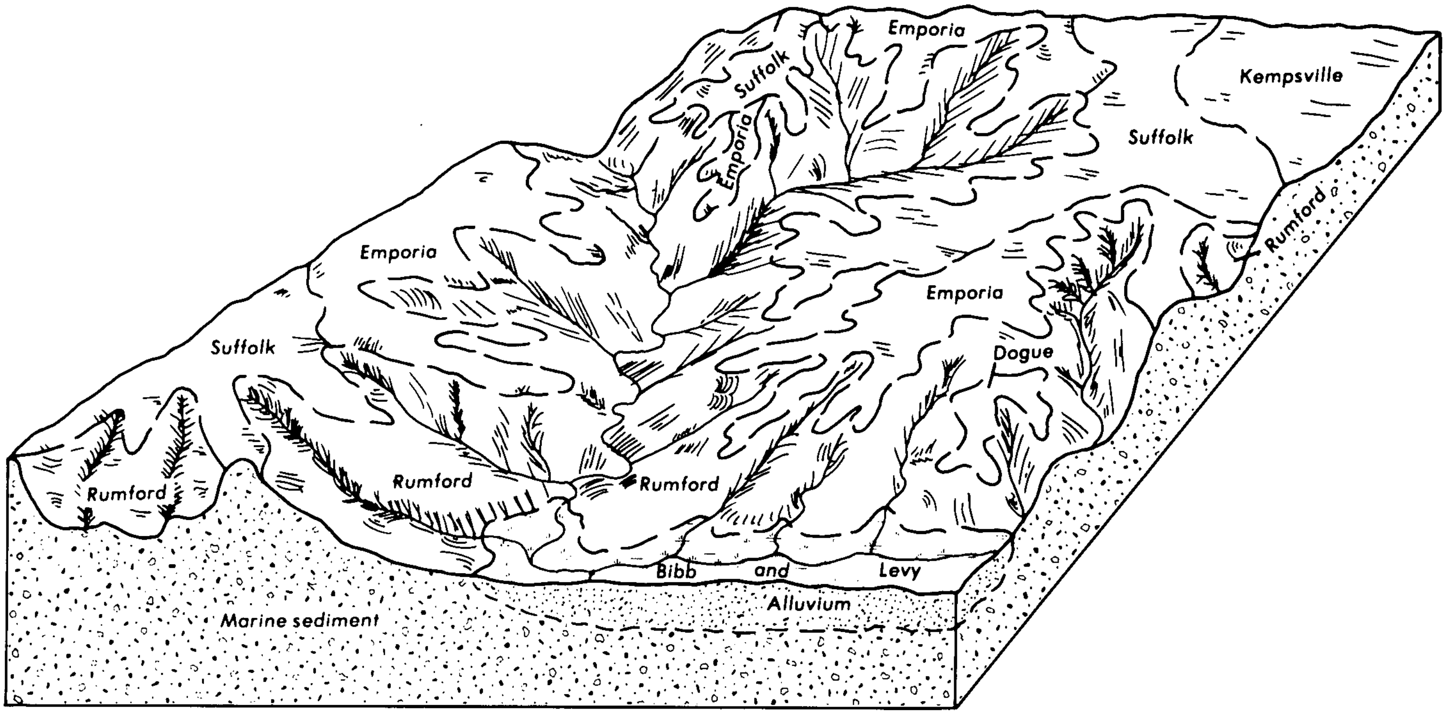


Figure 2.—Typical pattern of soils and underlying material in the Rumford-Emporia-Suffolk association.

moderately slow permeability. They have a surface layer of loam and a subsoil of firm loam and sandy clay loam.

The Suffolk soils are on nearly level to gently sloping, narrow to broad, slightly convex ridgetops and are intermingled with Emporia soils in a few places. The Suffolk soils are well drained and mostly moderately permeable. They have a surface layer of sandy loam. The subsoil is sandy loam and loam in the upper part. The lower part is sandy clay loam and has a layer that is slightly brittle and compact during dry periods.

The common minor soils are the moderately well drained Savannah soils intermingled with the Emporia soils on nearly level to gently sloping ridgetops; poorly drained and very poorly drained Bibb and Levy soils along narrow drainageways; well drained Kempsville soils on nearly level to gently sloping ridgetops; moderately well drained Dogue soils on eroded, gently sloping ridgetops mainly in the northern part of the county; and moderately well drained, moderately slowly permeable Atlee soils in nearly level to slightly depressional areas on ridgetops.

Farmland comprises about 20 percent of the acreage of this association, mainly the nearly level and gently sloping areas. Most of the rest of the association is suited to and used for trees. Slope is the main limitation of most areas for nonfarm development.

3. Suffolk-Rumford association

Well drained and somewhat excessively drained, gently sloping to steep, loamy and sandy soils on the Coastal Plain upland

This association mainly consists of gently sloping, narrow to broad ridgetops and sloping and steep sides of drainageways that dissect the uplands (fig. 3). Elevations range from less than 50 feet above sea level in the drainageways to about 140 feet above sea level on the ridgetops. Slopes range from 0 to 50 percent.

This association makes up about 20 percent of Richmond County. The association is about 50 percent Suffolk soils, 30 percent Rumford soils, and 20 percent soils of minor extent.

The Suffolk soils are on gently sloping, narrow to broad, slightly convex ridgetops. They are well drained and mostly have moderate permeability. The Suffolk soils have a surface layer of sandy loam. The subsoil is sandy loam and loam in the upper part. The lower part is sandy clay loam and has a layer that is slightly brittle and compact during dry periods.

The Rumford soils are commonly mixed with Tetotum soils on sloping and steep sides and heads of drainageways. The Rumford soils are somewhat excessively drained and have moderately rapid permeability in the subsoil. They have a surface layer of loamy sand and a subsoil of loamy sand and sandy loam.

The common minor soils are well drained Kempsville soils on nearly level to gently sloping ridgetops; poorly drained and very poorly drained Bibb and Levy soils along narrow drainageways; well drained and moderately well drained Emporia and Savannah soils on gently sloping, slightly higher knolls on ridgetops; and moderately well drained Tetotum soils on nearly level and gently sloping ridgetops around the heads of drainageways and in low depressions.

About half of the acreage of this association is wooded, and half is farmed. The gently sloping areas mostly are suitable and used for farming. The more sloping areas are wooded, and the soils are generally suitable for trees. Slope is the main limitation of some areas for nonfarm development.

4. Tomotley-Leaf-Yemassee association

Poorly drained and somewhat poorly drained, nearly level, loamy soils on the low marine terrace

This association consists of a northwest-to-southeast band of broad, nearly level back-bay areas. Elevations generally range from about 25 to 45 feet above sea level; a few isolated areas are between 5 and 15 feet. Seasonal wetness is a primary characteristic of the soils. Slopes range from 0 to 2 percent.

This association makes up about 6 percent of Richmond County. The association is about 38 percent Tomotley soils, 20 percent Leaf soils, 12 percent Yemassee soils, and 30 percent soils of minor extent.

The Tomotley soils are poorly drained and have moderate permeability. They have a surface layer of fine sandy loam and a subsoil of clay loam and sandy clay loam.

The Leaf soils are poorly drained and have slow permeability. They have a surface layer of silt loam and a commonly mottled subsoil of silty clay or clay.

The Yemassee soils commonly form the transition zone between the Tomotley and Leaf soils and the adjacent better drained soils. Yemassee soils are somewhat poorly drained and have moderate permeability in the subsoil. They have a surface layer of fine sandy loam and a subsoil that is fine sandy loam in the upper part and mottled loam to sandy clay loam in the lower part.

The common minor soils are somewhat poorly drained Wahee soils and the poorly drained Lumbee soils, both on broad flats, and moderately well drained Nansemond and Tetotum soils on ridges within the broad flats.

Most of the acreage of this association is wooded, and the soils are well suited to trees. Some areas have been cleared and drained and are used for cultivated crops. Seasonal wetness is the main limitation for most uses of the soils in the association.

5. Tetotum-Rumford-Suffolk association

Moderately well drained to somewhat excessively drained, nearly level to gently sloping, loamy and sandy soils on the low marine terrace

This association mainly consists of a band of soils bordered to the southwest by the Rappahannock River and to the northeast by the nearly level, wet areas adjacent to the upland escarpment. Some areas of the association consist of gently sloping benches at the ends of upland ridges along the major creeks (fig. 4). Elevations generally range from about 5 to 25 feet above sea level but are as much as 50 feet above sea level along major creeks. A fluctuating seasonal high water table is a primary characteristic of more than half of the association. Slopes range from 0 to 6 percent.

This association makes up about 17 percent of Richmond County. The association is about 31 percent Tetotum soils, 15 percent Rumford soils, 10 percent Suffolk soils, and 44 percent soils of minor extent.

The Tetotum soils are on nearly level, broad flats and on gently sloping areas around drainageways and at the foot of the upland escarpment. The Tetotum soils are moderately well drained, have moderate permeability,

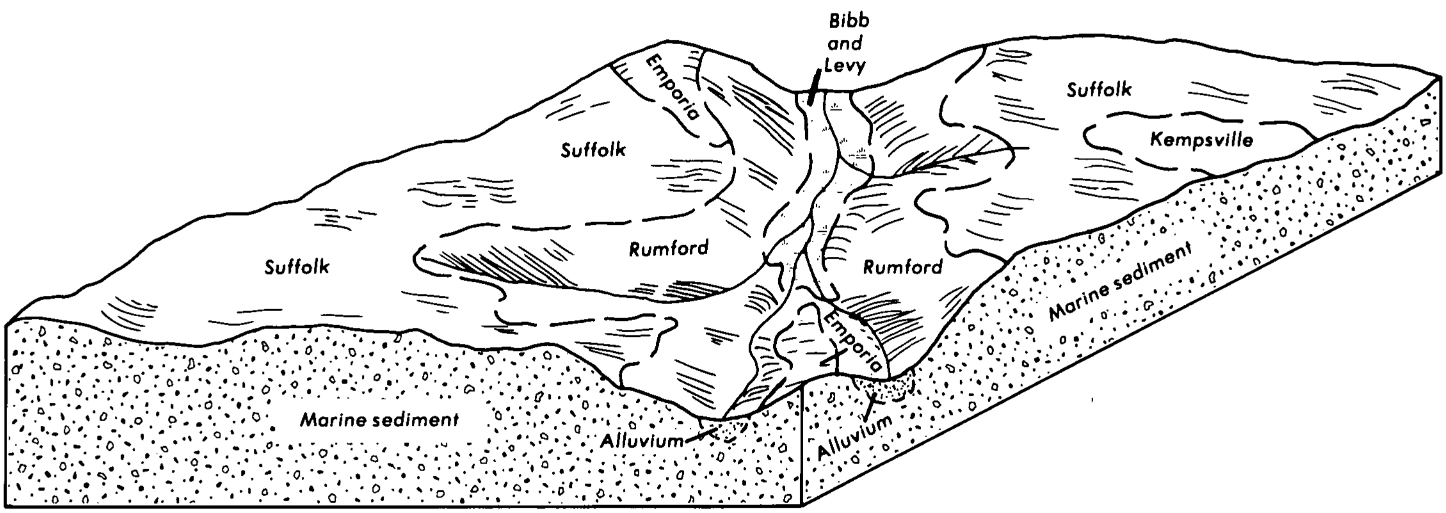


Figure 3.—Typical pattern of soils and underlying material in the Suffolk-Rumford association.

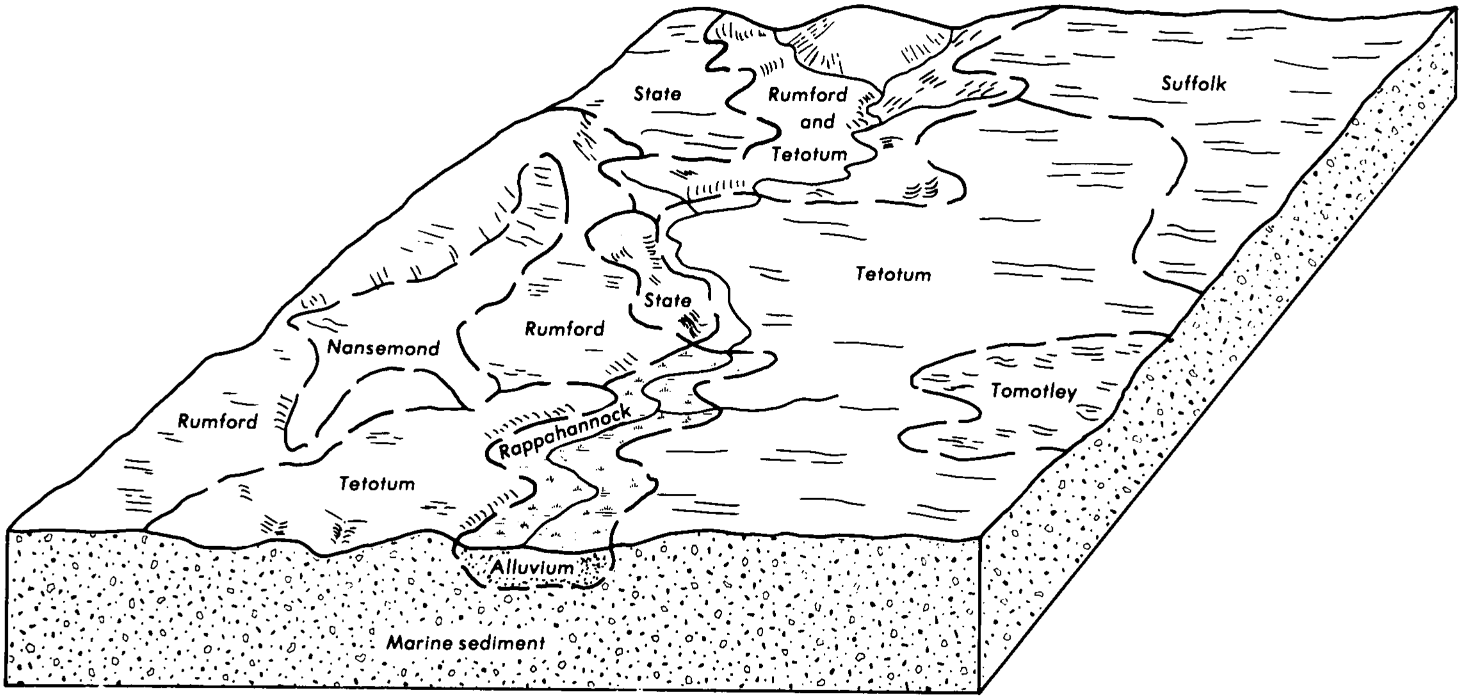


Figure 4.—Typical pattern of soils and underlying material in the Tetotum-Rumford-Suffolk association.

and have a seasonal high water table at a depth of 1-1/2 to 2-1/2 feet. They have a surface layer of fine sandy loam and a mottled subsoil of sandy clay loam to fine sandy loam.

The Rumford soils are on nearly level to gently sloping, narrow ridges on broad flats. The soils are somewhat excessively drained and are moderately rapidly permeable in the subsoil. They have a surface layer of loamy sand and a subsoil of sandy loam and loamy sand.

The Suffolk soils are on nearly level flats and on narrow ridges. The soils are well drained and mainly moderately permeable. They have a surface layer of sandy loam and a subsoil of sandy clay loam to loamy sand.

The common minor soils are moderately well drained, moderately rapidly permeable Nansemond soils on broad flats; well drained, moderately permeable State soils on broad flats; sloping and steep Rumford and Tetotum soils along the major creeks and drainageways; poorly drained, moderately permeable Tomotley soils on flats and in depressions; somewhat excessively drained, rapidly permeable, nearly level to gently sloping Catpoint soils on knolls and ridges near the major creeks; very poorly drained Rappahannock soils in tidal marshes; and poorly drained and very poorly drained Bibb and Levy soils along the major creeks and drainageways.

Most of the acreage of this association is well suited to and used for cultivated crops. The soils are suitable for trees, but few areas are wooded. Seasonal wetness in some areas is the main limitation for nonfarm development.

6. Rappahannock-Pamunkey-Nansemond association

Very poorly drained, moderately well drained, and well drained, nearly level, mucky and loamy soils on the fluvial river terrace

This association consists of areas along the Rappahannock River and major creeks. Elevations range from sea level to about 10 feet above sea level. In most areas the water table is at the surface most of the time. A few areas have a seasonal high water table at a depth of 4 to 6 feet. Slopes range from 0 to 2 percent.

This association makes up about 4 percent of Richmond County. The association is about 83 percent Rappahannock soils, 7 percent Pamunkey soils, 4 percent Nansemond soils, 6 percent soils of minor extent.

The Rappahannock soils are in tidal marshes and are very poorly drained. The soils consist of muck to a depth of about 40 inches.

The Pamunkey soils are on narrow fluvial deposits. The soils are well drained, are moderately permeable in the upper part of the subsoil, and have a seasonal high water table at a depth of 4 to 6 feet. They have a surface layer of loam and a subsoil of loam, fine sandy loam, and clay loam.

The Nansemond soils are on fluvial deposits adjacent to and surrounded by tidal marshes. The soils are moderately well drained, are moderately rapidly permeable in the subsoil, and have a seasonal high water table at a depth of 1-1/2 to 2-1/2 feet. The soils have a surface layer of fine sandy loam and a mottled subsoil of fine sandy loam and loamy fine sand.

The common minor soils are on fluvial deposits. They consist of somewhat excessively well drained Rumford soils on nearly level to gently sloping ridges and moderately well drained Tetotum soils and poorly drained Tomotley soils in slight depressions and along drainageways.

Most of the acreage of this association is in tidal marshes and in river deposits that support mixed hardwoods and pine. A few areas are used for cultivated crops. Wetness is the main limitation for nonfarm development and most other uses of the association.

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 loam,* is one of two phases in the *Kempsville series*.

Some map units are made up of two or more major soils. These map units are called undifferentiated groups.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in a mapped area are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. *Bibb and Levy soils* is an undifferentiated group in this survey area.

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.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. *Pits, sand and gravel,* is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown 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

1—Atlee silt loam. This soil is deep, nearly level, and moderately well drained. It is on narrow to broad ridgetops on the Coastal Plain upland. The areas of this soil are elongated, rectangular, or oval and are about 200 feet to 1,000 feet wide. The areas range from about 3 to 40 acres. Slopes are 0 to 2 percent.

Typically, the surface layer is grayish brown and light yellowish brown silt loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. It is brownish yellow to yellowish brown silt loam and clay loam. The lower part is mottled and firm.

Included with this soil in mapping are small areas of well drained Emporia and Kempsville soils and moderately well drained Savannah soils. These soils are slightly higher on the landscape than the Atlee soils or are mixed with the Atlee soils. Also included are areas where the surface layer is loamy fine sand and the lower part of the subsoil is sandy clay loam or sandy loam. Included soils make up about 20 percent of the unit.

The permeability of this Atlee soil is moderate in the upper part of the subsoil and moderately slow in the lower part. Available water capacity is moderate. Surface runoff is slow, and the erosion hazard is slight. The surface layer has a low to moderate organic matter content, and the soil has low natural fertility. The lower part of the subsoil has a moderate shrink-swell potential. The soil in unlimed areas is extremely acid or very strongly acid. The seasonal high water table is at a depth of 1.5 to 2.5 feet.

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

This soil is well suited to cultivated crops. The major management concern is seasonal wetness. Minimum tillage, the use of cover crops, keeping crop residue on or in the soil, and the use of grasses and legumes in the cropping system help to increase the organic matter content and maintain tilth in cultivated areas. Chisel plowing to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

The soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are the major pasture management concerns. The use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Grazing during periods of seasonal wetness often compacts the surface layer and reduces aeration.

The potential productivity for trees on this soil is moderate to moderately high. The soil is managed for pines and hardwoods. The use of timber equipment during periods of seasonal wetness compacts the surface layer.

The seasonal high water table and the moderately slow permeability of the soil are the main limitations for nonfarm use, especially for use of the soil as a site for buildings, sanitary landfills, or septic tank absorption fields and for most recreational uses. Low strength and the moderate shrink-swell potential limit the soil as a site for local roads and streets.

The capability subclass is IIw.

2—Bibb and Levy soils. This unit is made up of deep, nearly level soils. The total acreage of the unit is about 45 percent poorly drained Bibb loam, 35 percent very poorly drained Levy silt loam, and 20 percent other soils. Some areas of this unit are mostly Bibb soils, some are mostly Levy soils, and some are both. The soils were mapped together because they have no major differences in use and management. The areas of the unit are on flood plains of the major creeks and streams. They are long and winding and are about 100 to 1,000 feet wide. They range from about 5 to 200 acres. Slopes are less than 2 percent.

The Bibb soils generally are in the more narrow parts of this unit, particularly along the upper reaches of streams. The Levy soils generally are in the wider parts of the unit, mainly along the lower reaches of streams and upstream from beaver ponds and millponds or where highways cross this unit. The soils in this unit are frequently flooded during storms and by exceptionally high tides in areas adjacent to tidal areas.

Typically, the surface layer of the Bibb soils is dark brown loam about 8 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is dark gray and very dark gray sandy loam, and the lower part is dark gray and grayish brown loamy sand and sand.

Typically, the surface layer of Levy soils is dark grayish brown silt loam about 6 inches thick. The substratum is mostly dark gray, dark greenish gray, and very dark gray silty clay and clay loam to a depth of 60 inches or more.

Included with these soils in mapping are small intermingled areas of moderately well drained soils along the outer edge of this unit, low benches, and slightly raised depositional bars. Also included are very poorly drained Rappahannock soils adjacent to tidal areas.

The permeability of the Bibb soils in this unit is moderate, and available water capacity is high. A seasonal high water table is at a depth of 6 to 18 inches. The Bibb soils are very strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the substratum.

The permeability of the Levy soils in this unit is slow, and available water capacity is high. The seasonal high water table is at the surface of the soils, and water is ponded on some areas. The Levy soils are very strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the substratum.

Most areas of these soils are in woodland. A few areas of the Bibb soils are used for pasture.

Flooding and the seasonal high water table make this unit generally unsuitable for farming. The Bibb soils, however, are moderately well suited to pasture.

The potential productivity for trees is high on the Bibb soils and moderate for water-tolerant species on the Levy soils. The rate of seedling mortality is high, and flooding and wetness limit the use of equipment, especially on the Bibb soils.

Seasonal wetness and flooding limit the use of these soils for most nonfarm uses other than for wetland wildlife habitat.

The capability subclass is VIIw.

3B—Catpoint loamy sand, 0 to 6 percent slopes. This soil is deep, nearly level to gently sloping, and somewhat excessively drained. It is on the low marine terrace. The areas of this soil commonly are long and narrow or rectangular. The areas range from 4 to 40 acres. Slopes are smooth and are about 200 to 600 feet long.

Typically, the surface layer of this soil is dark brown loamy sand about 9 inches thick. The subsoil extends to a depth of 60 inches or more. It is dark yellowish brown, yellowish brown, and light yellowish brown sand in the upper part. The lower part mainly is very pale brown fine sand and yellowish brown fine sandy loam.

Included with this soil in mapping are small areas of somewhat excessively drained Rumford soils and moderately well drained Nansemond soils. The Rumford soils are on ridges, and the Nansemond soils are in shallow depressions. Also included are areas at an elevation of less than 10 feet that are rarely flooded. Included soils make up about 10 to 15 percent of the unit.

The permeability of this Catpoint soil is rapid, and available water capacity is low. Surface runoff is slow, and the erosion hazard is slight. The soil is low in organic matter content and natural fertility. It commonly is very strongly acid through slightly acid in unlimed areas.

About half of the acreage of this soil is in woodland. The other half mainly is in cultivated crops and a few areas of pasture or hay.

Droughtiness during the growing season makes this soil poorly suited to cultivated crops. Wind erosion is a major management concern. Minimum tillage, use of cover crops, and use of grasses and legumes in the cropping system help to increase organic matter content, improve available water capacity, and control wind erosion in cultivated areas.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. The soil is managed for pines and hardwoods. The rate of seedling mortality is moderate, and the use of timber equipment is limited because the soil is soft and loose.

Seepage and instability of excavations are the main limitations of the soil for nonfarm uses. Seepage limits the use of the soil for sewage lagoons and sanitary landfills.

The capability subclass is IIIs.

4B—Dogue fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on narrow to broad, slightly convex ridgetops on the Coastal Plain upland. Areas of these soils are long and narrow, rectangular, or oval and are 200 feet to 600 feet wide. The areas range from about 4 to 20 acres.

Typically, the surface layer is dark yellowish brown fine sandy loam about 8 inches thick. The subsoil is about 43 inches thick. The upper part of the subsoil is yellowish brown clay loam and mottled clay. The lower part is multicolored mottled clay. The substratum is mottled clay to a depth of 60 inches or more.

Included with this soil in mapping are small areas on fingerlike ridges of well drained Kempsville and Suffolk soils. Also included are intermingled areas of Emporia and Savannah soils. Included soils make up about 5 to 15 percent of the unit.

The permeability of this Dogue soil is moderately slow in the upper part of the subsoil, and available water capacity is moderate. Surface runoff is medium, and the erosion hazard is moderate. The surface layer has low organic matter content and low natural fertility. The subsoil has a moderate shrink-swell potential. Root growth is somewhat restricted by the clay subsoil at a depth of about 18 inches. The soil is extremely acid or very strongly acid in unlimed areas. The seasonal high water table is at a depth of 1.5 to 3 feet during the winter and early spring and during periods of above-average rainfall.

Over half of the acreage of this soil is in cultivated crops and pasture and hay. The rest is in woodland.

This soil is well suited to cultivated crops. The hazard of erosion is moderate and is a main management concern. Minimum tillage, use of cover crops, keeping crop residue on or in the soil, and use of grasses and legumes in the cropping system help to increase organic matter content, maintain tilth, and reduce runoff and control erosion in cultivated areas. Chisel plowing on the contour to a depth of 8 to 12 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Overgrazing and grazing during periods of seasonal wetness increases the hazard of erosion and compacts the surface layer.

The potential productivity for trees on this soil is moderate to moderately high. The soil is managed for pines and hardwoods. The use of timber equipment is limited by seasonal wetness.

The seasonal water table, the moderate shrink-swell potential, and the moderately slow permeability in the subsoil are the main limitations of this soil for nonfarm use, especially for use as a building site, a site for sanitary landfills or septic tank absorption fields, and for most recreational uses. Low strength limits the soil as a site for local roads and streets.

The capability subclass is IIe.

5B—Emporia loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on narrow to broad ridgetops on the Coastal Plain upland. The areas of this soil are long and narrow or oval and are commonly slightly convex. They are about 200 to 1,000 feet wide and range from about 5 to 75 acres.

Typically, the surface layer is dark grayish brown loam about 2 inches thick. The subsurface layer is light olive brown loam 7 inches thick. The subsoil is about 40 inches thick. It is yellowish brown and strong brown loam, sandy clay loam, clay, and sandy clay and is mottled in the lower part. The substratum extends to a depth of 60 inches or more. The upper part is mottled, multicolored gravelly sandy clay loam; the lower part is mottled, multicolored stratified loamy sand, sandy loam, and clay.

Included with this soil in mapping are a few small areas of well drained Kempsville and Suffolk soils and moderately well drained Savannah soils. Also included are small areas of moderately sloping soils, soils with gray mottles in the upper part of the subsoil, and severely eroded soils. Included soils make up about 15 percent of the unit.

The permeability of this Emporia soil is moderate or moderately slow in the upper part of the subsoil and moderately slow or slow in the lower part. Available water capacity is moderate. Surface runoff is medium, and the erosion hazard is moderate. The surface layer has low organic matter content and low natural fertility. The surface layer and subsoil in unlimed areas are commonly very strongly acid to strongly acid. The subsoil has a moderate shrink-swell potential in the lower part. The root zone is restricted to a depth of 30 to 45 inches by the firm subsoil and substratum. A seasonal high water table is perched at a depth of 3 to 4.5 feet during periods of above-average rainfall and in winter and early spring.

About two-thirds of the acreage of this soil is in woodland. The rest mainly is in cultivated crops and a few areas of pasture and hay.

This soil is well suited to cultivated crops and hay. The hazard of erosion is moderate and is a major management concern. Minimum tillage, contour tillage, cover crops, the use of grasses and legumes in the cropping system, and keeping crop residue in or on the soil help to increase organic matter, maintain tilth, and reduce erosion in cultivated areas. Chisel plowing on the contour to a depth of 10 to 14 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and use of lime and fertilizer are the main pasture management practices. Overgrazing increases the hazard of erosion.

The potential productivity for trees on this soil is moderate to moderately high. The soil is managed for pines and hardwoods.

The slow or moderately slow permeability in the lower part of the subsoil, the moderate shrink-swell potential, and the seasonal high water table are the main limitations of the soil for nonfarm use. The water table and permeability especially limit the use of the soil as a building site and as a site for sanitary landfills or septic tank absorption fields. Low strength and the shrink-swell potential limit the soil as a site for local roads and streets.

The capability subclass is IIe.

6B—Kempsville sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on broad to narrow ridgetops on the Coastal Plain upland. Areas of this soil are long and narrow, rectangular, or oval and are about 200 to 1,200 feet wide. The areas range from about 5 to 100 acres.

Typically, the surface layer of this soil is brown sandy loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is yellowish brown and strong brown loam. The middle part is strong brown and yellowish red, mottled sandy loam. The lower part is red sandy clay loam.

Included with this soil in mapping are small areas of well drained Emporia and Suffolk soils and moderately well drained Savannah soils. These soils mainly are on the outer edge of the unit and on knolls on ridgetops. Also included are small areas of severely eroded soils and moderately sloping soils. Included soils make up about 15 percent of the unit.

The permeability of this Kempsville soil is moderate in the lower part of the subsoil, and available water capacity is moderate. Surface runoff is slow to medium, and the erosion hazard is moderate. The surface layer is low in organic matter content and has low natural fertility. The soil is very strongly acid or strongly acid in unlimed areas, but the reaction of the surface layer varies according to local liming practices.

About half of the acreage of this soil is in woodland. The rest is used for cultivated crops and hay and pasture.

This soil is well suited to cultivated crops and hay. The hazard of erosion is moderate and is a main management concern. Minimum tillage, cover crops, keeping crop residue in or on the soil, and the use of grasses and legumes in the cropping system help to control erosion, increase organic matter content, and maintain tilth in cultivated areas. Chisel plowing on the contour to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

The soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are the main pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and use of lime and fertilizer are the main pasture management practices. Overgrazing increases runoff and erosion.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. The soil is managed for pines and hardwoods.

This soil generally is suitable for nonfarm use, but the permeability in the lower part of the subsoil is a limitation for septic tank absorption fields and low strength limits the soil as a site for local roads and streets.

The capability subclass is IIe.

7—Kempsville loam. This soil is deep, nearly level, and well drained. It is in irregularly shaped areas on broad ridgetops on the Coastal Plain upland. The areas are about 300 to 1,000 feet wide and range from about 5 to 100 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is dark yellowish brown loam about 12 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part of the subsoil is yellowish brown and strong brown loam. The middle part is strong brown and yellowish red, mottled sandy loam and loam. The lower part is yellowish red sandy clay loam.

Included with this soil in mapping are small areas of well drained Emporia soils and moderately well drained Savannah soils, mainly at the outer edge of the unit.

Also included are small areas of well drained Suffolk soils on ridgetops. Included soils make up 10 to 15 percent of the unit.

The permeability of this Kempsville soil is moderate in the lower part of the subsoil, and available water capacity is moderate. Surface runoff is slow, and the erosion hazard is slight. The surface layer is low in organic matter content and has low natural fertility. The soil is very strongly acid or strongly acid in unlimed areas, but the reaction of the surface layer varies according to local liming practices.

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

This soil is well suited to cultivated crops and hay (fig. 5). Minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. Chisel plowing to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

The soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are main pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high, especially for loblolly pine. The soil is managed for pines and hardwoods.

This soil generally is suitable for nonfarm use, the permeability in the lower part of the subsoil, however, is a limitation for septic tank absorption fields, and low strength limits the use of this soil as a site for local roads and streets.

The capability class is I.

8—Leaf silt loam. This soil is deep, nearly level, and poorly drained. It is on the low marine terrace, generally near the scarp to the Coastal Plain upland. Areas of this soil are oval or long and narrow and are commonly about 200 to 2,000 feet wide. They range from about 5 to 100 acres. Slopes range from 0 to 2 percent.

Typically, the surface and subsurface layers of this soil are dark grayish brown and light brownish gray silt loam about 7 inches thick. The subsoil extends to a depth of

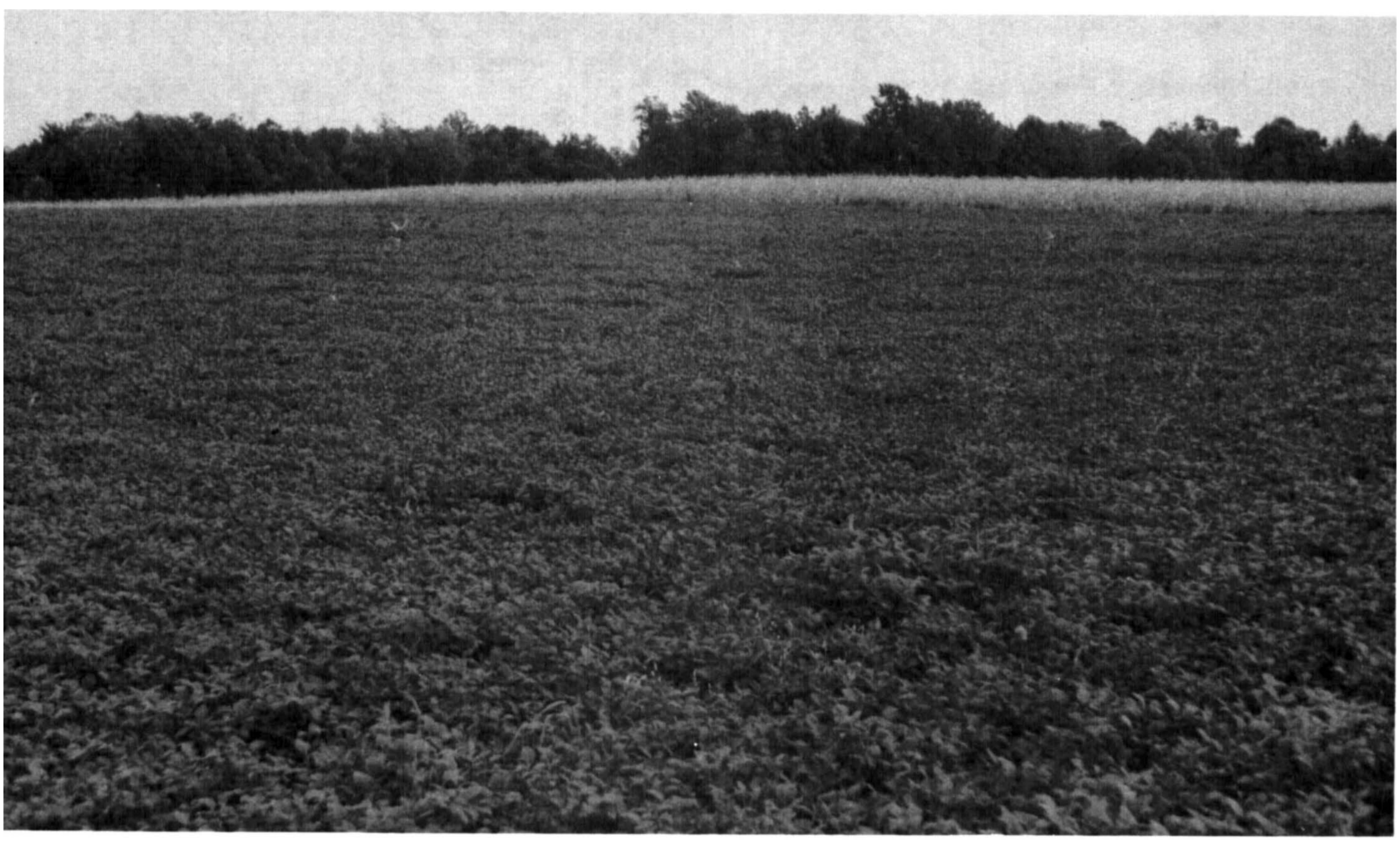


Figure 5.—Soybeans on an area of Kempsville loam.

60 inches or more. It is gray, dark gray, and light brownish gray, firm clay and silty clay that commonly is mottled.

Included with this soil in mapping are small areas of somewhat poorly drained Wahee and Yemassee soils and poorly drained Tomotley soils. In places, the surface layer is fine sandy loam and the upper part of the subsoil is silt loam to silty clay loam. In some other areas, the subsoil at a depth of more than 40 inches is clay loam to loamy sand. Included soils make up about 15 percent of the unit.

The permeability in the subsoil of this Leaf soil is very slow, and available water capacity of the soil is moderate to high. Runoff is slow to very slow. The surface layer has low to moderate organic matter content and low natural fertility. The subsoil has a high shrink-swell potential. The soil in unlimed areas is commonly extremely acid to strongly acid. Water commonly is on the surface of the soil during periods of high rainfall, and a seasonal high water table commonly is near the surface from winter through early summer.

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

Undrained areas of this soil are poorly suited to cultivated crops and moderately well suited to hay; drainage and improving the rate of runoff make the soil well suited to cultivated crops. Minimum tillage, the use of cover crops, keeping crop residue in or on the soil, and the use of grasses and legumes in the cropping system help to increase organic matter and maintain tilth in cultivated areas. If the soil is dry, chisel plowing to a depth of 8 to 12 inches every 3 to 5 years improves aeration and root development.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the prevention of overgrazing, and providing drainage are major pasture management concerns. Use of proper stocking rates, pasture rotation, and deferred grazing are the main pasture management practices. Grazing during periods of seasonal wetness cuts and compacts the surface layer and increases ponding.

The potential productivity for trees on this soil is high. The soil is managed for pines and hardwoods, but seasonal wetness causes a high rate of seedling mortality. The use of timber equipment during periods of wetness compacts the surface layer and causes increased ponding.

The seasonal high water table and the very slow permeability are the main limitations of the soil for nonfarm use, especially for use as a building site, as a site for sanitary landfills or septic tank absorption fields, and as a site for most types of recreation. Low strength and a high shrink-swell potential limit the soil as a site for local roads and streets.

The capability subclass is VIw.

9—Lumbee loam. This soil is deep, nearly level, and poorly drained. It is on very broad flats of the low marine terrace. Areas of this soil commonly are oval and are about 500 to 2,000 feet wide. They range from about 5 to 100 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer of this soil is grayish brown loam about 9 inches thick. The subsoil is mottled, light brownish gray and gray sandy clay loam and sandy loam 18 inches thick. The substratum extends to a depth of 60 inches or more. The upper part is stratified layers of mottled, white to strong brown loamy fine sand or sand. The lower part commonly is light olive gray clay loam.

Included with this soil in mapping are small areas of poorly drained Tomotley soils and moderately well drained Tetotum and Nansemond soils. Also included are a few small areas of soils with a surface layer and subsoil of loamy sand. Included soils make up about 10 percent of the unit.

The permeability of this Lumbee soil is moderate in the subsoil, and the available water capacity is low to moderate. Surface runoff is very slow. The surface layer is low to moderate in organic matter content and has low natural fertility. The soil in unlimed areas is very strongly acid or strongly acid. It frequently has water on the surface for brief periods during late winter and spring and has a seasonal high water table at or near the surface during winter and spring.

Most areas of this soil are in woodland. A few areas are used for cultivated crops and pasture or hay.

Undrained areas of this soil are poorly suited to cultivated crops and hay. Using drainage and improving the rate of runoff make the soil well suited to cultivated crops. The instability of the soil is a limitation for open-ditch drainage systems, and sedimentation is a hazard for tile systems. Minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. If the soil is dry, chisel plowing to a depth of 12 to 18 inches every 3 to 5 years improves aeration and root development.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, the use of lime and fertilizer, and artificial drainage are the main pasture management practices. Grazing during periods of seasonal wetness cuts and compacts the surface layer.

The potential productivity for trees on this soil is high. The soil is managed for mostly pine and some hardwood. Seasonal wetness causes a high rate of seedling mortality and limits the use of heavy timber equipment.

The seasonal water table and water on the surface are the main limitations of the soil for nonfarm use, especially for use as a building site, as a site for sanitary landfills or septic tank absorption fields, for most recreational uses, and for local roads and streets.

The capability subclass is IVw.

10—Nansemond fine sandy loam. This soil is deep, nearly level, and moderately well drained. It is on broad flats of the low marine terrace. Areas of this soil are long and narrow or oval and are about 400 to 1,000 feet wide. They range from about 5 to 75 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is dark grayish brown fine sandy loam 11 inches thick. The subsoil is 24 inches thick and is mottled in the lower 16 inches. The upper part of the subsoil is light yellowish brown fine sandy loam, and the lower part is light yellowish brown loamy fine sand. The substratum is mottled, light gray fine sand and mottled, light olive brown fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of poorly drained Lumbee soils, moderately well drained Tetotum soils, well drained State soils, and somewhat excessively drained Rumford soils. Also included are a few areas with a clayey substratum and an area along the Rappahannock River with neutral reaction, no mottles, and a seasonal high water table at a depth of less than 18 inches. These areas are mostly surrounded by Rappahannock soils on the fluvial terrace, generally at an elevation of less than 10 feet. Included soils make up about 15 percent of the unit.

The permeability of this Nansemond soil is moderately rapid in the subsoil, and available water capacity is low. Surface runoff is slow. The surface layer is low in organic matter content and has low natural fertility. The surface layer and subsoil in unlimed areas are very strongly acid or strongly acid. A seasonal high water table is at a depth of 1.5 to 2.5 feet during winter and early spring.

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

This soil is well suited to cultivated crops and hay. The seasonal high water table is the main management concern. Subsurface drainage systems are needed in some areas, but excavations are limited by the instability of the soil, and sedimentation is a hazard for drainage systems in this soil. Minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system are practices that control wind erosion, increase organic matter content, and maintain tilth in cultivated areas.

The soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are the main pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and use of lime and fertilizer are the main pasture management practices. Grazing during periods of seasonal wetness often cuts and compacts the surface layer.

The potential productivity for trees on this soil is high. The soil is managed mostly for pine. The use of timber equipment is limited by seasonal wetness.

The seasonal high water table is the main limitation of this soil for nonfarm use, especially for use as a site for septic tank absorption fields, dwellings with basements, and local roads and streets and for shallow excavations.

The capability subclass is IIw.

11—Pamunkey loam, wet substratum. This soil is deep, nearly level, and well drained. It is on the low terrace along the Rappahannock River. The areas are long and narrow and are about 200 to 1,000 feet wide. They range from about 5 to 100 acres. Slopes range from 0 to 2 percent.

Typically the surface layer is dark brown loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red loam and clay loam in the upper part and mottled, yellowish red fine sandy loam and loam in the lower part.

Included with this soil in mapping are small areas of somewhat excessively drained Rumford soils. Also included are small depressional areas with a seasonal high water table at a depth of less than 18 inches. Included soils make up about 10 percent of the unit.

The permeability of this Pamunkey soil is moderate in the surface layer and upper part of the subsoil. Available water capacity is moderate to high, and surface runoff is slow. The soil has medium natural fertility and low organic matter content in the surface layer. The surface layer and upper part of the subsoil are commonly medium acid through neutral. A seasonal high water table is generally at a depth of 4 to 6 feet in late winter and early spring and during other prolonged wet periods.

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

This soil is well suited to cultivated crops and hay. Minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. Chisel plowing to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are the main pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is high. The soil is managed for pines and hardwoods.

The seasonal water table and moderately rapid to rapid permeability in the lower part of the subsoil are the main limitations of this soil for nonfarm use, especially as a site for sanitary landfills, sewage lagoons, and septic tank absorption fields. Low strength limits the soil as a site for local roads and streets.

The capability class is I.

12—Pits, sand and gravel. This unit consists of areas from which gravel and sand have been removed for construction purposes. The excavations are mostly 5 to

15 feet deep and range from about 2 to 15 acres. Areas smaller than 2 acres are shown on the map by a special symbol. Some of the excavations have water on the floor of the pit, and some have been used for trash disposal.

The abandoned areas of this unit are covered by mainly woody bushes and grasses. The suitability or potential of the unit for any use requires onsite investigation to determine the degree of reclamation needed.

This unit is not assigned to a capability subclass.

13—Rappahannock muck. This soil is deep, level, and very poorly drained. It is on low-lying tidal flats. The soil is covered twice daily by brackish tidal water and is continuously waterlogged. The areas of this soil are oval or rectangular and are about 500 to 2,500 feet wide. They range from about 5 to 200 acres. Slopes are less than 1 percent.

Typically, the surface and subsurface layers of this soil are very dark grayish brown, very dark gray, and very dark brown muck 41 inches thick. The substratum is very dark gray mucky silty clay loam to a depth of 63 inches, black muck between depths of 63 and 75 inches, and very dark grayish brown sandy loam at a depth of more than 75 inches.

Included with the soil in mapping are small areas of poorly drained Bibb soils and very poorly drained Levy soils on higher landscape positions than this Rappahannock soil. Also included are small, slightly raised areas of sandy soils and small, low tidal pools and streams. Included areas make up about 30 percent of the unit.

The permeability of this Rappahannock soil is moderate. The surface layer and substratum are neutral to moderately alkaline when wet. The water table is at or near the surface most of the time.

The high water table, tidal flooding, and high organic matter content make this soil generally poorly suited to most uses other than as wetland wildlife habitat. Most areas are covered by big cordgrass, reeds, cattails, arrow-leaf, rushes, and other aquatic plants.

The capability subclass is VIIIw.

14B—Rumford loamy sand, 0 to 6 percent slopes. This soil is deep, nearly level to gently sloping, and somewhat excessively drained. It is on elongated ridges on the low marine terrace and on the river terrace of the Rappahannock River. Areas of this soil are long and narrow or oval and are 200 feet to 500 feet wide and up to 5,000 feet long. The areas range from 5 to 30 acres.

Typically, the surface layer is dark yellowish brown loamy sand about 9 inches thick. The subsoil is dark brown and yellowish red sandy loam and loamy sand 28 inches thick. The substratum is strong brown and yellowish brown sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of somewhat excessively drained Catpoint soils, moderately well drained Nansemond soils, and poorly drained Tomotley soils. The Catpoint soils are intermingled with the Rumford soils, and the Nansemond and Tomotley soils are in slightly lower landscape positions. Also included on the river terrace are well drained Pamunkey soils and soils similar to this Rumford soil but that have a seasonal high water table at a depth of less than 6 feet and that are rarely flooded. Included soils make up about 20 percent of the unit.

The permeability of this Rumford soil is moderately rapid in the subsoil, and available water capacity is low. Surface runoff is slow or medium. The surface layer has a low organic matter content and low natural fertility. The surface layer and subsoil in unlimed areas are extremely acid to medium acid.

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

This soil is well suited to cultivated crops and hay. The hazard of water erosion is moderate, but wind erosion is a major management concern. Minimum tillage, cover crops, and use of grasses and legumes in the cropping system help to increase organic matter content, maintain tilth, improve available water capacity, and control wind erosion.

The soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are the main pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing,and the use of lime and fertilizer are the main pasture management practices. Overgrazing increases runoff and the hazard of erosion. Pastures on this soil are damaged by prolonged summer drought but can withstand a wet winter because the soil has good drainage.

The potential productivity for trees on this soil is moderately high. This soil is managed mostly for pine.

This soil generally is suitable for nonfarm use, but the permeability limits the soil as a site for sewage lagoons, landfills, or septic tank absorption fields.

The capability subclass is IIs.

15E—Rumford soils, 15 to 50 percent slopes. These soils are deep, moderately steep to steep, and somewhat excessively drained. Some of the Rumford soils in this unit have a surface layer of fine sandy loam, and some have a surface layer of loamy sand. The soils were mapped together because they have no major differences in use and management. The unit is on side slopes of drainageways and on the scarps between the low marine terrace and the Coastal Plain upland. Slopes are complex and generally range from slightly concave to convex. The areas of these soils are long and narrow and are 100 to 300 feet wide and up to 10,000 feet long. The areas range from about 5 to 1,000 acres.

Typically, the surface layer is dark yellowish brown and yellowish brown loamy sand or fine sandy loam about 13 inches thick. The subsoil is yellowish brown and yellowish red sandy loam and sandy clay loam 20 inches thick. The substratum is strong brown and yellowish brown sand and sandy clay loam to a depth of 60 inches or more.

Included with these soils in mapping are many small areas of well drained Emporia, Kempsville, and Suffolk soils and moderately well drained Savannah soils. Also included are small areas of Bibb and Levy soils along drainageways and areas of very steep soils dominantly in the northwestern and central parts of the county. Seeps and springs are common at the lower edge of some slopes. Included areas make up about 25 to 35 percent of the unit.

The permeability of these Rumford soils is moderately rapid in the subsoil, and available water capacity is low. Surface runoff is moderate to rapid. The surface layer has a low organic matter content and low natural fertility. The surface layer and subsoil in unlimed areas are extremely acid to medium acid.

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

Droughtiness during the growing season and a severe hazard of erosion make these soils generally unsuitable for cultivated crops and poorly suited to hay. The soil is suitable for pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are the major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Overgrazing increases the hazard of erosion.

The potential productivity for trees on these soils is moderately high. The soils are managed for pines and hardwoods. The use of timber equipment is limited by slope.

Slope is the main limitation of these soils for nonfarm use. It especially limits the soils as a site for buildings and local roads and streets and, along with rapid permeability in the substratum, is a limitation for septic tank absorption fields.

The capability subclass is VIIe.

16D—Rumford and Tetotum soils, 6 to 15 percent slopes. These soils are deep, sloping and strongly sloping, and moderately well drained to somewhat excessively drained. They are on side slopes of drainageways and at the head of drainageways. Slopes are smooth to complex and are about 100 to 300 feet long. The areas of these soils are long and narrow or rectangular and are about 200 to 500 feet wide and up to 5,000 feet long. They are cut by shallow drainageways about 50 to 200 feet apart. The areas range from about 5 to 200 acres. The total acreage of this unit is about 45 percent Rumford loamy sand, 30 percent Tetotum sandy loam, and 25 percent other soils. Some areas consist mostly of Rumford soils, some mostly of Tetotum soils, and some of both. The soils were mapped together because they have no major differences in use and management.

Typically, the surface layer of the Rumford soils is dark yellowish brown and yellowish brown loamy sand about 13 inches thick. The subsoil is yellowish brown and yellowish red sandy loam and sandy clay loam 20 inches thick. The substratum is strong brown and yellowish brown sand and sandy clay loam to a depth of 60 inches or more.

Typically, the surface layer of the Tetotum soils is dark brown sandy loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more and is mottled at a depth of 23 inches. The upper part of the subsoil is yellowish brown clay loam. The lower part is light brownish gray loam.

Included with this unit in mapping are many small areas of well drained Emporia, Kempsville, and Suffolk soils and moderately well drained Savannah soils. Also included are small areas of Bibb and Levy soils along drainageways and areas of steep soils and severely eroded cultivated soils, mainly in the northwestern and central part of the county. Seeps and springs are common at the lower edge of slope breaks.

The permeability of these Rumford and Tetotum soils is moderate or moderately rapid in the subsoil. Available water capacity is low to moderate. Surface runoff is moderate to rapid. The surface layer has a low organic matter content and low natural fertility. The surface layer and subsoil of unlimed areas of these soils are commonly extremely acid to strongly acid. The Tetotum soils have a seasonal high water table at a depth of 1.5 to 2.5 feet.

Most areas of these soils are in woodland. A few areas are farmed.

These soils are poorly suited to cultivated crops but are moderately well suited to hay. In some years the Rumford soils are droughty during the growing season. The hazard of erosion is severe in cultivated areas and is a major management concern. Minimum tillage, cover crops, the use of grasses and legumes in the cropping system, and contour farming and stripcropping help to control erosion, increase organic matter content, and improve tilth and available water capacity in cultivated areas. Chisel plowing only on the contour especially helps to reduce runoff, increase water infiltration, and prevent the formation of gullies and further erosion.

These soils are moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing and cultivation during reseeding are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred of grazing, and the use of lime and fertilizer are the main pasture management practices. Overgrazing increases the hazard of erosion, especially on the Rumford soils. Pastures on these soils are damaged by prolonged summer drought but can withstand a wet winter because the soils have good drainage.

The potential productivity for trees on these soils is moderately high. The soils are managed for pines and hardwoods. The use of timber equipment on the Tetotum soils is limited during seasonally wet periods.

Slope and seasonal wetness in the Tetotum soils limit this unit for nonfarm use, especially as a site for buildings and septic tank absorption fields. Rapid permeability in the substratum of the Rumford soils is an additional limitation for septic tank absorption fields. Low strength limits the Tetotum soils as a site for local roads and streets.

The capability subclass is IVe.

17A—Savannah fine sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on ridgetops on the Coastal Plain upland. Areas of this soil are long and narrow or oval and are 200 feet to 600 feet wide. They range from about 5 to 50 acres.

Typically, the surface layer of this soil is yellowish brown fine sandy loam about 9 inches thick. The subsoil extends to a depth of more than 60 inches. The upper 11 inches of the subsoil is strong brown and yellowish brown sandy loam and sandy clay loam. The next 40 inches of the subsoil is light yellowish brown, firm, mottled fine sandy loam and sandy loam. The subsoil below a depth of 60 inches is strong brown, mottled sandy clay loam.

Included with this soil in mapping are small areas of well drained Emporia, Kempsville, and Suffolk soils on ridgetops. They make up about 25 percent of the unit.

The permeability of this Savannah soil is moderately slow in the subsoil, and available water capacity is low to moderate. Surface runoff is slow. The surface layer is low in organic matter content and has low natural fertility. The surface layer and subsoil in unlimed areas are commonly very strongly acid to strongly acid. A seasonal high water table is perched at a depth of 1.5 to 3 feet during winter and early spring.

About half of the acreage of this soil is in woodland. The remaining areas are used for cultivated crops and hay and pasture.

This soil generally is well suited to cultivated crops and hay. The soil is droughty during the growing season in areas where the firm part of the subsoil is at a depth of less than 32 inches. Minimum tillage, cover crops, keeping crop residue in or on the soil, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. Chisel plowing to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development. Subsurface tile drainage is sometimes needed in broad, flat areas or in slight depressions.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Grazing during periods of seasonal wetness often cuts and compacts the surface layer.

The potential productivity for trees on this soil is moderately high. The soil is managed mostly for pine, which is subject to uprooting during windy periods.

The seasonal high water table and the moderately slow permeability are the main limitations of the soil for nonfarm use, especially for use of the soil as a site for buildings or septic tank absorption fields. The water table and low strength limit the soil for local roads and streets.

The capability subclass is IIw.

17B—Savannah fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on ridgetops on the Coastal Plain upland. Slopes are smooth and commonly complex and are about 80 to 400 feet long. Areas of this soil are long and narrow or oval. They range from about 5 to 20 acres.

Typically, the surface layer of this soil is yellowish brown fine sandy loam about 9 inches thick. The subsoil extends to a depth of more than 60 inches. The upper 11 inches of the subsoil is strong brown, friable sandy clay loam and loam. The next 40 inches is light yellowish brown, firm, mottled fine sandy loam and sandy loam. The subsoil below a depth of 60 inches is strong brown, mottled sandy clay loam.

Included with this soil in mapping are small areas of well drained Emporia, Kempsville, and Suffolk soils on ridgetops. Also included are small areas of severely eroded soils and areas in which the firm part of the subsoil is at a depth of less than 18 inches. Included areas make up about 25 percent of the unit.

The permeability of this Savannah soil is moderately slow in the subsoil, and available water capacity is low to moderate. Surface runoff is medium. The surface layer is low in organic matter content and has low natural fertility. The surface layer and subsoil in unlimed areas are commonly very strongly acid to strongly acid. A seasonal high water table is perched at a depth of 1.5 to 3 feet during winter and early spring.

About half of the acreage of this soil is in woodland. The remaining areas are used for cultivated crops and hay and pasture.

This soil is moderately well suited to cultivated crops and hay. The soil is droughty during the growing season in areas where the firm part of the subsoil is at a depth of less than 32 inches. The hazard of erosion is moderate and is a major management concern. Wet-weather springs and seeps below slope breaks sometimes limit the use of farm equipment. Minimum tillage, cover crops, keeping crop residue in or on the soil, and using grasses and legumes in the cropping system help to increase organic matter and maintain tilth in cultivated areas. Chisel plowing on the contour to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

The soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Overgrazing increases runoff and erosion. Grazing during periods of seasonal wetness often cuts and compacts the surface layer and increases erosion.

The potential productivity for trees on this soil is moderately high. The soil is managed mostly for pine, which is susceptible to uprooting during windy periods.

The seasonal high water table and the moderately slow permeability are the main limitations of the soil for nonfarm use, especially for use of the soil as a site for buildings or septic tank absorption fields. The water table and low strength limit the soil for local roads and streets.

The capability subclass is IIe.

18A—State fine sandy loam, 0 to 2 percent slopes. This soil is deep, level to nearly level, and well drained. It is on the low marine terrace. The areas of this soil are long and narrow or oval and are 400 to 1,000 feet wide. They range from about 5 to 50 acres.

Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The subsoil is strong brown loam, clay loam, and sandy loam 36 inches thick. The substratum is mottled, light brownish gray sandy clay loam and very fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately well drained Tetotum soils, somewhat excessively drained Rumford soils, and well drained Suffolk soils. The Tetotum soils are in lower landscape positions and depressions, and the Rumford and Suffolk soils are on slightly higher ridges and knolls. Included soils comprise about 30 percent of this unit.

The permeability of this State soil is moderate in the subsoil, and available water capacity is moderate. Surface runoff is slow. The surface layer is low in organic matter content and has low to moderate natural fertility. The surface layer and subsoil in unlimed areas are commonly very strongly acid or strongly acid. A seasonal high water table mainly is at a depth of 4 to 6 feet.

Most areas of this soil are used for cultivated crops and for pasture and hay. A few areas are in woodland.

This soil is well suited to cultivated crops and hay, especially to corn, soybeans, and such small grains as barley and wheat. Minimum tillage, keeping crop residue on or in the soil, cover crops, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. Chisel plowing to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. The main pasture management practices are the use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer.

The potential productivity for trees on this soil is high. Most wooded areas are managed for loblolly pine.

The soil is generally suitable for nonfarm use, but the seasonal high water table is a limitation for use as a site for septic tank absorption fields and dwellings with basements. Low strength limits the soil as a site for local roads and streets.

The capability class is I.

18B—State fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is in low, narrow areas between the Coastal Plain upland and the low marine terrace and at the break between broad flat areas and interfingering drainageways. The areas are 200 to 500 feet wide and range from about 5 to 30 acres.

Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The subsoil is strong brown loam, clay loam, and sandy loam 36 inches thick. The substratum is mottled, light brownish gray sandy clay loam and very fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of moderately well drained Tetotum soils, somewhat excessively drained Rumford soils, and well drained Suffolk soils. The Tetotum soils are in lower landscape positions and depressions, and the Rumford and Suffolk soils are on slightly higher ridges and knolls. Included soils comprise about 30 percent of this unit.

The permeability of this State soil is moderate in the subsoil, and available water capacity is moderate. Surface runoff is medium. The surface layer is low in organic matter content and has low to moderate natural fertility. The surface layer and subsoil in unlimed areas are commonly very strongly acid or strongly acid. A seasonal high water table mainly is at a depth of 4 to 6 feet.

Most areas of this soil are used for cultivated crops and pasture and hay. A few areas are in woodland.

This soil is well suited to cultivated crops and hay. The hazard of erosion is moderate and is a main management concern. Grassed waterways, minimum tillage and contour tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to increase organic matter content, maintain tilth, and control erosion in cultivated areas. Chisel plowing on the contour to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. The main pasture management practices are the use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer. Overgrazing increases the hazard of erosion.

The potential productivity for trees on this soil is high. Most wooded areas are managed for loblolly pine.

The soil is generally suitable for nonfarm use, but the seasonal high water table is a limitation for use as a site for septic tank absorption fields and dwellings with basements. Low strength limits the soil as a site for local roads and streets.

The capability subclass is IIe.

19A—Suffolk sandy loam, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It is on broad ridgetops on the Coastal Plain upland and on the low marine terrace. The areas of this soil are rectangular or oval and are 200 to 2,000 feet wide. They range from about 5 to 100 acres.

Typically, the surface layer is brown sandy loam about 9 inches thick. The subsoil is strong brown and is 32 inches thick. It is loam and fine sandy loam in the upper part and loamy sand in the lower part. The substratum is light yellowish brown sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Emporia and Savannah soils on the upland and State and Tetotum soils on the low marine terrace. The Emporia and Savannah soils are on knolls, at the ends of narrow ridges, and at the upper edge of steeper side slopes. The State and Tetotum soils are at slightly lower areas or in slightly depressional areas. Included soils make up about 10 to 15 percent percent of this unit.

The permeability of this Suffolk soil mainly is moderate. In some sandy layers it is moderately rapid. Available water capacity is moderate. Surface runoff is slow. The surface layer is low in organic matter content and has low natural fertility. The surface layer and subsoil in unlimed areas are very strongly acid or strongly acid.

Most areas of this soil are used for cultivated crops and pasture and hay. A few areas are in woodland.

This soil is well suited to cultivated crops and hay (fig. 6). The hazard of wind erosion is a main management concern. Minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to control wind erosion, increase organic matter content, and maintain tilth in cultivated areas. Chisel plowing to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime

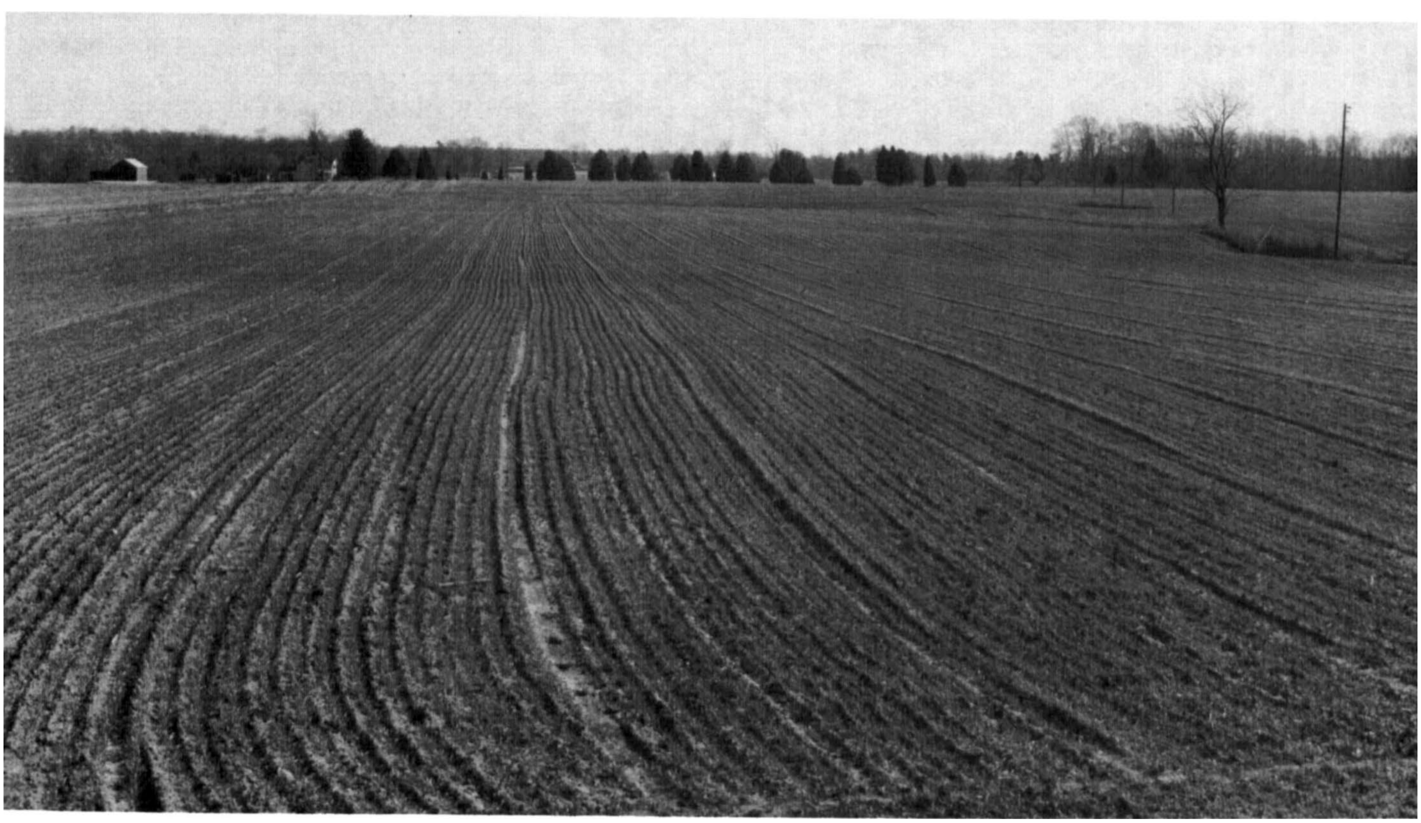


Figure 6.—Fall-planted small grains on an area of Suffolk sandy loam, 0 to 2 percent slopes.

and fertilizer are the main pasture management practices.

The potential productivity for trees on this soil is moderately high. The wooded areas of the soil are managed for pines and hardwoods.

The soil is generally suitable for nonfarm use, but the moderately rapid permeability in the sandy layers causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

The capability class is I.

19B—Suffolk sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and well drained. It is on ridgetops on the Coastal Plain upland. The areas of this soil are rectangular or oval and are about 200 to 1,200 feet wide. They range from about 5 to 100 acres.

Typically, the surface layer is brown and yellowish brown sandy loam about 8 inches thick. The subsoil is 49 inches thick. It is brown and strong brown sandy loam and loam in the upper part and pale brown loamy sand in the lower part. The substratum is yellowish red sandy clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Emporia and Savannah soils on knolls, at the ends of narrow ridges, and at the upper edge of steeper side slopes. Included soils make up about 10 to 15 percent of this unit.

The permeability of this Suffolk soil mainly is moderate. In some sandy layers it is moderately rapid. Available water capacity is moderate. Surface runoff is slow to medium. The surface layer is low in organic matter content and has low natural fertility. The surface layer and subsoil in unlimed areas are very strongly acid or strongly acid.

About half of the acreage of this soil is used for cultivated crops and pasture and hay. The remaining areas are in woodland.

This soil is well suited to cultivated crops and hay. The hazard of water erosion is moderate and is a main management concern, especially in the more sloping areas. Contour and minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to control erosion by wind and water, increase organic matter content, and maintain tilth in cultivated areas. Chisel plowing on the contour to a depth of 12 to 18 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Overgrazing increases the hazard of erosion.

The potential productivity for trees on this soil is moderately high. The wooded areas of the soil are managed for pines and hardwoods.

The soil is generally suitable for nonfarm use, but the moderately rapid permeability in the sandy layers causes a hazard of ground-water pollution in areas used for septic tank absorption fields.

The capability subclass is IIe.

20A—Tetotum fine sandy loam, 0 to 2 percent slopes. This soil is deep, level to nearly level, and moderately well drained. It is on the broad areas of the low marine terrace. The areas are 200 to 1,000 feet wide. Some are broad and level and range from 20 to 40 acres, and some are in drainageways and range from 5 to 20 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 10 inches thick. The subsoil is 46 inches thick. The upper part of the subsoil is light olive brown fine sandy loam, loam, and mottled sandy clay loam. The middle part is mottled, yellowish brown sandy clay loam. The lower part is mottled, light brownish gray fine sandy loam. The substratum is mottled, light gray fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Nansemond soils, well drained State soils, and somewhat poorly drained Yemassee soils. The Nansemond soils are mixed with this Tetotum soil. The State soils are at slightly higher landscape positions than the Tetotum soils, and the Yemassee soils are in shallow depressions. Also included are areas of moderately well drained to somewhat poorly drained soils on the river terrace. Included soils make up about 10 to 15 percent of the unit.

The permeability of this Tetotum soil is moderate in the subsoil, and available water capacity is moderate. Surface runoff is slow. The surface layer is low to moderate in natural fertility. The surface layer and subsoil in unlimed areas are extremely acid to strongly acid. A seasonal high water table is at a depth of 1.5 to 2.5 feet during late winter and early spring and during periods of prolonged wet weather.

Most areas of this soil are used for cultivated crops and for pasture and hay. A few areas are in woodland.

This soil is well suited to cultivated crops and hay. Minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. Chisel plowing to a depth of 10 to 16 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Grazing during periods of seasonal wetness often cuts and compacts the surface layer.

The potential productivity for trees on this soil is moderately high. Most wooded areas of the soil are managed for loblolly pine. Seasonal wetness limits the use of some types of equipment.

The seasonal high water table is the main limitation of the soil for nonfarm use. The water table especially limits the soil as a site for septic tank absorption fields and sanitary landfills and, along with low strength, as a site for local roads and streets.

The capability subclass is IIw.

20B—Tetotum fine sandy loam, 2 to 6 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is in long, narrow areas between the Coastal Plain upland and the low marine terrace and in interfingering drainageways. Slopes are smooth and are 200 to 500 feet wide. The areas range from about 4 to 80 acres.

Typically, the surface layer is dark brown fine sandy loam about 10 inches thick. The subsoil is 46 inches thick. The upper part of the subsoil mainly is yellowish brown sandy clay loam, loam, and mottled clay loam. The lower part is mottled, light brownish gray fine sandy loam. The substratum is mottled, light gray sandy loam and loamy fine sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Nansemond soils, somewhat excessively drained Rumford soils, well drained State soils, and somewhat poorly drained Yemassee soils, all of which are mixed with this Tetotum soil. Also included are areas with a substratum of clay. Included soils make up about 5 to 10 percent of the unit.

The permeability of this Tetotum soil is moderate in the subsoil. Available water capacity is moderate. Surface runoff is medium. The surface layer is low in organic matter content and low to moderate in natural fertility. The surface layer and subsoil in unlimed areas are extremely acid to strongly acid. A seasonal high water table is at a depth of 1.5 to 2.5 feet during late winter and early spring and during periods of prolonged wet weather.

Most areas of this soil are used for cultivated crops and pasture and hay. A few areas are in woodland.

This soil is well suited to cultivated crops and hay. The hazard of erosion is moderate and is a main management concern. Minimum tillage and contour tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to reduce runoff and control erosion in cultivated areas. Chisel plowing on the contour to a depth of 10 to 16 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes and the prevention of overgrazing are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred of grazing, and the use of lime and fertilizer are the main pasture management practices. Overgrazing increases runoff and erosion.

The potential productivity for trees on this soil is moderately high. The wooded areas of the soil are managed for hardwoods and loblolly pine. Seasonal wetness limits the use of some types of equipment.

The seasonal high water table is the main limitation of the soil for nonfarm use. The water table especially limits the soil as a site for septic tank absorption fields and sanitary landfills and, along with low strength, as a site for local roads and streets.

The capability subclass is IIe.

21—Tomotley fine sandy loam. This soil is deep, poorly drained, and nearly level. It is on the low marine terrace and is in drainageways and depressions on the Coastal Plain upland. Some areas of this soil are long and narrow, and some are oval. The areas are 200 to 1,000 feet wide and range from about 5 to 100 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is mottled, very dark gray and light gray fine sandy loam about 7 inches thick. The subsoil is mottled, grayish brown and gray clay loam and sandy clay loam 34 inches thick. The substratum is stratified light brownish gray and gray sand and clay loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of poorly drained Leaf soils, moderately well drained Nansemond and Tetotum soils, and somewhat poorly drained Yemassee soils. The Leaf soils are in depressional landscape positions, and the Nansemond and Tetotum soils are in slightly higher landscape positions than this Tomotley soil. These included soils make up less than 20 percent of the unit.

The permeability of this Tomotley soil is moderate in the subsoil. Available water capacity is moderate. Surface runoff is slow to very slow. The surface layer is low to moderate in organic matter content and low in natural fertility. The surface layer and subsoil in unlimed areas commonly are extremely acid to strongly acid. A seasonal high water table is between the surface and a depth of 1 foot during winter and early spring.

Most areas of this soil are in woodland. A few areas are used for cultivated crops and pasture and hay.

Undrained areas of this soil are poorly suited to cultivated crops and hay, but drained areas are well suited (fig. 7). Minimum tillage, cover crops, keeping crop residue in or on the soil, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. Chisel plowing to a depth of 10 to 16 inches every 3 to 5 years improves aeration of the soil and root development.

Seasonal wetness makes this soil poorly suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the prevention of overgrazing, and providing drainage are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred of grazing, and the use of lime and fertilizer are the main pasture management practices. Grazing during periods of seasonal wetness often compacts the surface layer.

The potential productivity for trees on this soil is high, and the soil is managed for pines and hardwoods.

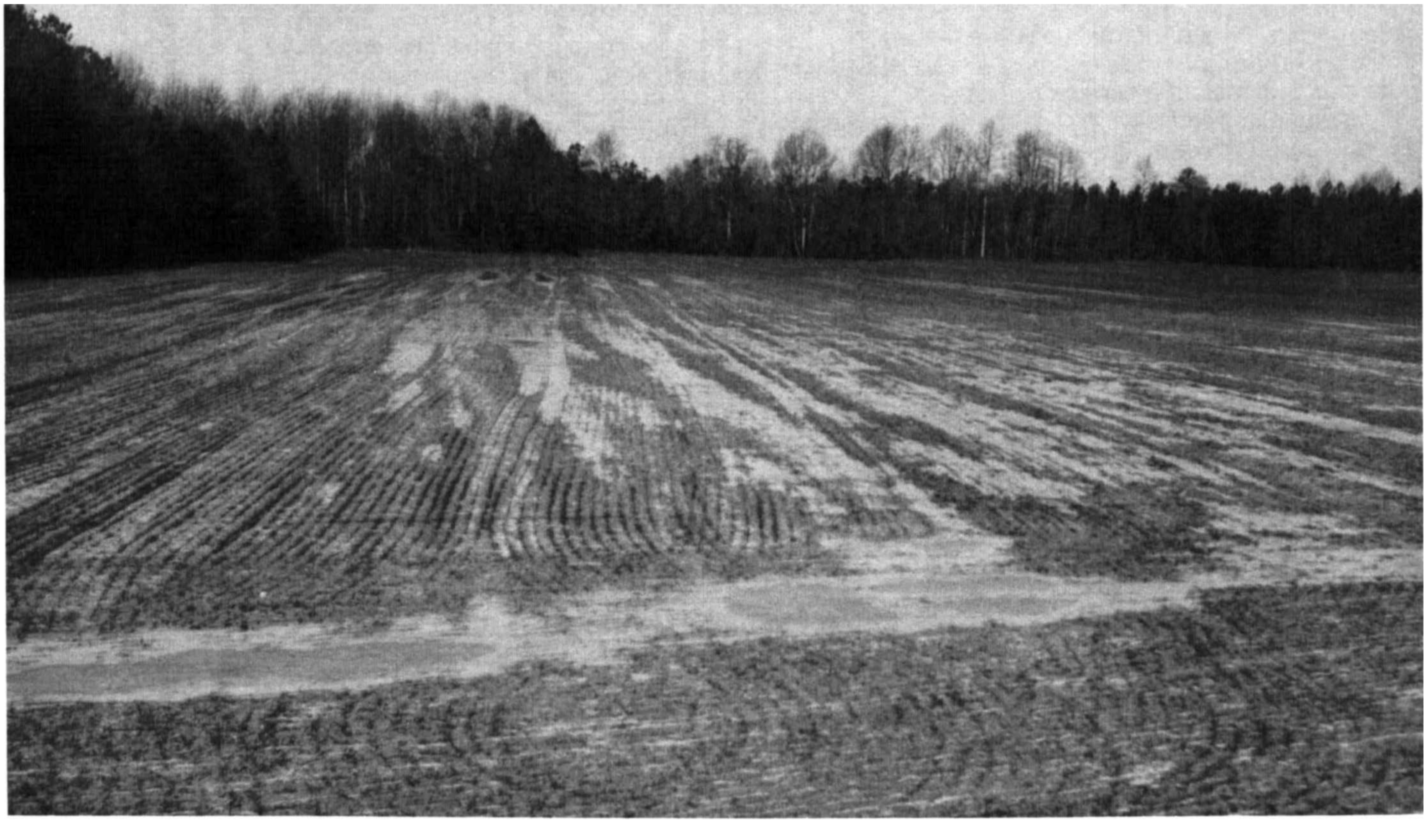


Figure 7.—Wet spots on an area of Tomotley fine sandy loam.

Seasonal wetness, however, causes a high rate of seedling mortality and restricts the use of timber equipment.

The seasonal high water table is the main limitation for nonfarm use. It limits the use of the soil as a site for buildings, sanitary landfills, septic tank absorption fields, and local roads and streets.

The capability subclass is IVw.

22—Wahee fine sandy loam. This soil is deep, nearly level, and somewhat poorly drained. It is on the low marine terrace of the Rappahannock River. The areas range from about 5 to 30 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is dark brown and yellowish brown fine sandy loam and loam about 6 inches thick. The subsoil is mottled and extends to a depth of 60 inches or more. The upper part of the subsoil is yellowish brown, light olive brown, and grayish brown clay. The lower part is light brownish gray sandy clay loam.

Included with this soil in mapping are small areas around drainageways and in slight depressions of moderately well drained Tetotum soils, somewhat poorly drained Yemassee soils, and poorly drained Leaf soils. Included soils make up about 10 percent of the unit.

The permeability of this Wahee soil is slow in the subsoil. Available water capacity is moderate to high. Surface runoff is slow. The surface layer is low to moderate in organic matter content and low in natural fertility. A seasonal high water table is at a depth of 6 to 18 inches during winter and spring. The subsoil has a moderate shrink-swell potential. The surface layer and subsoil in unlimed areas commonly are extremely acid to medium acid.

Most areas of this soil are in woodland. A few areas are used for cultivated crops or for pasture and hay.

Undrained areas of this soil are moderately well suited to cultivated crops and to hay, and drained areas are well suited. Seasonal wetness is the main limitation, and providing drainage is the main management concern. Minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. Deep chisel plowing mixes the clayey subsoil with the surface layer and destroys the tilth of the soil.

This soil is moderately well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the prevention of overgrazing, and providing drainage are the major pasture management concerns. Use of proper stocking rates, pasture rotation, and deferred grazing are the main pasture management practices. Grazing during periods of seasonal wetness cuts and compacts the surface layer.

The potential productivity for trees on this soil is high, and the soil is managed for pines and hardwoods. Seasonal wetness, however, causes a high rate of seedling mortality and restricts the use of timber equipment.

The seasonal high water table is the main limitation of the soil for nonfarm use. It limits the use of the soil as a site for buildings, sanitary landfills, septic tank absorption fields, and local roads and streets.

The capability subclass is IIIw.

23—Yemassee fine sandy loam. This soil is deep, somewhat poorly drained, and nearly level. It is on the low marine terrace. The areas of this soil are irregularly shaped or oval and are 200 to 1,200 feet wide. They range from about 5 to 25 acres. Slopes range from 0 to 2 percent.

Typically, the surface layer is grayish brown fine sandy loam about 8 inches thick. The subsoil is 40 inches thick. The upper part of the subsoil is light olive brown fine sandy loam. The lower part is mottled and gray clay loam, loam, and sandy clay loam. The substratum is light gray fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Nansemond and Tetotum soils that are at slightly higher landscape positions than this Yemassee soil and poorly drained Tomotley soils in slightly depressional areas. Included soils make up 5 to 10 percent of the unit.

The permeability of this Yemassee soil is moderate in the subsoil. Available water capacity is moderate. Surface runoff is slow. The surface layer is low to moderate in organic matter content and low in natural fertility. The surface layer and subsoil in unlimed areas are commonly extremely acid through strongly acid. A seasonal high water table is at a depth of 1 to 1.5 feet during winter and early spring and during periods of prolonged wetness.

Most areas of this soil are in woodland. A few areas are used for cultivated crops and for pasture and hay.

Undrained areas of this soil are moderately well suited to cultivated crops and hay, and drained areas are well suited. Minimum tillage, cover crops, keeping crop residue on or in the soil, and using grasses and legumes in the cropping system help to increase organic matter content and maintain tilth in cultivated areas. Chisel plowing to a depth of 10 to 16 inches every 3 to 5 years improves aeration of the soil and root development.

This soil is well suited to pasture. Establishing and maintaining a mixture of grasses and legumes, the prevention of overgrazing, and providing drainage are major pasture management concerns. Use of proper stocking rates, pasture rotation, deferred grazing, and the use of lime and fertilizer are the main pasture management practices. Grazing during periods of seasonal wetness often compacts the surface layer.

The potential productivity for trees on this soil is high, and the soil is managed for pines and hardwoods. Seasonal wetness, however, causes a high rate of seedling mortality and restricts the use of timber equipment.

The seasonal high water table is the main limitation for nonfarm use. It limits the use of the soil as a site for buildings, sanitary landfills, septic tank absorption fields, and local roads and streets.

The capability unit is IIIw.

prime farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. It is of major importance in providing the Nation's short- and long-range needs for food and fiber. The supply of high quality farmland is limited, and the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, must encourage and facilitate the use of our Nation's prime farmland with wisdom and foresight.

Prime farmland, as defined by the U.S. Department of Agriculture, is 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 economically produce a sustained high yield of crops when it is treated and managed using acceptable farming methods. Prime farmland produces the highest yields with minimal inputs of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland may now be in crops, pasture, woodland, or other land, but not in urban and built-up land or water areas. It must either be used for producing food or fiber or be available for these uses.

About 55,082 acres, or nearly 42 percent, of Richmond County meets the soil requirements for prime farmland. The areas are in all parts of the county. The prime farmland in the county usually has an adequate and dependable supply of moisture from precipitation or irrigation. It also has favorable temperature and growing season and acceptable levels of acidity or alkalinity. It has few or no rocks and is permeable to water and air. Prime farmland is not excessively erodible or saturated with water for long periods and is not flooded during the growing season. The slope ranges 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.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and difficult to cultivate and usually less productive.

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

Some soils that have a high water table can be classified as prime farmland if such a limitation is overcome. These soils are shown in the following list, and the measure needed to overcome the limitation is given in parentheses. Onsite evaluation is necessary in such areas to determine if the limitation has been overcome.

The map units that meet the soil requirements for prime farmland are:

1—Atlee silt loam
4B—Dogue fine sandy loam, 2 to 6 percent slopes
5B—Emporia loam, 2 to 6 percent slopes
6B—Kempsville sandy loam, 2 to 6 percent slopes
7—Kempsville loam
8—Leaf silt loam (if artificially drained)
9—Lumbee loam (if artificially drained)
10—Nansemond fine sandy loam
11—Pamunkey loam, wet substratum
14B—Rumford loamy sand, 0 to 6 percent slopes
18A—State fine sandy loam, 0 to 2 percent slopes
18B—State fine sandy loam, 2 to 6 percent slopes
19A—Suffolk sandy loam, 0 to 2 percent slopes
19B—Suffolk sandy loam, 2 to 6 percent slopes
20A—Tetotum fine sandy loam, 0 to 2 percent slopes
20B—Tetotum fine sandy loam, 2 to 6 percent slopes
21—Tomotley fine sandy loam (if artificially drained)
22—Wahee fine sandy loam (if artificially drained)
23—Yemassee fine sandy loam (if artificially drained)

use and management of the soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help 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 bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

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

crops and pasture

General management needed for crops and pasture is suggested in this section. 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.

Erosion is the major hazard on the gently sloping soils in the county that are well suited to crops. The gently sloping areas cover about 70 percent of the acreage. Erosion is harmful for two reasons. First, if the surface layer is lost through erosion, most of the available nutrients and organic matter are lost, thereby reducing the rate of water infiltration, the available water capacity, and the general tilth of the soil. Erosion of the surface layer is especially damaging to soils that have a firm underlying layer. Second, erosion on farmland commonly causes sedimentation of streams, reducing the quality of water for municipal use and for fish and wildlife.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps plant cover on the soil for extended periods reduces soil erosion and preserves the productive capacity of the soils. Minimum tillage and contour tillage and a system that rotates grass or close-growing crops with row crops will help to control erosion on cropland.

Another type of erosion, soil blowing, is a moderate hazard on areas of State and Suffolk soils and a severe hazard on the Catpoint and Rumford soils. Maintaining a plant cover or using crop residues as a surface mulch minimizes soil blowing on these soils.

Drainage of water from the soil is needed on some of the acreage used for crops. On the upland, drainage is needed to a limited extent to eliminate seeps and wet spots in drainageways and depressions and to lower the perched water table in the Savannah and Atlee soils. Drainage is needed to lower the seasonal high water table in soils such as Lumbee and Leaf soils and in the Nansemond and Tetotum soils on the low marine terrace.

The design of surface and subsurface drainage systems varies with the kind of soil. Generally, a subsurface system is needed in areas of Lumbee, Nansemond, Tomotley, Tetotum, and Yemassee soils, but a combined surface and subsurface system is needed on the Leaf and Wahee soils that are intensively farmed.

Fertilizers, in the form of nitrates, phosphates, and potash, are suitable for most of the arable soils in the county. Such soils are commonly medium acid to strongly acid and require periodic applications of ground limestone to lower acidity.

yields per acre

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

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations 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 insures 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 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils.

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 grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor does it consider possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. 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, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is 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.

woodland management and productivity

M. Thomas Brooks, Virginia State Department of Forestry, and Norman O. Wilson, Soil Conservation Service, assisted with the preparation of this section.

Richmond County contains about 79,027 acres of forestland, most of which is privately owned (*5*).

Four major forest types are dominant in the county: (1) The oak-hickory forest type comprises 51 percent of the wooded area and is mainly on the Rumford, Kempsville, and Emporia soils. (2) The loblolly-shortleaf pine forest type comprises 34 percent of the wooded area and is mainly on the Emporia, Suffolk, and Kempsville soils. (3) The oak-gum-cypress forest type comprises 9 percent of the wooded area and is mainly on the Leaf, Bibb, and Levy soils. (4) The oak-pine forest type comprises 6 percent of the wooded area and is mainly on the Lumbee, Wahee, and Savannah soils.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops.

Only those soils suitable for wood crops are listed. The table lists the ordination (woodland suitability) symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *w* indicates excessive water in or on the soil; *c*, clay in the upper part of the soil; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: w, c, and r.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

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

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

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

Ratings of *windthrow hazard* are based on soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that a few trees may be blown down by normal winds; *moderate*, that some trees will be blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

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. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

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

recreation

The soils of the survey area are rated in table 7 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 recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

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

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

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have 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, horseback riding, and bicycling 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 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The 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, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, 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, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are tall fescue and clover.

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, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are broom sedge, goldenrod, beggarweed, polkweed, and fescue.

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, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, holly, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants furnish browse, seeds, and cones. 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, cedar, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, and slope. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, 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 wetness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

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

Habitat for openland wildlife consists of cropland, pasture, 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, woodchucks, 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, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and whitetail 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, shore birds, muskrat, and beaver.

engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. 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, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, 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 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and 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 bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 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 bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), 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 bedrock or 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, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

sanitary facilities

Table 10 shows the degree and the 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 10 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 bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock 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 effectively filter the effluent. 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 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, flooding, 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, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

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

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

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench 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 soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, 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 11 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 large stones, 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, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They 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 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand 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 rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand 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 and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

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

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

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are 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, stones, 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, stones, 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 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed 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, irrigation, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or 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. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, 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 bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

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

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or 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 classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

engineering index properties

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

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "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 a soil contains particles coarser than sand, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

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

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

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

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 oven-dry 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.

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

Clay as a soil separate 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 earth-moving 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.

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 and the amount of soil lost. 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 18 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 18 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 14, the estimated content of organic matter of the plow layer is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

soil and water features

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

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt and water in swamps and marshes are not considered flooding.

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

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information 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 that form in 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 15 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An apparent water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An artesian water table is under hydrostatic head, generally beneath 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.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

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.

water table fluctuations

The seasonal high water table is the primary limitation in Richmond County for nonfarm and farm use of most of the soils on the low marine terrace and fluvial river terrace. The range in depth to the water table in the soils in these areas is shown in figure 8. The information given in figure 8 was compiled during the period 1975-79.

Figure 8.—Water table fluctuations in soils on the low marine terrace.

Water table levels were read on the 15th of each month. The mean value, given in parentheses, is the mean for all observations for that month during the period of observation. The range indicates the minimum and maximum depths of the water table for each month. A plus (+) sign preceding the range indicates that water is above the surface; a plus sign following the range indicates that the depth of the water table exceeds maximum given in the range.

Soil	Well Number	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
		Inches From The Surface											
Leaf	1	(9)3-20	(10)3-16	(3)2-4	(13)5-28	(2)0-3	(30)22-38	(71)62-80	(31)8-47	(47)20-68	(32)3-94	(34)2-96	(15)4-38
Lumbee	2	(5)0-10	(22)	(8)	(20)	(30)	(30)	(46)46-46	(36)31-41	(33)12-54	(37)12-62	(33)0-66	(19)14-24
Nansemond	3	(37)24-60	(35)22-40	(27)4-55	(38)22-60	(46)10-72	(60)43-78	(79)60-100	(72)36-100+	(74)25-100	(57)18-100+	(54)21-97	(55)24-82
Pamunkey	4	(58)40-76	(60)50-68	(60)40-72	(63)48-72	(63)20-84+	(68)55-84+	(72)34-84+	(82)78-84+	(77)50-84+	(71)47-84+	(63)34-84+	(67)60-72
Rumford	5	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)
Savannah	6A	(13)3-20	(30)20-40	(15)10-24	(38)36-42+	(19)3-41	(35)28-42+	(42+)40-42+	(36)24-42+	(42+)40-42+	(30)6-42+	(19)3-42+	(20)5-30
Savannah	6B	(18)11-27	(34)26-43	(25)12-49	(51)36-61	(26)6-59	(52)34-82+	(74)68-82+	(64)27-82+	(69)42-82+	(60)15-82+	(35)11-82+	(37)7-76
Suffolk	7	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)	(120+)
State	8	(84)70-104	(78)69-87	(70)48-90	(84)76-91	(85)60-102	(96)76-108	(108)90-115+	(103)82-115+	(100)60-115+	(85)58-115+	(89)57-115+	(94)75-115+
Tetotum	10	(45)38-62	(47)42-56	(38)20-56	(54)47-60	(54)25-69	(62)47-76	(79)61-100+	(76)50-94	(79)78-100+	(54)18-99	(58)22-92	(61)36-90
Tomotley	12	(4)+1-23	(5)0-10	(2)0-8	(10)0-20	(24)0-40	(48)34-64	(53)6-83	(59)0-88	(64)10-90	(36)0-84	(29)+1-100	(19)0-90
Wahee	13A	(9)5-18	(52)10-106	(27)3-90	(43)8-88	(65)1-114	(88)24-120+	(80)21-120+	(96)13-120+	(107)82-120+	(67)1-120	(48)2-120	(20)3-51
Wahee	13B	(7)3-16	(18)5-24+	(13)2-24+	(16)5-24+	(16)0-24+	(18)1-24+	(20)13-24+	(21)10-24+	(24)22-24+	(16)1-24+	(13)2-24+	(13)2-24+
Wahee	14	(16)3-35	(17)6-24	(14)+1-33	(28)19-42	(39)2-74	(61)34-92	(76)27-105	(75)22-105	(83)35-105	(51)4-105	(46)4-105	(50)12-95
Wahee	15	(20)1-86	(12)6-24	(9)1-15	(24)12-33	(43)0-85	(80)46-112	(88)28-112+	(85)12-112+	(96)32-112+	(75)4-112+	(55)1-112+	(45)4-111
Yemassee	16	(53)21-98	(39)16-68	(15)10-20	(32)19-40	(31)10-56	(35)18-47	(54)12-82	(61)32-92	(72)30-95	(66)14-95	(63)9-95	(73)18-101

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. In table 16, the soils of the survey area are classified according to the system. 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 Ultisol.

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

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

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

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

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

soil series and their morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. 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 (*4*). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (*3*). 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."

Atlee series

The soils of the Atlee series are deep and moderately well drained. The lower part of the B2t horizon is moderately slowly permeable clay loam. The soils formed in medium textured to fine textured marine sediments on ridgetops on the Coastal Plain upland. Slopes range from 0 to 2 percent.

Atlee soils commonly are near Emporia, Kempsville, and Rumford and Tetotum soils. Atlee soils are not as well drained as the Emporia and Kempsville soils, are more clayey and more slowly permeable in the lower part of the solum than the Kempsville soils, and are not as steep as the Rumford and Tetotum soils.

Typical pedon of Atlee silt loam, at Kennard, 265 yards north of the end of a woods road and 565 yards northwest of VA-631, at a point 0.7 mile south of the junction of the woods road and VA-631:

O1—2 inches to 0, undecomposed and decomposed pine needles and twigs.

A1—0 to 3 inches, grayish brown (10YR 5/2) silt loam; weak medium granular structure; slightly hard, very friable, nonsticky, slightly plastic; many fine and medium roots; common fine interstitial and few fine tubular pores; very strongly acid; abrupt wavy boundary.

A2—3 to 9 inches, light yellowish brown (2.5Y 6/4) silt loam; moderate thin platy structure in upper part, weak thin platy structure in lower part; hard, friable, slightly sticky, slightly plastic; common very fine and few medium roots; common very fine interstitial pores; extremely acid; clear smooth boundary.

B21t—9 to 16 inches, brownish yellow (10YR 6/6) silt loam; weak fine and medium subangular blocky structure; hard, friable, sticky, slightly plastic; common very fine and fine roots; few very fine interstitial and few fine continuous oblique tubular pores; thin continuous yellowish red (5YR 4/6) films of clay; extremely acid; clear smooth boundary.

B22t—16 to 22 inches, yellowish brown (10YR 5/6) clay loam; common fine distinct gray (10YR 6/1) mottles and few medium distinct red (2.5YR 4/6) mottles; moderate very coarse prismatic structure parting to weak thin platy; very hard, friable, sticky, slightly plastic; firm and compact in place; few very fine roots on plate surfaces, common very fine roots in gray (10YR 6/1) vertical polygonal veins and in lateral vein at the top of polygons; common fine interstitial pores; thin continuous yellowish brown (10YR 5/6) films of clay; extremely acid; clear smooth boundary.

B23t—22 to 32 inches, brownish yellow (10YR 6/6) clay loam; few fine distinct red (2.5YR 4/6) mottles and common fine faint reddish yellow (7.5YR 6/6) mottles; moderate very coarse prismatic structure parting to weak medium platy; very hard, sticky, slightly plastic, firm and compact in place; compact and brittle in 50 percent of the volume; common very fine roots in gray (10YR 6/1) vertical polygonal veins and few very fine roots on plate faces; common very fine interstitial pores; thin continuous strong brown (7.5YR 5/6) films of clay; extremely acid; gradual irregular boundary.

B24t—32 to 63 inches, mottled yellowish brown (10YR 5/6), red (2.5YR 4/6), reddish yellow (7.5YR 6/8), and gray (10YR 6/1) clay loam; weak very coarse prismatic structure parting to weak medium platy; very hard, firm, very firm in place, sticky, plastic; few very fine roots in gray vertical polygonal veins; few very fine interstitial pores; thin continuous strong brown (7.5YR 5/6) clay films on faces of plates; extremely acid.

The solum thickness is more than 60 inches. The depth to low-chroma mottles ranges from 16 to 28 inches. The depth to the compact and brittle horizon ranges from 20 to 40 inches. Fine pebbles make up 0 to 5 percent of individual horizons in the lower part of the solum. Reaction throughout this soil is extremely acid or very strongly acid in unlimed areas.

The Ap or A1 horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4. The horizon is silt loam, loam, or fine sandy loam. The A2 horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 3 or 4. It is silt loam, loam, or fine sandy loam.

The B horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 8. The upper part of the B horizon is silt loam, loam, or clay loam. The lower part is mottled yellow, gray, brown, and red. It is clay loam or clay.

Bibb series

The soils of the Bibb series are deep and poorly drained. They are moderately permeable and formed in coarse textured to medium textured stratified alluvial sediments along the major streams. These soils are flooded several times during most years. Slopes are dominantly less than 1 percent but range to 2 percent.

The Bibb soils in this survey area are only mapped with Levy soils and commonly are near Rumford and Tetotum soils and Tomotley soils. Bibb soils have more sand throughout the profile than the Levy soils, are not as well drained and not as steep as the Rumford and Tetotum soils, and are coarser textured than the Tomotley soils.

Typical pedon of Bibb loam, in an area of Bibb and Levy soils, in Strawberry Bottom on Bookers Mill stream, 330 yards west of VA-612, 0.7 mile north of the junction of VA-612 and VA-602, 1.14 miles east of Farnham:

A1—0 to 8 inches, dark brown (7.5YR 3/2) loam; weak fine granular structure; friable, sticky, slightly plastic; many fine and medium roots; very strongly acid; clear smooth boundary.

C1—8 to 13 inches, dark gray (10YR 4/1) sandy loam; few fine distinct light brownish gray (10YR 6/2) mottles; massive; friable, slightly sticky, slightly plastic; many fine roots; medium acid; abrupt smooth boundary.

C2—13 to 20 inches, dark gray (10YR 4/1) sandy loam; common medium faint dark grayish brown (2.5Y 4/2) mottles; massive; friable, slightly sticky; common fine roots; medium acid; clear smooth boundary.

C3—20 to 34 inches, very dark gray (10YR 3/1) sandy loam; massive; friable; few fine roots; medium acid; clear smooth boundary.

C4—34 to 48 inches, dark gray (10YR 4/1) loamy sand; common coarse faint very dark gray (10YR 3/1) mottles; massive; friable; few fine roots; slightly acid; clear smooth boundary.

C5—48 to 54 inches, grayish brown (2.5Y 5/2) sand; massive; very friable; 1 percent fine pebbles; slightly acid; clear smooth boundary.
C6—54 to 60 inches, grayish brown (2.5Y 5/2) loamy sand; many coarse distinct strong brown (7.5YR 5/6) mottles; massive; very friable; strongly acid.

The soil is very strongly acid or strongly acid unless limed. In areas where lime has been added to parts of the watershed, the soil ranges to neutral at a depth of less than 20 inches and to mildly alkaline at a depth of more than 20 inches.

The A horizon has hue of 7.5YR through 2.5Y, value of 3 or 4, and chroma of 0 through 2. It is loam or silt loam.

The C horizon has hue of 10YR through 5Y, value of 3 through 7, and chroma of 1 or 2. Few to many mottles of red, brown, and yellow are in most pedons. The horizon mainly is loamy sand, sand, sandy loam, or loam. In some pedons it is stratified at a depth of less than 40 inches and has thin strata ranging from sand through silty clay loam at a depth of more than 40 inches. In some pedons the horizon has thin strata that have a high content of organic matter or pebbles.

Catpoint series

Soils of the Catpoint series are deep, nearly level or gently sloping, and somewhat excessively drained. The soils formed in coarse textured fluviomarine sediments on the low marine terrace. Slopes range from 0 to 6 percent.

Catpoint soils commonly are near Suffolk soils and Rumford and Tetotum soils. Catpoint soils are more sandy and more excessively drained than the Suffolk and Tetotum soils and are not as sloping as the Rumford and Tetotum soils.

Typical pedon of Catpoint loamy sand, 0 to 6 percent slopes, 18 yards north of a field road at a point 420 yards west along field road from farm lane, 0.76 mile north of the intersection of the farm lane and VA-634, 2.0 miles west of the junction of VA-624 and VA-634, near Cat Point Creek:

Ap—0 to 9 inches, dark brown (10YR 3/3) loamy sand; weak coarse granular structure; very friable; common fine roots; slightly acid; abrupt smooth boundary.
B21—9 to 16 inches; dark yellowish brown (10YR 4/4) sand; common medium faint light yellowish brown (10YR 6/4) pockets; weak coarse subangular blocky structure; very friable; coated few fine roots; Ap material in upper part; 1 percent semirounded quartz pebbles 1/2 to 1 inch in diameter; slightly acid; gradual wavy boundary.
B22—16 to 27 inches; yellowish brown (10YR 5/4) sand; few fine distinct brown (7.5YR 4/4) pockets; single grain; loose; coated few fine roots; 1 percent semirounded quartz pebbles 1/2 to 1 inch in diameter; slightly acid; wavy diffuse boundary.
A21—27 to 40 inches; light yellowish brown (10YR 6/4) sand; single grain; loose; few fine roots; slightly acid; gradual wavy boundary.
A22&B—40 to 72 inches; very pale brown (10YR 7/3) fine sand (A2); single grain; loose; uncoated; few dark minerals; yellowish brown (10YR 5/4) fine sandy loam lamellae (Bt) 1/8 to 1 inch thick, totaling 2 to 3 inches in thickness; weak fine subangular blocky structure; very friable; sand grains coated and bridged with clay; slightly acid.

The thickness of sandy material is more than 80 inches. The soil is very strongly acid through slightly acid in unlimed areas. Rounded pebbles make up 0 to 20 percent, by volume, of the soil. Lamellae are at a depth of 40 to 60 inches and have a total thickness of less than 3 inches. Lamellae have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4. The lamellae are sandy loam or fine sandy loam.

The Ap or A1 horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 3 or 4. The Ap and A1 horizons that have a moist color value and chroma of 3 or less or dry value of 5 or less are less than 10 inches thick. The Ap or A1 horizon is loamy sand, loamy fine sand, sand, and or fine sand.

The B2 horizon has hue of 7.5YR or 10YR, value of 4 through 6, and chroma of 4 or 6. The B2 horizon is sand, loamy sand, or their gravelly analogs.

The A2 horizon has hue of 10YR or 2.5Y, value of 6 through 8, and chroma of 2 through 4. The A2 horizon is sand, fine sand, loamy sand, loamy fine sand, or their gravelly analogs.

A C horizon similar to the A2 horizon is in some pedons.

Dogue series

The soils of the Dogue series are deep, gently sloping, and moderately well drained. They formed mostly in fine textured or moderately fine textured marine sediments on dissected ridges of the Coastal Plain uplands. Slopes range from 2 to 6 percent.

Dogue soils commonly are near Emporia, Kempsville, Savannah, and Rumford and Tetotum soils. Dogue soils are more clayey in the upper part of the solum than the Emporia soils and are not as well drained. Dogue soils do not have a fragipan, which is a characteristic of the Savannah soils. They are more poorly drained and less permeable than the Kempsville soils and are not as steep as the Rumford and Tetotum soils.

Typical pedon of Dogue fine sandy loam, 2 to 6 percent slopes, 80 yards south of a farm lane at a point 475 yards west of VA-624, 230 yards north of the junction of VA-624 and VA-678, at Oak Row:

Ap—0 to 8 inches, dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; friable;

common fine roots; yellowish brown (10YR 5/6) clay loam from B21t; medium acid; abrupt smooth boundary.

B21t—8 to 18 inches, yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; friable, sticky, plastic; few fine roots; thin continuous clay films; dark yellowish brown (10YR 4/4) Ap material; very strongly acid; clear wavy boundary.

B22t—18 to 33 inches, yellowish brown (10YR 5/6) clay; common medium prominent red (10R 4/6) mottles and few fine distinct light brownish gray (10YR 6/2) mottles; moderate fine and medium subangular blocky structure; firm, sticky, plastic; thin continuous clay films; very strongly acid; clear smooth boundary.

B3t—33 to 51 inches, mottled yellowish brown (10YR 5/6), dark yellowish brown (10YR 4/4), red (10R 4/6), and light brownish gray (2.5Y 6/2) clay; weak thick platy structure parting to weak medium subangular blocky; firm, sticky, plastic; common pockets of sandy loam; thin very patchy clay films; 2 percent fine pebbles; very strongly acid; abrupt smooth boundary.

IIC1g—51 to 60 inches, mottled red (2.5YR 4/6), dark red (10R 3/6), and yellowish brown (10YR 5/6) clay; light brownish gray (2.5Y 6/2) faces of peds; moderate fine and medium angular blocky structure; firm, sticky, plastic; thick continuous clay films; 2 percent fine pebbles; extremely acid.

The solum thickness ranges from 46 to 60 inches or more. The depth to low-chroma mottles ranges from 18 to 30 inches. Fine pebbles make up 0 to 2 percent of the lower part of the solum and the C horizon. The soil is extremely acid or very strongly acid throughout in unlimed areas.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3 through 4. It is fine sandy loam or loam.

The upper part of the Bt horizon has hue 10YR or 7.5YR, value of 5 or 6, and chroma 4 through 6. It is clay loam or clay. The lower part of the Bt horizon has similar hue, value, and chroma and red, brown, yellow, and gray mottles. It is clay loam, clay, or sandy clay loam. The B3 and C horizons are mottled gray, red, yellow, and brown. They are commonly stratified and range from clay through sandy clay loam. Some pedons have layers that are as coarse textured as the sandy loam in the C horizon.

Emporia series

Soils of the Emporia series are deep, gently sloping, and well drained. They formed in medium textured to fine textured stratified marine sediments on the Coastal Plain upland. Slopes range from 2 to 6 percent.

Emporia soils commonly are near Kempsville, Savannah, Suffolk, and Rumford and Tetotum soils. Emporia soils are less permeable than the Kempsville and Suffolk soils, do not have the fragipan of the Savannah soils, and are not as steep as the Rumford and Tetotum soils.

Typical pedon of Emporia loam, 2 to 6 percent slopes, 265 yards west of VA-632 at a point 1.52 miles southwest of the junction of VA-3 and VA-632, at Cobham Park:

O1—2 inches to 1 inch, loose leaves, pine needles, and twigs.

O2—1 inch to 0, decomposed needles and leaves and partially decomposed twigs.

A1—0 to 2 inches, dark grayish brown (10YR 4/2) loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; very strongly acid; abrupt smooth boundary.

A2—2 to 9 inches, light olive brown (2.5Y 5/4) loam; weak fine granular structure; very friable; slightly sticky, slightly plastic; many fine medium and coarse roots; very strongly acid; clear smooth boundary.

B21t—9 to 14 inches, yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; hard, friable, slightly sticky, slightly plastic; common fine medium and coarse roots; thin very patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B22t—14 to 22 inches, yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable, sticky, slightly plastic; few fine and medium roots; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B23t—22 to 32 inches, strong brown (7.5YR 5/6) sandy clay loam; weak very thick platy structure parting to weak medium subangular blocky; firm, sticky, slightly plastic; thin continuous clay films on faces of peds; 3 percent fine pebbles; very strongly acid; gradual wavy boundary.

IIB24t—32 to 41 inches, strong brown (7.5YR 5/6) clay; many medium and coarse faint yellowish red (5YR 5/6) mottles, and common medium faint yellowish brown (10YR 5/6) mottles; weak coarse prismatic structure parting to weak very thick platy parting to moderate medium subangular blocky; firm, sticky, slightly plastic; thick continuous clay films; 4 percent pebbles; very strongly acid; gradual wavy boundary.

IIB25t—41 to 49 inches, strong brown (7.5YR 5/6) sandy clay; many medium and coarse yellowish red (5YR 5/6) mottles, common medium faint yellowish brown (10YR 5/6) mottles, and few medium prominent light gray (10YR 7/2) mottles; weak very thick platy structure parting to weak medium subangular blocky; firm, sticky, slightly plastic; thick patchy clay films on faces of peds; 10 percent fine pebbles; very strongly acid; gradual wavy boundary.

IIIC1—49 to 58 inches, mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), red (2.5YR 4/6) and light gray (10YR 7/2) gravelly sandy clay loam; 1/4 to 1/2 inch gravelly clay lenses; massive; firm, sticky; 20 percent fine pebbles; very strongly acid; clear wavy boundary.

IIIC2—58 to 65 inches, mottled strong brown (7.5YR 5/6), red (2.5YR 4/6) and light gray (10YR 7/2) stratified loamy sand, sandy loam, and clay; massive; firm, slightly sticky; 6 percent fine pebbles; very strongly acid.

Solum thickness ranges from 42 to 60 inches or more. The depth to low-chroma mottles ranges from 35 to 50 inches. The content of coarse fragments less than 1 inch in size ranges from 0 to 15 percent in the lower part of the B horizon and from 0 to 25 percent in the C horizon. Reaction throughout the soil is very strongly acid or strongly acid in unlimed areas.

The A horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. It is loam, fine sandy loam, or sandy loam.

The upper part of the Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 or 6. It is sandy clay loam, loam, or clay loam. The lower part of the Bt horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 through 8. It is sandy clay loam, clay loam, sandy clay, or clay.

The C horizon, commonly is variegated with hue of 5YR through 2.5Y, value of 4 through 7, and chroma of 1 through 6. It mainly is sandy loam, sandy clay loam, sandy clay, clay loam, clay, and their gravelly analogs. Thin lenses of loamy sand or sand are in many pedons.

Kempsville series

The soils of the Kempsville series are deep, nearly level and gently sloping, and well drained. They formed in moderately coarse textured to moderately fine textured marine sediments. Slopes range from 0 to 6 percent.

Kempsville soils commonly are near Emporia, Savannah, Suffolk, and Rumford and Tetotum soils. Kempsville soils do not have the moderately slowly and slowly permeable subsoil typical of the Savannah and Emporia soils, have more clay in the lower part of the subsoil than the Suffolk soils, and are not as steep as the Rumford and Tetotum soils.

Typical pedon of Kempsville sandy loam, 2 to 6 percent slopes, 82 yards east of VA-646, 1/2 mile north of the junction of VA-646 and US-360:

Ap—0 to 9 inches, brown (10YR 5/3) sandy loam, weak fine granular structure; soft, very friable, nonsticky, nonplastic; common fine roots; few medium continuous tubular pores; slightly acid; abrupt smooth boundary.

B1t—9 to 13 inches, yellowish brown (10YR 5/4) loam; weak fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common medium vertical and many fine oblique continuous tubular pores partially filled or coated with brown (10YR 5/3) Ap material; sand grains coated or bridged with clay; neutral; clear wavy boundary.

B21t—13 to 27 inches, strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine roots; common fine interstitial and common medium vertical continuous tubular pores coated with continuous clay films; thin continuous clay films on faces of peds; 2 percent fine pebbles; medium acid; clear wavy boundary.

B22t—27 to 42 inches; strong brown (7.5YR 5/6) sandy loam; many medium distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common very fine interstitial pores; thin continuous clay films on faces of peds and in pores; common black soft nodules of manganese or charcoal; 2 percent fine pebbles less than 1/4 inch in diameter; medium acid; clear wavy boundary.

B23t—42 to 58 inches, yellowish red (5YR 5/6) sandy loam; 35 percent many medium and coarse distinct light yellowish brown (10YR 6/4) irregularly elongated varves and pockets of sand; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; many fine interstitial pores; thin patchy clay films on faces of peds and sand grains coated and bridged with clay; few fine black soft nodules of manganese or charcoal; 2 percent fine pebbles less than 1/4 inch in diameter; strongly acid; clear smooth boundary.

B24t—58 to 68 inches, red (2.5YR 4/8) sandy clay loam; weak medium and coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine interstitial and common medium vertical continuous tubular pores; strongly acid; thin continuous clay films.

The solum thickness is 60 inches or more. The content of coarse fragments, mostly smooth quartz pebbles, ranges from 0 to 15 percent in the upper part of the solum and 0 to 25 percent in the lower part. The soil is very strongly acid or strongly acid unless limed.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4. It is fine sandy loam, sandy loam, or loam.

The B2t horizon has hue of 7.5YR or 10YR in the upper part and 2.5YR through 7.5YR in the lower part, value of 4 through 6, and chroma of 4 through 8. Mottles with chroma of 2 or less are in some pedons at a depth of more than 50 inches. The B2t horizon is sandy loam, loam, sandy clay loam, or clay loam. Some pedons have a subhorizon of the B2t that is brittle and slightly to moderately compact in up to 40 percent of the mass.

Leaf series

The soils of the Leaf series are deep, nearly level, and poorly drained. They formed in medium textured to fine textured fluviomarine sediments. They are on the low marine terrace. Slopes range from 0 to 2 percent.

Leaf soils commonly are near Lumbee, Tomotley, and Wahee soils. Leaf soils have a more abrupt textural change from the A horizon to the B horizon than those associated soils, have a more clayey subsoil than the Lumbee or Tomotley soils, and are ponded longer than are the Wahee soils.

Typical pedon of Leaf silt loam, 80 yards southeast into woods from farm lane, 0.6 mile northeast of the end of VA-660, 0.45 mile northwest of the junction of VA-660 and VA-630, 1.4 miles southwest of Kennard:

A1—0 to 2 inches, dark grayish brown (10YR 4/2) silt loam; common fine distinct yellowish brown (10YR 5/8) mottles around root channels; weak fine granular structure; slightly hard, friable, slightly sticky, slightly plastic; many fine and common medium roots; few fine tubular pores; 2 percent fine pebbles less than 1/4 inch in diameter; very strongly acid; abrupt smooth boundary.

A2—2 to 7 inches, light brownish gray (10YR 6/2) silt loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak thin and medium platy structure; hard, firm, slightly sticky, slightly plastic; common fine roots; few fine constricted pores in peds; 2 percent fine pebbles less than 1/4 inch in diameter; extremely acid; clear smooth boundary.

B21tg—7 to 13 inches; gray (10YR 5/1) silty clay; many medium distinct strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; hard, firm, sticky, plastic; common fine, and medium roots; few thin discontinuous pores within peds; thin very patchy clay films on faces of peds; 2 percent fine pebbles; extremely acid; clear smooth boundary.

B22tg—13 to 28 inches; dark gray (10YR 4/1) silty clay; common medium distinct yellowish brown (10YR 5/8) mottles; moderate fine and medium subangular blocky structure; very hard, firm, sticky, plastic; common fine and very fine roots; few very fine discontinuous pores within peds; thin continuous clay films on faces of peds; 2 percent fine pebbles; extremely acid; gradual wavy boundary.

B23tg—28 to 39 inches; dark gray (10YR 4/1) clay; common medium prominent red (10R 4/6) and distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very hard, very firm, sticky, plastic; common fine roots between peds and common very fine roots within peds; few very fine discontinuous pores within peds; thin continuous clay films on faces of peds; 2 percent fine pebbles less than 1/4 inch in diameter; extremely acid; abrupt wavy boundary.

B31tg—39 to 54 inches, light brownish gray (2.5Y 6/2) clay; common medium prominent reddish yellow (5YR 6/8) mottles, common coarse distinct dark gray (10YR 4/1) mottles, and few fine prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very hard, firm, sticky, plastic; common fine roots on faces of peds and common very fine roots within peds; thin continuous clay films, silt flows or pressure faces; extremely acid; gradual wavy boundary.

B32tg—54 to 67 inches, light brownish gray (2.5Y 6/2) clay; many medium prominent red (10R 4/6) mottles, common medium distinct reddish yellow (5YR 6/8) mottles, and common coarse distinct dark gray (10YR 4/1) mottles; weak medium prismatic structure parting to moderate medium angular blocky; very hard, firm, sticky, plastic; common fine roots on faces of peds, common very fine roots in peds; few fine discontinuous pores in peds; thin continuous clay films or pressure faces; extremely acid.

The solum thickness is 60 inches or more. The content of fine pebbles ranges from 0 to 5 percent in individual horizons throughout the soil. The soil is extremely acid to strongly acid throughout unless limed.

The A1 or Ap horizon has hue of 10YR, value of 4, and chroma of 2. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. The A horizon is silt loam or loam.

The B horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 1 or 2. Few to many, high-chroma mottles are throughout the B horizon. The horizon is silty clay loam, silty clay, or clay.

Levy series

The soils of the Levy series are deep and very poorly drained. They formed in medium textured to fine textured alluvial sediments in low, nearly level backswamp areas and freshwater marshes. The soils commonly are adjacent to tidal marshes and are inland along major creeks. The Levy soils in this survey are mapped only with Bibb soils. Slopes are less than 1 percent.

Levy soils commonly are near Bibb, Rappahannock, and Rumford and Tetotum soils. Levy soils have neither the sulfidic materials within 20 inches of the surface layer nor the layers of organic material that the Rappahannock soils have. Levy soils have more clay in the textural control section than Bibb soils and are not as steep as the Rumford and Tetotum soils.

Typical pedon of Levy silt loam, in an area of Bibb and Levy soils, 33 yards east of the western edge of Branham Mill Swamp, at a point approximately 533 yards north of US-360, 1.45 miles east of the junction of VA-3 and US-360, in Warsaw:

A1—0 to 6 inches, dark grayish brown (2.5Y 4/2) silt loam; slightly sticky; many fine and medium roots;

massive; flows easily between fingers when squeezed; very strongly acid; clear smooth boundary.

C1g—6 to 22 inches, dark gray (5Y 4/1) silty clay; massive; sticky; many fine roots; flows easily between fingers when squeezed; slighty acid; gradual smooth boundary.

C2g—22 to 37 inches, dark greenish gray (5GY 4/1) silty clay; massive; sticky; common fine roots; flows easily between fingers when squeezed; slightly acid; clear smooth boundary.

C3g—37 to 52 inches, very dark gray (5Y 3/1) clay loam; massive; slightly sticky; few fine roots; flows easily between fingers when squeezed; slightly acid; gradual smooth boundary.

C4g—52 to 60 inches, dark gray (5Y 4/1) clay loam; massive; slightly sticky; flows easily between fingers when squeezed; slightly acid.

These soils have an *n* value of 0.7 or more in all mineral layers to a depth of 40 inches. Reaction in limed areas ranges from very strongly acid through slightly acid in the A horizon and slightly acid to mildly alkaline in the C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 through 3.

The C horizon has hue of 10YR through 5Y, 5GY, or is neutral; value of 3 through 5; and chroma of 0 through 2. It is silty clay, silty clay loam, and, at a depth of less than 40 inches, clay loam. The C horizon at a depth of more than 40 inches ranges from sandy loam to clay, and some of the layers have an *n* value of less than 0.7.

Lumbee series

The soils of the Lumbee series are deep, nearly level, and poorly drained. They formed in moderately fine textured over coarse textured fluviomarine sediments on the low marine terrace. Slopes are less than 2 percent.

Lumbee soils commonly are near Nansemond, Tetotum, and Tomotley soils. Lumbee soils have sands closer to the surface than do the Tomotley soils. Lumbee soils are not as well drained as the Nansemond or Tetotum soils.

Typical pedon of Lumbee loam, 66 yards east of Sabine Hall farm access road, 1.33 miles southeast of US-360, at a point 1.5 miles east of the Rappahannock River:

Ap—0 to 9 inches, grayish brown (2.5Y 5/2) loam; common coarse faint grayish brown (2.5Y 5/2) mottles and few fine distinct brown (7.5YR 5/4) mottles; weak coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; common fine roots; common medium vesicular and many very fine discontinuous random tubular pores; slightly acid; abrupt smooth boundary.

B21tg—9 to 16 inches, light brownish gray (2.5Y 6/2) sandy clay loam; common medium faint gray (10YR 6/1) mottles and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable, slightly sticky, plastic; common fine roots; common fine discontinuous interstitial pores; thin continuous clay films on faces of peds; very strongly acid; clear smooth boundary.

B22tg—16 to 22 inches, gray (10YR 5/1) sandy clay loam; common medium distinct light olive brown (2.5Y 5/4) mottles and common medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, plastic; common very fine roots; common fine discontinuous interstitial pores; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

B3g—22 to 27 inches, gray (10YR 6/1) sandy loam; common coarse distinct light olive brown (2.5Y 5/4) mottles and common medium prominent yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; very friable, nonsticky, nonplastic; few fine roots; common fine discontinuous interstitial pores; very strongly acid; abrupt smooth boundary.

C1g—27 to 30 inches, white (10YR 8/1) sand; single grain; loose; few fine roots; very strongly acid; abrupt irregular boundary.

C2g—30 to 43 inches, gray (10YR 5/1) loamy fine sand; common coarse prominent yellowish brown (10YR 5/8) mottles and common coarse distinct light olive brown (2.5Y 5/4) mottles; massive; very friable, nonsticky, nonplastic; common very fine discontinuous interstitial pores; common fine irregular vertically elongated lenses of uncoated white (10YR 8/1) sand grains; very strongly acid; abrupt irregular boundary.

C3g—43 to 53 inches, mottled light gray (10YR 6/1) and gray (10YR 5/1) loamy fine sand; massive; very friable, nonsticky, nonplastic; common very fine discontinuous interstitial pores; very strongly acid; abrupt wavy boundary.

C4—53 to 58 inches, strong brown (7.5YR 5/8) sand; many medium prominent gray (10YR 6/1) mottles and many medium distinct yellowish brown (10YR 5/4) mottles; massive; very friable, nonsticky, nonplastic; few very fine discontinuous interstitial pores; few medium irregular vertically elongated lenses of uncoated white (10YR 8/1) sand grains; very strongly acid; abrupt smooth boundary.

IIC5g—58 to 65 inches, light olive gray (5Y 6/2) clay loam; many medium prominent reddish yellow (7.5YR 6/8) mottles; strong medium angular blocky structure; very firm, sticky, plastic; thin discontinuous ironstone layer at 58 inches; 2 percent fine pebbles; very strongly acid.

The solum thickness ranges from 20 to 34 inches. The content of pebbles in the Bt and C horizons ranges from 0 to 2 percent. Reaction of the soil in unlimed areas is very strongly acid or strongly acid.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2. Brown to dark yellowish brown mottles are in many pedons. The horizon is loam or fine sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 1 or 2. It has strong brown to light olive brown or gray mottles. It mainly is clay loam or sandy clay loam but commonly grades to sandy loam.

The C horizon has hue of 7.5YR through 5Y, value of 4 through 8, and chroma of 1 through 8. It is sand, loamy sand or loamy fine sand and, many pedons, is clay loam at a depth of more than 54 inches.

Nansemond series

The soils of the Nansemond series are deep, nearly level, and moderately well drained. They formed in moderately coarse textured and coarse textured fluviomarine sediments on the low marine terrace. Slopes range from 0 to 2 percent.

Nansemond soils commonly are near Rumford, State, Tetotum, and Tomotley soils. Nansemond soils are better drained and more sandy than the Tomotley soils, are not as well drained as Rumford or State soils, and are more sandy and more permeable than the Tetotum soils.

Typical pedon of Nansemond fine sandy loam, 200 yards south of Woodberry Farm access road, 266 yards south of VA-641, 66 yards east from VA-642 and VA-608, at Simons Corner:

Ap—0 to 11 inches, dark grayish brown (10YR 4/2) fine sandy loam; weak medium granular structure; soft, very friable, nonsticky, nonplastic; common fine roots; few fine discontinuous random tubular pores; slightly acid (limed); abrupt smooth boundary.

B1t—11 to 15 inches, light yellowish brown (2.5Y 6/4) fine sandy loam; weak medium subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine roots; few medium discontinuous random tubular pores filled with Ap material; sand grains coated and bridged with clay; 10 percent dark grayish brown (10YR 4/2) Ap material; slightly acid (limed); clear smooth boundary.

B21t—15 to 19 inches, light yellowish brown (2.5Y 6/4) fine sandy loam; weak coarse subangular blocky structure; soft, very friable, slightly sticky, nonplastic; few fine roots; few fine discontinuous random tubular pores; sand grains coated and bridged with clay; slightly acid (limed); clear smooth boundary.

B22t—19 to 30 inches, light yellowish brown (2.5Y 6/4) fine sandy loam; few medium distinct light gray (2.5Y 7/2) mottles and few fine prominent strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; soft, friable, slightly sticky, nonplastic; few fine roots; few fine discontinuous random tubular pores; sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B3t—30 to 35 inches, light yellowish brown (2.5Y 6/4) loamy fine sand; few fine prominent strong brown (7.5YR 5/8) mottles and few medium faint yellowish brown (10YR 5/4) mottles; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky, nonplastic; few fine roots; very few fine discontinuous tubular pores; 40 to 50 percent sand grains coated and bridged with clay; 1/2 to 1 inch bodies of light gray (2.5Y 7/2) sand oriented vertically; very strongly acid; gradual wavy boundary.

C1g—35 to 48 inches, light gray (2.5Y 7/2) fine sand; few fine prominent strong brown (7.5YR 5/8) mottles; single grain loose nonsticky nonplastic; few fine roots; few fine interstitial pores; strongly acid; clear wavy boundary.

C2—48 to 63 inches, light olive brown (2.5Y 5/4) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and faint grayish brown (2.5Y 5/2) mottles; weak medium angular blocky structure; soft, friable, nonsticky, nonplastic; sand grains coated and bridged with clay; slightly compact in place; 3 percent pebbles less than 3/4 inch in diameter; very strongly acid.

The solum thickness ranges from 35 to 57 inches. The content of fine pebbles ranges from 0 to 2 percent in individual horizons in the solum and 0 to 15 percent in the C horizon. In unlimed areas the A horizon and upper part of the B horizon are strongly acid or very strongly acid, and the lower part of the B horizon and the C horizon are strongly acid to extremely acid.

The A1 or Ap horizon has hue of 10YR, value of 4 or 5, and chroma of 2 through 4. The A horizon is fine sandy loam or sandy loam.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 4 or 6. Low-chroma mottles are in the upper 24 inches of the Bt horizon. The horizon mainly is fine sandy loam or sandy loam and ranges to sandy clay loam in thin subhorizons. The B3t horizon has hue of 10YR or 2.5Y, value of 5 or 6, chroma of 4 or 6. It is loamy sand or loamy fine sand.

The C horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 1 through 8. It ranges from sand through fine sandy loam.

Pamunkey series

The soils of the Pamunkey series are deep, nearly level, and well drained. They formed in moderately coarse textured to moderately fine textured fluvial sediments on the fluvial river terrace along the Rappahannock River. The Pamunkey soils in Richmond County have an apparent water table between depths of 4 and 6 feet. Slopes range from 0 to 2 percent.

Pamunkey soils commonly are near Rappahannock, Rumford, Tetotum, and Tomotley soils. Pamunkey soils are better drained than the Rappahannock, Tetotum, or Tomotley soils and have a more clayey subsoil than the Rumford soils.

Typical pedon of Pamunkey loam, wet substratum, 50 yards west of a farm access road, 0.75 mile southeast of US-360:

Ap—0 to 8 inches, dark brown (7.5YR 4/4) loam; weak fine granular structure; slightly hard, very friable, nonsticky, nonplastic; many fine roots; few medium continuous vertical tubular pores; medium acid; abrupt smooth boundary.

B21t—8 to 14 inches, yellowish red (5YR 5/6) loam; weak fine subangular blocky sturcture; friable, slightly sticky, slightly plastic; few fine roots on faces of peds; few very fine discontinuous interstitial and few very fine vertical continuous tubular pores; thin patchy reddish brown (5YR 4/4) films of clay; common very fine flakes of mica; slightly acid; clear smooth boundary.

B22t—14 to 31 inches, yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure; friable, slightly sticky, plastic; common fine roots on faces of peds; few very fine discontinuous interstitial and few fine continuous vertical tubular pores; thin continuous reddish brown (5YR 4/4) films of clay; few fine manganese stains; common very fine flakes of mica, neutral; gradual smooth boundary.

B31t—31 to 54 inches, yellowish red (5YR 5/8) fine sandy loam; few medium faint brown (7.5YR 5/4) mottles; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine continuous oblique tubular pores; sand grains coated and bridged with clay; few black manganese stains; many very fine flakes of mica; neutral; gradual smooth boundary.

B32—54 to 60 inches, yellowish red (5YR 4/6) loam; weak medium subangular blocky structure; very friable, nonsticky, plastic; many very fine flakes of mica; neutral.

The solum thickness and the depth to unconforming strata range from 42 inches to more than 60 inches. The content of the rounded pebbles ranges from 0 to 5 percent throughout. The content of flakes of mica ranges from few to many throughout. Reaction ranges from medium acid to neutral in the A horizon and upper part of the B horizon, and from strongly acid to neutral in the lower part of the B horizon and in the C horizon.

The A horizon has hue of 7.5YR through 10YR, value of 3 or 4, and chroma of 2 through 4. It is loamy sand, fine sandy loam, loam, or silt loam.

The B2t horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 6. It is loam, sandy clay loam or clay loam. The B3 horizon is sandy loam, loam, and fine sandy loam.

Some pedons have a IIC horizon with hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 or 6. It ranges from sandy loam through sand.

Rappahannock series

The soils of the Rappahannock series are deep, nearly level, and very poorly drained. They formed in highly decomposed herbaceous organic materials overlying stratified fluvial sediments. The soils are in tidal marsh areas on the fluvial river terrace along the Rappahannock River and extend along the major creeks to about the limit of tidal influence. Most areas are flooded twice daily by brackish water. Slopes are less than 1 percent.

Rappahannock soils commonly are near Bibb, Levy, Nansemond, and Rumford soils. The Bibb, Levy, Nansemond, and Rumford soils are not organic soils and do not have the high sulfur content typical of the Rappahannock soils. The Bibb and Levy soils are frequently flooded by freshwater.

Typical pedon of Rappahannock muck, 66 yards northeast of the Rappahannock River, 0.75 mile south of Downing Bridge on US-360:

Oa1—0 to 16 inches; very dark grayish brown (10YR 3/2) muck (sapric material); 14 percent fiber rubbed; massive; nonsticky; many fine and medium roots; flows easily between the fingers when squeezed; weak sulfide odor; mildly alkaline; clear smooth boundary.

Oa2—16 to 30 inches; very dark gray (10YR 3/1) muck (sapric material); 5 percent fiber rubbed; massive; nonsticky; many fine roots; flows easily between the fingers when squeezed; moderate sulfide odor; moderately alkaline; gradual wavy boundary.

Oa3—30 to 41 inches; very dark brown (10YR 2/2) muck (sapric material); 8 percent fiber rubbed; massive; slightly sticky; common fine roots; flows easily between the fingers when squeezed; moderate sulfide odor; moderately alkaline; gradual smooth boundary.

IICg—41 to 63 inches; very dark gray (10YR 3/1) mucky silty clay loam; massive; sticky, slightly plastic; common fibers and few fine roots; flows easily between the fingers when squeezed; moderate sulfide odor; moderately alkaline; gradual wavy boundary.

IIIOa4—63 to 75 inches; black (10YR 2/1) muck (sapric material); 5 percent fiber rubbed; massive; nonsticky; flows easily between the fingers when squeezed; moderate sulfide odor; moderately alkaline; abrupt smooth boundary.

IVCg—75 to 80 inches; very dark grayish brown (10YR 3/2) sandy loam; massive; nonsticky, nonplastic; flows easily between the fingers when squeezed; weak sulfide odor; mildly alkaline.

The sulfur content is more than 0.75 percent in some horizons within 40 inches of the surface. The organic layers of the control section are dominantly sapric material; hemic material is in the layers of some pedons.

The mineral strata are in the control section below the surface layer. Reaction ranges from neutral to moderately alkaline throughout the profile. After drying, reaction ranges to strongly acid. Conductivity of the saturation extract of layers at a depths of more than 6 inches is less than 16 mmho/cm.

The organic layers have hue of 10YR, value of 2 or 3, and chroma of 1 or 2. They are muck or mucky peat. The rubbed fiber content commonly is 3 to 15 percent but ranges to 60 percent. The *n* value commonly is more than 1.0 but ranges from 0.7 to 2.0.

The mineral strata have hue of 10YR through 5GY, value of 2 through 4, and chroma of 1 or 2. They range from silt loam through clay in the subsurface horizons and to sandy loam and sand in the substratum. The *n* value commonly is less than 1.0 but ranges from less than 0.4 to 2.0.

Rumford series

The soils of the Rumford series are deep, level to steep, and somewhat excessively drained. They formed in coarse textured to moderately coarse textured fluviomarine sediments. The soils are on nearly level to gently sloping subdued ridges on the low marine terrace and fluvial river terrace and on sloping to steep side slopes along drainageways and on the scarp between the Coastal Plain upland and the low marine terrace. Slopes range from 0 to 50 percent.

Rumford soils commonly are near Nansemond, State, Tetotum, and Tomotley soils on the low marine terrace; Pamunkey soils on the fluvial river terrace; and Emporia, Kempsville, and Suffolk soils on the Coastal Plain upland. Rumford soils are more sandy and droughty than the Emporia, Kempsville, Pamunkey, State, Suffolk, Tetotum, or Tomotley soils and are better drained than the Nansemond, State, Tetotum, or Tomotley soils.

Typical pedon of Rumford loamy sand, 0 to 6 percent slopes, 50 yards north of a State-owned gravel pit access road, 0.45 mile west of the junction of the access road and VA-614, 2.2 miles southwest of Emmerton:

Ap—0 to 9 inches, dark yellowish brown (10YR 4/4) loamy sand; weak fine granular structure; very friable; common fine and medium roots; slightly acid (limed); abrupt smooth boundary.

B21t—9 to 14 inches, dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; slightly sticky; common fine and medium roots; thin patchy films of clay; few fine flakes of mica; slightly acid (limed); clear wavy boundary.

B22t—14 to 27 inches, yellowish red (5YR 4/6) sandy loam; weak medium and coarse subangular blocky structure; very friable, slightly sticky; common fine roots; thin patchy films of clay; few very fine flakes of mica; medium acid; clear wavy boundary.

B3t—27 to 37 inches, yellowish red (5YR 4/6) loamy sand; weak coarse subangular blocky structure; very friable; few fine and medium roots; sand grains coated and bridged with clay; few fine flakes of mica; very strongly acid; gradual smooth boundary.

C1—37 to 61 inches, strong brown (7.5YR 5/6) sand; massive; very friable; few fine roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

C2—61 to 68 inches, yellowish brown (10YR 5/6) sand; common coarse faint light yellowish brown (10YR 6/4) mottles; massive; very friable; few fine roots; few fine flakes of mica; very strongly acid.

The solum thickness ranges from 37 to 55 inches. The content of fine pebbles ranges from 0 to 5 percent in individual horizons in the solum and 0 to 20 percent in the C horizon. Reaction in unlimed areas is extremely acid to strongly acid in the A horizon, very strongly acid through medium acid in the B horizon, and extremely acid through slightly acid in the C horizon. Few flakes of mica are throughout the solum of most pedons.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 2 through 4. It is fine sandy loam, loamy fine sand, or loamy sand.

The B2t horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 through 8. It is sandy loam, fine sandy loam, or sandy clay loam. The B3 horizon includes loamy sand.

The C horizon is yellowish brown or strong brown to light gray or white. It is sandy loam to loamy sand or sand and their gravelly analogues. A thin subhorizon of sandy clay loam is in some pedons.

Savannah series

The soils of the Savannah series are deep, nearly level to gently sloping, and moderately well drained. They are shallow or moderately deep to a fragipan. They formed in moderately coarse textured to moderately fine textured marine sediments on the Coastal Plain upland. Slopes range from 0 to 6 percent.

Savannah soils commonly are near Emporia, Kempsville, Suffolk, and Rumford and Tetotum soils. Savannah soils have a fragipan, which is not typical of the Emporia, Kempsville, or Suffolk soils, and they are not as well drained as those soils. Savannah soils are not as steep as the Rumford and Tetotum soils.

Typical pedon of Savannah fine sandy loam, 2 to 6 percent slopes, 17 yards east of VA-613, 0.95 mile southeast of the junction of VA-613 and VA-3, between Emmerton and Farnham:

Ap—0 to 9 inches, yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; common fine roots; neutral (limed); abrupt smooth boundary.

B21t—9 to 14 inches, strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; thin patchy clay films; infiltration of yellowish brown (10YR 5/4) Ap material; neutral (limed); gradual smooth boundary.

B22t—14 to 20 inches, strong brown (7.5YR 5/6) loam; common medium faint yellowish brown (10YR 5/6) mottles and few fine faint yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; thin patchy clay films; slightly acid (limed); clear smooth boundry.

Bx1—20 to 28 inches, light yellowish brown (10YR 6/4) fine sandy loam; many medium and coarse strong brown (7.5YR 5/6) mottles and few fine distinct yellowish red (5YR 5/6) mottles; moderate very thick platy structure parting to moderate medium angular blocky; firm; few fine and medium vesicular pores; thin very patchy clay films on strong brown (7.5YR 5/6) material; brittle and compact in 65 percent of the mass; very strongly acid; gradual smooth boundary.

Bx2—28 to 40 inches, light yellowish brown (10YR 6/4) sandy loam; many medium distinct strong brown (7.5YR 5/6) mottles and common medium distinct very pale brown (10YR 7/3) mottles; moderate very thick platy structure parting to moderate medium angular blocky; firm; common fine vesicular pores; thin very patchy clay films on strong brown (7.5YR 5/6) material; strong brown (7.5YR 5/6) sandy clay loam vertical veins 1 to 1-1/2 inches wide and 18 inches apart; brittle and compact in 90 percent of the mass; very strongly acid; clear wavy boundary.

Bx3—40 to 60 inches, light yellowish brown (10YR 6/4) sandy loam; many medium distinct strong brown (7.5YR 5/6) mottles and few fine distinct light gray (10YR 7/1) mottles; weak very thick platy structure parting to moderate medium angular blocky; firm; few fine vesicular pores; thin very patchy clay films on strong brown (7.5YR 5/6) sandy clay loam vertical bands less than 1 inch wide and 18 inches apart; brittle and compact in 70 percent of mass; very strongly acid; clear wavy boundary.

IIB23t—60 to 70 inches, strong brown (7.5YR 5/6) sandy clay loam; many medium faint yellowish brown (10YR 5/6) mottles, common medium faint yellowish red (5YR 5/6) mottles, and few fine distinct light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; thin patchy clay films; very strongly acid.

The solum thickness is 60 inches or more. The depth to the fragipan is commonly 18 to 36 inches, and the thickness of the fragipan ranges from 10 to 42 inches. The soil is very strongly acid or strongly acid throughout in unlimed areas.

The A1 or Ap horizon has hue of 10YR and 2.5Y, value of 4 or 5 and chroma of 2 or 4. Some pedons have an A2 horizon with hue of 10YR and 2.5Y, value of 5 or 6, and chroma of 4. The A horizon is fine sandy loam or sandy loam.

The Bt horizon above the fragipan has hue of 7.5YR or 10YR, value of 5, and chroma of 4 through 6. The Bt horizon is sandy clay loam, loam, clay loam, or sandy loam.

The Bx horizon has hue of 7.5YR through 2.5Y, value of 5 through 7, and chroma of 2 through 6. It is sandy loam, fine sandy loam, or sandy clay loam.

The B2t horizon below the fragipan is variegated with hue of 2.5Y to 5YR, value of 5 through 8, and chroma of 2 through 6. It is sandy clay loam, clay loam, loam or sandy loam.

The B3 or, in some pedons, the C horizon is mottled with hue of 2.5Y to 2.5YR, value of 3 through 7 and chroma of 1 through 8. It is sandy loam to clay.

State series

The soils of the State series are deep, nearly level to gently sloping, and well drained. They formed in moderately coarse textured to moderately fine textured fluviomarine sediments on the low marine terrace along the Rappahannock River. Slopes range from 0 to 6 percent.

State soils commonly are near Nansemond, Rumford, Tetotum, Tomotley, and Yemassee soils. State soils are better drained than the Nansemond, Tetotum, Tomotley, or Yemassee soils and are not as excessively drained as the Rumford soils.

Typical pedon of State fine sandy loam, 0 to 2 percent slopes, 300 yards south of VA-615, 530 yards west on VA-615 from its junction with VA-614, 2.5 miles southwest of Emmerton:

Ap—0 to 10 inches, dark brown (10YR 4/3) fine sandy loam; moderate medium granular structure; very friable, nonsticky, nonplastic; many fine and medium roots; few fine constricted oblique tubular pores; neutral (limed); abrupt smooth boundary.

B1t—10 to 15 inches, strong brown (7.5YR 5/6) loam; many medium distinct light yellowish brown (10YR 6/4) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and very fine roots; common medium and fine constricted oblique tubular pores; thin patchy clay films; neutral (limed); clear wavy boundary.

B21t—15 to 27 inches, strong brown (7.5YR 5/6) clay loam; moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and very fine roots; common fine and few medium continuous oblique tubular and common very fine interstitial pores; thin continuous yellowish red (5YR 4/6) clay films; slightly acid (limed); clear wavy boundary.

B22t—27 to 36 inches, strong brown (7.5YR 5/6) sandy loam; common medium faint (10YR 6/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; common very fine interstitial and few fine and medium continuous oblique tubular pores; thin patchy yellowish red (5YR 4/6) clay films; strongly acid; gradual wavy boundary.

B3t—36 to 46 inches, strong brown (7.5YR 5/8) sandy loam; weak coarse subangular blocky structure; very friable, nonsticky, nonplastic; few fine roots; few medium constricted oblique tubular pores; thin very patchy reddish brown (5YR 4/4) clay films, sand grains coated and bridged with clay; few fine to coarse vertically elongated very pale brown (10YR 7/4) sand pockets; common fine manganese stains; 1 inch zone of iron-rich sandy loam at 45 inches; very strongly acid; abrupt smooth boundary.

IIC1tg—46 to 58 inches, light brownish gray (10YR 6/2) sandy clay loam; common fine prominent strong brown (7.5YR 5/8) mottles and common coarse faint light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; common fine constricted oblique tubular pores; few fine dark minerals and very fine mica flakes; very strongly acid; clear wavy boundary.

IIC2g—58 to 65 inches, light brownish gray (2.5Y 6/2) very fine sandy loam; common fine prominent red (2.5YR 5/8) mottles; weak coarse angular blocky structure; very friable, nonsticky, nonplastic; few very fine roots; few fine constricted oblique tubular pores; few very fine flakes of mica; very strongly acid.

The solum thickness ranges from 35 to 60 inches. The content of fine pebbles ranges from 0 to 2 percent in individual horizons in the solum and C horizon. Few fine flakes of mica commonly are throughout the lower portion of the solum and the C horizon. This soil mainly is very strongly acid or strongly acid throughout in unlimed areas. In some areas the C horizon is medium acid.

The A horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4. It is fine sandy loam, sandy loam, loam, or loamy fine sand.

The B2t horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 4 through 8. The B2t horizon is clay loam, loam, sandy clay loam, or sandy loam.

The B3 horizon has hue of 7.5YR through 2.5Y, value of 5 or 6, and chroma of 4 through 8. It is mottled in some pedons. It is sandy loam, sandy clay loam, or loam.

The C horizon has hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 2 through 8; or it is mottled. It mainly is sand, loamy sand, and sandy loam but ranges to clay or sandy clay loam in some pedons.

Suffolk series

The soils of the Suffolk series are deep, level to gently sloping, and well drained. They formed in moderately coarse textured to medium textured fluviomarine sediments on the Coastal Plain upland and on the broad low marine terrace. Slopes range from 0 to 6 percent.

The Suffolk soils in this survey area are a taxadjunct to the Suffolk series because of three characteristics that are outside the range for the series: The solum is thicker; more sand is in the control section; and a leached, brittle and moderately compact zone is in the lower B horizon during dry periods, particularly in areas on gently sloping ridgetops on the Coastal Plain upland.

Suffolk soils commonly are near Emporia, Kempsville, Savannah, and Rumford and Tetotum soils. Suffolk soils have a thinner subsoil and lower available water capacity than the Kempsville soils. Suffolk soils do not have restrictive layers typical of the Savannah and Emporia soils, and are less droughty than the Rumford and Tetotum soils.

Typical pedon of Suffolk sandy loam, 2 to 6 percent slopes, at Farnham, 1.2 miles east of the junction of the logging road and VA-3, 1.7 miles south of junction of VA-3 and VA-602:

O—1 inch to 0, loose needles, leaves, and twigs.

Ap1—0 to 4 inches, brown (10YR 4/3) sandy loam; weak fine granular structure; very friable, nonsticky, nonplastic; many fine and medium roots; medium acid (limed); abrupt, smooth boundary.

Ap2—4 to 8 inches; yellowish brown (10YR 5/4) sandy loam; weak thin platy structure parting to weak fine subangular blocky; very friable, nonsticky, nonplastic; many fine and medium roots; few fine continuous tubular pores; slightly acid (limed); abrupt, smooth boundary.

B1t—8 to 15 inches; brown (7.5YR 5/4) sandy loam; many coarse distinct light yellowish brown (10YR 6/4) pockets and veins of infiltrated Ap material; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; many fine and common medium roots; few fine and medium continuous tubular and common fine interstitial pores; thin patchy clay films; strongly acid; clear smooth boundary.

B21t—15 to 31 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium roots; few fine and medium continuous tubular pores; thin continuous clay films; strongly acid; clear wavy boundary.

B22t—31 to 39 inches; strong brown (7.5YR 5/6) sandy loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; few fine continuous tubular and common fine interstitial pores; thin very patchy clay films; medium acid; clear wavy boundary.

A2b&B3t—39 to 57 inches; pale brown (10YR 6/3) loamy sand (A2b); massive, friable, moderately compact in place, nonsticky, nonplastic; few fine oblique contricted tubular and many fine interstitial pores; thin patchy clay films in pores, thin continuous yellowish red (5YR 3/6) clay films at the upper interface between A2b and B3t material; 40 percent yellowish brown (10YR 5/6) (B3t); weak coarse subangular blocky structure; very friable, nonsticky, nonplastic; few fine roots; sand grains coated and bridged with clay; medium acid; gradual wavy boundary.

B23tb—57 to 72 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky, nonplastic; few fine roots; few fine insterstitial pores; thin patchy clay films; strongly acid; gradual boundary.

The solum thickness ranges from 35 to more than 72 inches. The content of fine quartz pebbles ranges from 0 to 5 percent in the solum. Reaction of the solum in unlimed areas is very strongly or strongly acid.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 1 through 4. It is loamy fine sand, loamy sand, sandy loam, and fine sandy loam.

The Bt horizon has hue of 5YR through 10YR, value of 4 or 5, and chroma of 4 through 7. It is sandy loam, loam, fine sandy loam, or sandy clay loam.

The B3 or A2b & B3 horizons have hue of 5YR through 10YR, value of 5 or 6 and chroma of 6 or 8. The horizon is loamy sand, sand, or sandy loam. In some areas it is brittle and moderately compact in place during dry periods. Some pedons have an A2b horizon less than 6 inches in thickness with a hue of 10YR, value of 5 or 6 and chroma of 3 or 4. It is loamy sand or sand.

The Btb horizon has hue of 10YR through 5YR, value of 4, through 6, and chroma of 4 or 6. It is loam, sandy loam or sandy clay loam.

Some pedons have a C horizon with hue of 2.5Y through 7.5YR, value of 5 through 7, and chroma of 2 through 8. Chroma of 2 is in zones of uncoated sand grains. It is loamy sand or sand.

Tetotum series

The soils of the Tetotum series are deep, level to sloping, and moderately well drained. They formed in moderately coarse textured to moderately fine textured fluviomarine sediments on the low marine terrace and on sloping areas of the Coastal Plain upland. Slopes range from 0 to 6 percent.

Tetotum soils commonly are near State, Suffolk, Tomotley, and Yemassee soils, and are mapped with Rumford soils on the upland and low marine terrace. Tetotum soils are not as well drained as the Rumford, State, and Suffolk soils and are better drained than the Tomotely and Yemassee soils.

Typical pedon of Tetotum fine sandy loam, 0 to 2 percent slopes, 33 yards north of VA-624 and 0.7 mile west of Junction of VA-639 and VA-624 near Germans Corner:

Ap—0 to 10 inches, dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; very friable; common fine roots; few inclusions of light olive brown (2.5Y 5/4) B1 material in lower portion; neutral (limed); abrupt smooth boundary.

B1—10 to 13 inches, light olive brown (2.5Y 5/4) fine sandy loam; weak fine subangular blocky structure; friable, slightly sticky; few fine roots; infiltration of Ap horizon material in pores; slightly acid (limed); clear wavy boundary.

B21t—13 to 21 inches, light olive brown (2.5Y 5/4) loam; yellowish brown (10YR 5/4) on faces of peds; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine pores; thin patchy clay films; slightly acid (limed); clear wavy boundary.

B22t—21 to 27 inches, light olive brown (2.5Y 5/4) sandy clay loam; few medium distinct light brownish gray (2.5Y 6/2) and few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine pores; 1 percent fine semirounded pebbles; thin patchy clay films; very strongly acid; clear wavy boundary.

B23t—27 to 38 inches, yellowish brown (10YR 5/4) sandy clay loam; many medium distinct light brownish gray (2.5Y 6/2) mottles and common medium distinct yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic; few fine roots; few fine pores; 1 percent fine pebbles less than 1/4 inch in diameter; thin very patchy clay films; very strongly acid; clear irregular boundary.

B3—38 to 56 inches, mottled light brownish gray (2.5Y 6/2), light gray (2.5Y 7/2), yellowish brown (10Y 5/4), and strong brown (7.5YR 5/8) fine sandy loam; weak medium and coarse subangular blocky structure; friable; few fine pores; 2 percent pebbles less than 1 inch in diameter; common thin lenses and pockets of sandy clay loam; extremely acid; clear wavy boundary.

C—56 to 67 inches, mottled light gray (2.5Y 7/2), light yellowish brown (2.5Y 6/4), light olive brown (2.5Y 5/4), and strong brown (7.5YR 5/8) fine sandy loam; massive; friable; stratified very thin bands of dark colored minerals; extremely acid.

The solum thickness ranges from 40 to 60 inches or more. The content of fine pebbles range from 0 to 5 percent throughout the soil. The soil in unlimed areas is extremely acid through strongly acid.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 or 3. Some pedons have an A2 horizon with hue 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. The A horizon is fine sandy loam, or sandy loam.

The B1 horizon, has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 4 or 6. The B2t horizon has hue of 7.5YR through 2.5Y, value of 4 through 6 and chroma of 4 through 8. Mottles with chroma of 2 or less are within the upper 24 inches of the B2t horizon. The lower part of the B2t horizon in some pedons and the entire B3 horizon have hue of 10YR or 2.5Y, value of 5 through 7, and chroma of 1 or 2. The Bt horizon is loam, clay loam, or sandy clay loam. The B3 horizon is sandy loam, fine sandy loam, sandy clay loam or loam.

The C or IIC horizon typically is gray mottled with brown and yellow. It is mainly sandy clay loam through loamy fine sand and has subhorizons of sandy clay, clay or silty clay in some pedons.

Tomotley series

The soils of Tomotley series are deep, nearly level, and poorly drained. They formed in moderately coarse textured to moderately fine textured fluviomarine sediments mainly on the low marine terrace and on the Coastal Plain upland. Slopes range from 0 to 2 percent.

Tomotley soils commonly are near Leaf, Nansemond, State, Tetotum, and Yemassee soils on the low marine terrace and Kempsville, Suffolk and Savannah soils on the Coastal Plain upland. Tomotley soils are more poorly drained than the Kempsville, Nansemond, Savannah, State, Suffolk, Tetotum, or Yemassee soils and do not have as much clay in the subsoil as the Leaf soils.

Typical pedon of Tomotley fine sandy loam 0.85 mile northwest on VA-640 from junction of VA-640 and VA-636, and 50 yards east:

O1—2 inches to 1 inch, loose pine needles, leaves and twigs.

O2—1 inch to 0, decomposed needles and leaves and partially decomposed twigs.

A1—0 to 2 inches, very dark gray (10YR 3/1) fine sandy loam; few medium distinct light brownish gray (2.5Y 6/2) mottles; weak fine granular structure; very friable; many fine and medium roots; 1 percent fine pebbles; very strongly acid; abrupt wavy boundary.

A2g—2 to 7 inches, light gray (10YR 6/1) fine sandy loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate thin platy structure in upper part and weak coarse subangular blocky structure in lower part; friable; common fine roots; 1 percent fine pebbles; very strongly acid; clear wavy boundary.

B21tg—7 to 15 inches, grayish brown (2.5Y 5/2) clay loam; many medium faint light olive brown (2.5Y 5/4) mottles and common medium distinct yellowish brown (10YR 5/6) mottles; gray (5Y 5/1) and few fine distinct light olive brown (2.5Y 5/4) mottles on faces of peds; moderate medium subangular blocky structure; firm, sticky, plastic; few fine roots; thin continuous clay films; few fine flakes of mica; 1 percent fine pebbles; very strongly acid; gradual wavy boundary.

B22tg—15 to 26 inches, gray (10YR 5/1) sandy clay loam; many medium distinct olive brown (2.5Y 4/4) mottles and few fine distinct yellowish brown (10YR 5/6) mottles; light gray (10YR 6/1) faces of peds; moderate medium subangular blocky structure; firm, sticky, plastic; few fine and medium roots; thin patchy clay films; few fine flakes of mica; 1 percent fine pebbles; very strongly acid; gradual wavy boundary.

B23tg—26 to 41 inches, gray (10YR 5/1) sandy clay loam; many medium distinct dark yellowish brown (10YR 4/4) mottles, few medium faint light brownish gray (2.5Y 6/2) mottles, and few fine distinct yellowish brown (10YR 5/6) mottles; dark gray (10YR 4/1) faces of peds; weak medium and coarse subangular blocky structure; friable, sticky slightly plastic; few fine roots; thin patchy clay films; few fine flakes of mica; 1 percent fine pebbles; very strongly acid; abrupt irregular boundary.

C1g—41 to 45 inches, mottled light gray (10YR 6/1), gray (10YR 5/1), and brownish yellow (10YR 6/6) clay loam; massive; firm, sticky, plastic; few fine roots; 1 percent fine pebbles; extremely acid; abrupt wavy boundary.

C2g—45 to 60 inches, 55 percent light brownish gray (10YR 6/2) sand and 45 percent gray (10YR 5/1) loamy sand; common medium distinct yellowish brown (10YR 5/6) and few fine distinct strong brown (7.5YR 5/6) mottles; massive; very friable; few fine flakes of mica; extremely acid.

The solum thickness ranges from 40 to 50 inches. The content of fine pebbles ranges from 0 to 1 percent in the solum. Reaction is extremely acid to strongly acid in unlimed areas. Few flakes of mica are throughout the soil in most pedons.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 1 or 2. It is fine sandy loam, sandy loam, loam, or silt loam.

The B2t horizon has hue of 10YR through 5Y, value of 5 through 7, and chroma of 1 or 2. It has yellowish brown and olive brown mottles. It is fine sandy loam, sandy clay loam, or clay loam.

The C horizon has light gray to dark gray matrix colors and strong brown to light olive brown mottles. It ranges from sand to clay loam.

Wahee series

The soils of the Wahee series are deep, nearly level, and somewhat poorly drained. They formed mostly in medium textured to fine textured fluviomarine sediments on the low marine terrace. Slopes range from 0 to 2 percent.

Wahee soils commonly are near Leaf, State, Tetotum, and Tomotley soils. Wahee soils have a more clayey subsoil than the State, Tetotum, or Tomotley soils and are not as well drained as the State or Tetotum soils. Wahee soils are better drained than the Leaf or Tomotley soils.

Typical pedon of Wahee fine sandy loam, 100 yards west into woods from a farm lane, 1.1 miles southwest of the junction of VA-631 and a point 0.87 miles south of Kennard:

O1—2 inches to 1 inch, loose pine needles and twigs.
O2—1 inch to 0, decomposed needles and partially decomposed twigs.
A11—0 to 3 inches, dark brown (10YR 3/3) fine sandy loam; many medium faint yellowish brown (10YR 5/4) mottles; weak fine granular structure; friable; common fine and medium roots; strongly acid; abrupt smooth boundary.
A12—3 to 6 inches, yellowish brown (10YR 5/4) loam; weak fine and medium subangular blocky structure; friable; slightly sticky, slightly plastic; common fine and medium roots; 1 percent fine pebbles; infiltration of A11 material; strongly acid; abrupt smooth boundary.
B21t—6 to 18 inches, yellowish brown (10YR 5/4) clay; common fine faint yellowish brown (10YR 5/6) mottles; moderate fine and medium subangular blocky structure; firm, sticky, plastic; common fine and medium roots; thin continuous films of clay; 1 percent fine pebbles; extremely acid; clear wavy boundary.
B22t—18 to 28 inches, mottled light olive brown (2.5YR 5/4), grayish brown (10YR 5/2), yellowish brown (10YR 5/8), and yellowish red (5YR 4/6) clay; light olive brown (2.5Y 5/4) ped coatings; moderate fine and medium blocky structure; firm, sticky, plastic; few fine roots; thin continuous films of clay; 1 percent fine pebbles; extremely acid; clear wavy boundary.
B23tg—28 to 43 inches, grayish brown (10YR 5/2) clay; many fine prominent strong brown (7.5YR 5/8) mottles and common fine faint light gray (10YR 7/1) mottles; grayish brown (2.5Y 5/2) ped coatings; moderate medium prismatic structure parting to moderate medium blocky; firm, sticky, plastic; few fine roots on faces of prisms; thin continuous films of clay; 1 percent fine pebbles; extremely acid; clear wavy boundary.
B3tg—43 to 60 inches, light brownish gray (2.5Y 6/2) sandy clay loam; many fine prominent strong brown (7.5YR 5/6) mottles and common medium distinct light olive brown (2.5Y 5/4) mottles; light brownish gray (2.5Y 6/2) ped coatings; moderate coarse prismatic structure parting to weak coarse subangular blocky; friable, slightly sticky, slightly plastic; few fine roots on faces of prisms; thin patchy films of clay; few fine flakes of mica; 1 percent fine pebbles; extremely acid.

The solum thickness ranges from 54 to 60 inches or more. The content of fine pebbles ranges from 0 to 2 percent in the solum and from 0 to 5 percent in the C horizon. The soil in unlimed areas is very strongly acid to medium acid in the A horizon and extremely acid to strongly acid in the B and C horizons. Few flakes of mica are throughout the solum of most pedons.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 through 5, and chroma of 2 through 4. Some pedons have an A2 horizon with the hue and chroma of the A1 horizon and value of 3 through 7. The A horizon is loam or fine sandy loam.

The upper part of the B2t horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. The lower part of the B2t horizon has hue of 10YR or 2.5Y, value of 4 through 7, and chroma of 1 or 2. The B2t horizon is mostly clay, sandy clay, or clay loam. The B3 horizon ranges from clay to sandy clay loam.

Some pedons have C horizon with hue of 10YR through 5Y, value of 6 or 7, and chroma of 1 or 2. It has yellow, brown, and red mottles and is clay loam or sandy clay loam.

Yemassee series

The soils of the Yemassee series are deep, nearly level, and somewhat poorly drained. They formed in moderately coarse textured to moderately fine textured fluviomarine sediments on the low marine terrace. Slopes range from 0 to 2 percent.

Yemassee soils commonly are near Nansemond, State, Tetotum, and Tomotley soils. Yemassee soils have more clay in the subsoil than the Nansemond soils, are not as well drained as the State or Tetotum soils, and are better drained than the Tomotley soils.

Typical pedon of Yemassee fine sandy loam, 700 yards east on VA-608 from the junction of VA-608 and VA-642, 317 yards along a field road, at Simons Corner:

Ap—0 to 8 inches, grayish brown (10YR 5/2) fine sandy loam; common fine faint yellowish brown (10YR 4/4) mottles; weak fine granular structure; very friable, nonsticky, nonplastic; common fine roots; common fine interstitial pores; medium acid; abrupt smooth boundary.
B1t—8 to 16 inches, light olive brown (2.5Y 5/4) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles and few fine faint grayish brown (2.5Y 5/2) mottles; moderate fine subangular blocky structure; friable, slightly sticky, plastic; common fine roots; many very fine oblique tubular pores and few medium vesicular pores within peds; thin continuous clay films; few very fine flakes of mica; medium acid (limed); clear smooth boundary.
B21tg—16 to 23 inches, mottled gray (5Y 5/1), light olive brown (2.5Y 5/4), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6) clay loam; weak medium subangular blocky structure; friable, slightly sticky, plastic; few fine roots; few medium and common fine oblique tubular pores; thin continuous grayish brown (2.5Y 5/2) clay films; few very fine flakes of mica; very strongly acid; common smooth boundary.
B22t—23 to 32 inches, mottled olive gray (5Y 5/2), strong brown (7.5YR 5/6), gray (10YR 5/1), and

yellowish brown (10YR 5/4), loam; weak thick platy structure parting to weak medium subangular blocky; friable, slightly sticky, slightly plastic; few fine and medium roots; few fine continuous oblique tubular and common fine interstitial pores; thin continuous clay films; 1 percent fine quartz pebbles; few very fine flakes of mica; very strongly acid; gradual smooth boundary.

B23tg—32 to 48 inches, gray (10YR 5/1) sandy clay loam; common small pockets of sandy loam; common fine prominent yellowish red (5YR 4/6) mottles and common coarse distinct brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; friable, sticky, plastic; few fine roots; many fine oblique tubular pores between peds and common medium vesicular pores within peds; some tubular pores filled with uncoated sand grains; thin patchy dark gray (10YR 4/1) clay films; 3 percent fine pebbles up to 1 inch in diameter; few very fine flakes of mica; very strongly acid; clear, irregular boundary.

Cg—48 to 60 inches, light gray (10YR 7/1) fine sandy loam; common coarse distinct brownish yellow (10YR 6/6) mottles and many fine prominent strong brown (7.5YR 5/8) mottles; massive; hard in place, very friable, nonsticky, nonplastic; few fine vesicular pores; few very fine flakes of mica; very strongly acid.

The solum thickness ranges from 45 to 60 inches or more. The content of fine pebbles ranges from 0 to 3 percent throughout the soil. The soil in unlimed areas is extremely acid to medium acid in the A horizon and extremely acid to strongly acid in the B and C horizons. Few very fine flakes of mica are throughout the solum of most pedons.

The A1 or Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 0 through 2. Some pedons have an A2 horizon with hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 0 through 4. The A horizon is fine sandy loam or sandy loam.

The B1 horizon has hue of 2.5Y, value of 5 or 6, and chroma of 3 or 4. It is sandy loam or fine sandy loam.

The B2t horizon has hue of 10YR through 5Y, value of 5 through 7, and chroma of 1 through 3. It is loam, clay loam, or sandy clay loam. Some pedons have a B3 horizon that ranges from sandy loam to sandy clay.

The C horizon has hue of 10YR through 5Y, value 5 through 7, and chroma of 1 or 2. It is loamy fine sand, loamy sand, fine sandy loam, or sand.

formation of the soils

This section describes the factors of soil formation as they relate to the soils of Richmond County and explains the major processes in the development of soil horizons.

factors of soil formation

Soils are formed through the interaction of five major factors: climate, plant and animal life, parent material, topography, and time.

climate

Richmond County has a warm, continental climate. The average annual rainfall and air temperature allow leaching of plant nutrients from the soil and cause oxidation of the organic matter in the surface layer of the soils. Most of the soils in Richmond County are frozen only for short periods and to a shallow depth each winter; the soils that are wooded and covered with forest litter are rarely frozen. Consequently, weathering and translocation of leachable materials are accelerated.

plant and animal life

All living organisms affect soil formation, including vegetation, animals, and man. Plants supply organic debris, and burrowing animals, earthworms, and insects help keep the soil open and porous. Bacteria and other micro-organisms act to decompose plant material into organic matter that is incorporated into the soil. Man has altered the soil to some extent by clearing woodland, plowing, adding farm chemicals, and mixing soil layers.

parent material

All of the parent material of the soils of Richmond County is transported material that has been moved and deposited by marine and stream action. The transported material is in three main landscape positions on the Coastal Plain: upland terraces and side slopes, lowland terraces, and swamps and tidal marshes. Most areas of this material are several hundred feet thick and are of fluviomarine origin; the river terrace on the Rappahannock River is fluvial sediments of Piedmont origin. All soils in Richmond County are underlain by sand. Emporia, Kempsville, Savannah, and Suffolk soils are the main soils formed on the upland terraces, Leaf, Wahee, Tomotley, Rumford, State, and Tetotum soils are on the lowland terraces, Rappahannock, Levy, and Bibb soils are in swamps and tidal marshes.

topography

Topography, or relief, modifies the effects of other soil-forming factors so that in many places more than one kind of soil forms from similar parent material. For example, Tetotum and Tomotley soils have formed in similar parent materials and are adjacent to each other, but the Tetotum soils are slightly higher and thus are better drained.

time

The soils of Richmond County have a wide range in age. The soils of the older upland ridges, such as Kempsville soils, have deep profile development. Some other soils, such as Catpoint soils, have little or no profile development and are known as young soils. Time is one of the main factors for subsoil development.

major soil horizons

The results of the soil-forming factors can be distinguished 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 contain 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 one horizon. An example would be the B2t horizon, a B horizon that contains 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 A2 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 A1 horizon but darker in color 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

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 and have been for thousands of years.

The accumulation and incorporation of organic matter takes place with the decomposition of plant residue. These additions darken the surface layer and help to form the A1 horizon. Organic matter, once lost, normally takes a long time to replace. In Richmond County the organic matter content of the surface layer averages about 1 percent.

For soils to have distinct subsoil horizons, it is believed that some of the lime and soluble salts 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 Richmond County have a yellowish brown to yellowish red subsoil. These colors are caused mainly by thin coatings of iron oxides on sand and silt grains. In some soils, however, the colors are inherited from the materials in which the soil formed. The structure of well drained and moderately well drained soils is weak to moderate, subangular blocky, and the subsoil contains more clay than the overlying surface layer.

A fragipan has developed in the subsoil of one moderately well drained soil in the county. The fragipan is very firm and brittle when moist, and it is very hard when dry. Soil particles are tightly packed so that bulk density is high and pore space is low, but genesis of this horizon is not fully understood. Clay, silica, and oxides of aluminum are the most likely cementing agents causing brittleness and hardness.

The reduction and transfer of iron, called gleying, is associated mainly with the wetter, more poorly drained soils. Moderately well drained to somewhat poorly drained soils have yellowish brown and strong brown mottles, which indicate the segregation of iron. In poorly drained soils, such as Leaf and Tomotley soils, the subsoil and underlying materials are grayish, which indicates reduction and transfer of iron by removal in solution.

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glossary

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.

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 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	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.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Broad-base terrace. A ridge-type terrace built to control erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

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 loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

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.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15.2 to 38.1 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.

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.

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 arresting grazing for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically 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.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

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 fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Fast intake (in tables). The 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.

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.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

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.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 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.

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 upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual.* The major horizons of mineral soil are as follows:
O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.
A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A 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) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.
C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C

horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

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.

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—

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.

Large stones (in tables). Rock fragments 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Moderately coarse textured soil. 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 the 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.

N value. The relation between the percentage of water under field conditions and the percentages of inorganic clay and of humus. The *N* value is helpful in predicting whether the soil may be grazed by livestock or will support loads and the degree of subsidence that would occur after drainage. Field determination of *N* value is made by squeezing the soil in the hand. If the soil flows with difficulty between the fingers, the *N* value is low. If the soil flows easily between the fingers, the *N* value is high. Soils that have been permanently saturated, such as in tidal marshes, are likely to have a high *N* value.

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.

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 0.20 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.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. The water can be removed only by percolation or evapotranspiration.

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.

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
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

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.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

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.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

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.

Salty water (in tables.) Water that is too salty for consumption by livestock.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

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 underlying material. 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 runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

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 insure 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 (7.5 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 mm 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 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.

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 grained* (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. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from

4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed 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. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

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.

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 sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data were recorded in the period 1951-78 at Warsaw, Virginia]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days[1]	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	46.2	26.7	36.5	73	1	91	3.08	1.80	4.21	7	5.3
February---	49.6	28.7	39.1	74	7	104	2.71	1.37	3.87	6	4.5
March------	57.7	35.4	46.6	83	16	244	3.51	2.23	4.66	7	3.2
April------	69.5	44.4	57.0	90	26	510	2.93	1.51	4.17	6	.1
May--------	77.3	53.6	65.5	94	34	791	3.96	2.03	5.64	7	.0
June-------	85.0	62.0	73.5	98	45	1,005	3.80	1.68	5.59	7	.0
July-------	88.5	66.3	77.4	99	51	1,159	4.31	2.16	6.18	7	.0
August-----	87.0	65.4	76.3	97	49	1,125	4.29	1.97	6.27	7	.0
September--	81.1	58.6	69.9	96	38	897	3.99	1.52	6.05	5	.0
October----	70.4	47.3	58.9	88	27	586	3.43	1.26	5.27	5	.0
November---	59.8	38.2	49.0	81	17	279	3.26	1.53	4.74	6	.5
December---	49.4	30.2	39.8	74	8	135	3.34	1.76	4.71	7	2.7
Yearly:											
Average--	68.5	46.4	57.5	---	---	---	---	---	---	---	---
Extreme--	---	---	---	101	1	---	---	---	---	---	---
Total	---	---	---	---	---	6,926	42.61	35.82	49.12	77	16.3

[1]A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40° F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data were recorded in the period 1951-78 at Warsaw, Virginia]

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--	April 1	April 19	April 28
2 years in 10 later than--	March 26	April 13	April 23
5 years in 10 later than--	March 15	April 2	April 15
First freezing temperature in fall:			
1 year in 10 earlier than--	November 6	October 20	October 7
2 years in 10 earlier than--	November 11	October 26	October 12
5 years in 10 earlier than--	November 22	November 5	October 22

TABLE 3.--GROWING SEASON

[Data were recorded in the period 1951-78 at Warsaw, Virginia]

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	227	192	171
8 years in 10	236	200	179
5 years in 10	252	216	190
2 years in 10	268	232	202
1 year in 10	276	241	208

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Atlee silt loam	462	0.4
2	Bibb and Levy soils	5,457	4.2
3B	Catpoint loamy sand, 0 to 6 percent slopes	719	0.6
4B	Dogue fine sandy loam, 2 to 6 percent slopes	873	0.7
5B	Emporia loam, 2 to 6 percent slopes	9,026	6.9
6B	Kempsville sandy loam, 2 to 6 percent slopes	3,067	2.4
7	Kempsville loam	2,098	1.6
8	Leaf silt loam	1,571	1.2
9	Lumbee loam	666	0.5
10	Nansemond fine sandy loam	2,206	1.7
11	Pamunkey loam, wet substratum	386	0.3
12	Pits, sand and gravel	103	0.1
13	Rappahannock muck	4,711	3.6
14B	Rumford loamy sand, 0 to 6 percent slopes	3,266	2.5
15E	Rumford soils, 15 to 50 percent slopes	36,362	28.0
16D	Rumford and Tetotum soils, 6 to 15 percent slopes	7,624	5.9
17A	Savannah fine sandy loam, 0 to 2 percent slopes	1,258	1.0
17B	Savannah fine sandy loam, 2 to 6 percent slopes	3,706	2.9
18A	State fine sandy loam, 0 to 2 percent slopes	966	0.7
18B	State fine sandy loam, 2 to 6 percent slopes	690	0.5
19A	Suffolk sandy loam, 0 to 2 percent slopes	8,916	6.9
19B	Suffolk sandy loam, 2 to 6 percent slopes	16,175	12.3
20A	Tetotum fine sandy loam, 0 to 2 percent slopes	5,231	4.0
20B	Tetotum fine sandy loam, 2 to 6 percent slopes	1,723	1.3
21	Tomotley fine sandy loam	3,757	2.9
22	Wahee fine sandy loam	753	0.6
23	Yemassee fine sandy loam	1,108	0.9
	Water	7,040	5.4
	Total	129,920	100.0

TABLE 5.--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	Corn	Corn silage	Soybeans	Barley	Wheat	Tall fescue	Grass-legume hay
	Bu	Ton	Bu	Bu	Bu	AUM*	Ton
1: Atlee	90	18	30	---	30	7.5	3.5
2: Bibb and Levy	---	---	---	---	---	---	---
3B: Catpoint	60	14	20	40	20	6.0	2
4B: Dogue	115	23	40	70	55	9.5	3.5
5B: Emporia	100	20	30	75	50	8.5	5
6B: Kempsville	145	29	40	70	50	9.5	5
7: Kempsville	150	30	40	75	50	9.5	5
8: Leaf	90	18	35	50	30	8.0	4.5
9: Lumbee	110	22	45	50	30	9.0	5
10: Nansemond	130	26	40	70	45	8.5	5
11: Pamunkey	160	32	45	80	50	10	5.5
12**. Pits							
13: Rappahannock	---	---	---	---	---	---	---
14B: Rumford	100	20	20	65	25	7.5	2.8
15E: Rumford	---	---	---	---	---	5.5	---
16D: Rumford and Tetotum	---	---	---	---	---	6.5	---
17A: Savannah	110	22	35	60	45	8.0	3
17B: Savannah	100	20	35	60	45	8.0	3
18A: State	130	26	45	75	60	8.5	5.1
18B: State	120	24	40	70	60	8.0	5.1
19A: Suffolk	120	24	40	70	45	7.5	4.5

See footnote at end of table.

TABLE 5.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Corn	Corn silage	Soybeans	Barley	Wheat	Tall fescue	Grass-legume hay
	Bu	Ton	Bu	Bu	Bu	AUM*	Ton
19B------------------------ Suffolk	110	22	35	70	40	7.0	4.0
20A------------------------ Tetotum	150	30	40	75	45	9.5	5.0
20B------------------------ Tetotum	145	29	35	70	35	9.0	5.0
21------------------------- Tomotley	130	26	40	70	45	9.5	4.0
22------------------------- Wahee	90	18	40	50	30	10.0	4.5
23------------------------- Yemassee	120	24	45	75	50	9.5	4.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Soil name and map symbol	Ordi-nation symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Common trees	Site index	
1----------------- Atlee	3o	Slight	Slight	Slight	Slight	Loblolly pine------- Virginia pine------- Southern red oak----	76 70 70	Loblolly pine.
2*: Bibb--------------	2w	Slight	Severe	Severe	Slight	Loblolly pine------- Sweetgum----------- Water oak-----------	90 90 90	Eastern cottonwood, loblolly pine, sweetgum, yellow-poplar.
Levy--------------	3w	Slight	Severe	Severe	Slight	Water tupelo-------- Sweetgum----------- Red maple----------- Baldcypress---------	--- 76 --- ---	Baldcypress.
3B----------------- Catpoint	3s	Slight	Moderate	Moderate	Slight	Loblolly pine------- Longleaf pine------- Sweetgum-----------	80 80 80	Loblolly pine.
4B----------------- Dogue	2w	Slight	Moderate	Slight	Slight	Loblolly pine------- Southern red oak---- Sweetgum----------- Yellow-poplar------- White oak-----------	90 80 90 95 80	Loblolly pine.
5B----------------- Emporia	3o	Slight	Slight	Slight	Slight	Loblolly pine------- Southern red oak----	75 70	Loblolly pine, sweetgum.
6B, 7-------------- Kempsville	3o	Slight	Slight	Slight	Slight	Southern red oak---- Loblolly pine------- Virginia pine------- Sweetgum----------- Yellow-poplar-------	75 82 75 85 85	Loblolly pine.
8------------------ Leaf	2w	Slight	Severe	Severe	Slight	Loblolly pine------- Slash pine---------- Sweetgum-----------	90 90 90	Loblolly pine, Shumard oak, sweetgum.
9------------------ Lumbee	2w	Slight	Severe	Severe	Slight	Loblolly pine------- Slash pine---------- Pond pine----------- Water tupelo-------- Sweetgum----------- White oak-----------	94 91 --- --- --- ---	Loblolly pine, slash pine, water tupelo, sweetgum.
10----------------- Nansemond	2w	Slight	Moderate	Slight	Moderate	Loblolly pine------- Sweetgum----------- Slash pine---------- Shortleaf pine------	88 84 88 77	Loblolly pine, yellow-poplar, black walnut, sweetgum.
11----------------- Pamunkey	2o	Slight	Slight	Slight	Slight	Northern red oak---- Yellow-poplar------- Loblolly pine-------	80 90 90	Loblolly pine, yellow-poplar.
14B---------------- Rumford	3o	Slight	Slight	Slight	Slight	Southern red oak---- Virginia pine------- Loblolly pine-------	65 70 80	Loblolly pine, Virginia pine.
15E*--------------- Rumford	3r	Slight	Moderate	Slight	Slight	Southern red oak---- Virginia pine------- Loblolly pine-------	65 70 80	Loblolly pine, Virginia pine.

See footnote at end of table.

TABLE 6.--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	
16D*:								
Rumford	3o	Slight	Slight	Slight	Slight	Southern red oak	65	Loblolly pine, Virginia pine.
						Virginia pine	70	
						Loblolly pine	80	
Tetotum	3w	Slight	Moderate	Slight	Slight	Loblolly pine	84	Loblolly pine.
						Sweetgum	80	
						Southern red oak	70	
17A, 17B Savannah	3o	Slight	Slight	Slight	Moderate	Loblolly pine	81	Loblolly pine.
						Southern red oak	75	
						Sweetgum	85	
18A, 18B State	3o	Slight	Slight	Slight	Slight	Southern red oak	75	Black walnut, yellow-poplar, loblolly pine.
						Yellow-poplar	95	
						Virginia pine	80	
						Loblolly pine	96	
19A, 19B Suffolk	3o	Slight	Slight	Slight	Slight	Loblolly pine	83	Loblolly pine, shortleaf pine.
						Shortleaf pine	70	
20A, 20B Tetotum	3w	Slight	Moderate	Slight	Slight	Loblolly pine	84	Loblolly pine.
						Sweetgum	80	
						Southern red oak	70	
21 Tomotley	2w	Slight	Severe	Severe	Slight	Loblolly pine	94	Loblolly pine, slash pine, sweetgum, American sycamore.
						Slash pine	91	
						Sweetgum	90	
						Water tupelo	---	
22 Wahee	2w	Slight	Moderate	Moderate	Slight	Loblolly pine	86	Loblolly pine, slash pine, sweetgum, American sycamore, water oak.
						Slash pine	86	
						Sweetgum	90	
23 Yemassee	2w	Slight	Moderate	Moderate	Slight	Loblolly pine	90	Slash pine, loblolly pine, American sycamore, yellow-poplar.
						Slash pine	88	
						Sweetgum	95	
						Southern red oak	---	
						White oak	---	
						Yellow-poplar	100	

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
1 Atlee	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: percs slowly, wetness.	Moderate: wetness.	Moderate: wetness.
2*:					
Bibb	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: flooding, wetness.
Levy	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
3B Catpoint	Slight	Slight	Moderate: slope, small stones.	Slight	Severe: droughty.
4B Dogue	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
5B Emporia	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
6B Kempsville	Slight	Slight	Moderate: slope.	Slight	Slight.
7 Kempsville	Slight	Slight	Slight	Slight	Slight.
8 Leaf	Severe: flooding, wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
9 Lumbee	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
10 Nansemond	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
11 Pamunkey	Slight	Slight	Slight	Slight	Slight.
12*. Pits					
13 Rappahannock	Severe: flooding, excess salt, excess humus.	Severe: wetness, excess humus, excess salt.	Severe: excess humus, excess salt, flooding.	Severe: wetness, excess humus, flooding.	Severe: excess salt, excess sulfur, flooding.
14B Rumford	Slight	Slight	Moderate: slope, small stones.	Slight	Moderate: droughty.
15E* Rumford	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
16D*:					
Rumford	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
Tetotum	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Moderate: wetness.	Moderate: wetness, slope.
17A Savannah	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.
17B Savannah	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.
18A State	Slight	Slight	Slight	Slight	Slight.
18B State	Slight	Slight	Moderate: slope.	Slight	Slight.
19A Suffolk	Slight	Slight	Slight	Slight	Slight.
19B Suffolk	Slight	Slight	Moderate: slope.	Slight	Slight.
20A Tetotum	Moderate: wetness.	Moderate: wetness.	Moderate: small stones, wetness.	Moderate: wetness.	Moderate: wetness.
20B Tetotum	Moderate: wetness.	Moderate: wetness.	Moderate: slope, small stones, wetness.	Moderate: wetness.	Moderate: wetness.
21 Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
22 Wahee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
23 Yemassee	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1 Atlee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
2*:										
Bibb	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
Levy	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Good	Good	Very poor.	Very poor.	Good.
3B Catpoint	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
4B Dogue	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
5B Emporia	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
6B, 7 Kempsville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8 Leaf	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
9 Lumbee	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
10 Nansemond	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
11 Pamunkey	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
12*. Pits										
13 Rappahannock	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
14B Rumford	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
15E* Rumford	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
16D*:										
Rumford	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Tetotum	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
17A, 17B Savannah	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
18A, 18B State	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
19A, 19B Suffolk	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
20A----------------- Tetotum	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
20B----------------- Tetotum	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
21------------------ Tomotley	Very poor.	Very poor.	Poor	Fair	Fair	Good	Good	Very poor.	Poor	Good.
22------------------ Wahee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
23------------------ Yemassee	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1: Atlee	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
2*:						
Bibb	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding.	Severe: wetness, flooding.
Levy	Severe: ponding.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: flooding, ponding, shrink-swell.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
3B: Catpoint	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Severe: droughty.
4B: Dogue	Severe: cutbanks cave, wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell, slope.	Severe: low strength.	Moderate: wetness.
5B: Emporia	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: slope, shrink-swell.	Moderate: low strength.	Slight.
6B: Kempsville	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
7: Kempsville	Slight	Slight	Slight	Slight	Moderate: low strength.	Slight.
8: Leaf	Severe: wetness.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: flooding, wetness, shrink-swell.	Severe: low strength, wetness.	Severe: wetness.
9: Lumbee	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.
10: Nansemond	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
11: Pamunkey	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: low strength.	Slight.
12*. Pits						
13: Rappahannock	Severe: excess humus, ponding, flooding.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: flooding, ponding, low strength.	Severe: low strength, ponding, flooding.	Severe: excess salt, excess sulfur, flooding.
14B: Rumford	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
15E*: Rumford	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
16D*:						
Rumford----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Tetotum----------	Severe: cutbanks cave, wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: low strength, wetness, slope.	Moderate: wetness, slope.
17A--------------- Savannah	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, droughty.
17B--------------- Savannah	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness, droughty.
18A--------------- State	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Moderate: low strength.	Slight.
18B--------------- State	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Moderate: slope.	Moderate: low strength.	Slight.
19A--------------- Suffolk	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Slight.
19B--------------- Suffolk	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Slight.
20A--------------- Tetotum	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
20B--------------- Tetotum	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.	Moderate: wetness.
21---------------- Tomotley	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
22---------------- Wahee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness.	Severe: wetness.
23---------------- Yemassee	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1 Atlee	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
2*:					
Bibb	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
Levy	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
3B Catpoint	Severe: poor filter.	Severe: seepage.	Severe: seepage, wetness, too sandy.	Severe: seepage.	Severe: seepage, too sandy.
4B Dogue	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: seepage, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
5B Emporia	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Moderate: wetness, too clayey.	Slight	Fair: too clayey, wetness.
6B Kempsville	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
7 Kempsville	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Fair: too clayey.
8 Leaf	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
9 Lumbee	Severe: wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: wetness.
10 Nansemond	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: too sandy, wetness.
11 Pamunkey	Moderate: wetness, percs slowly.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, thin layer.
12*. Pits					
13 Rappahannock	Severe: flooding, ponding.	Severe: flooding, excess humus, ponding.	Severe: flooding, ponding, excess humus.	Severe: flooding, ponding.	Poor: ponding, excess humus.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
14B----------------- Rumford	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
15E*---------------- Rumford	Severe: slope, poor filter.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
16D*:					
Rumford------------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Tetotum------------	Severe: wetness.	Severe: wetness, seepage, slope.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, small stones, slope.
17A, 17B------------ Savannah	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey, wetness.
18A, 18B------------ State	Moderate: wetness.	Severe: seepage.	Severe: seepage, wetness.	Moderate: wetness.	Fair: too clayey, thin layer.
19A, 19B------------ Suffolk	Slight------------	Severe: seepage.	Severe:	Slight------------	Good.
20A, 20B------------ Tetotum	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Fair: too clayey, small stones.
21------------------ Tomotley	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
22------------------ Wahee	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
23------------------ Yemassee	Severe: wetness.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," "probable," and "improbable." Absence of an entry indicates that the soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1 Atlee	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
2*:				
Bibb	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Levy	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3B Catpoint	Good	Probable	Improbable: too sandy.	Poor: too sandy, small stones, area reclaim.
4B Dogue	Poor: low strength.	Improbable: thin layer.	Improbable: too sandy.	Poor: too clayey.
5B Emporia	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
6B, 7 Kempsville	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
8 Leaf	Poor: low strength, wetness, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness, too clayey.
9 Lumbee	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
10 Nansemond	Fair: wetness.	Improbable: thin layer.	Improbable: excess fines.	Fair: thin layer.
11 Pamunkey	Fair: low strength.	Improbable: thin layer.	Improbable: thin layer, too sandy.	Fair: small stones, area reclaim.
12*. Pits				
13 Rappahannock	Severe: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, excess salt, wetness.
14B Rumford	Good	Improbable: thin layer.	Probable	Fair: small stones, area reclaim.
15E* Rumford	Poor: slope.	Improbable: thin layer.	Probable	Severe: slope.
16D*:				
Rumford	Good	Improbable: thin layer.	Probable	Fair: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
16D*:				
Tetotum	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
17A, 17B Savannah	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
18A, 18B State	Fair: low strength.	Improbable: thin layer.	Improbable: thin layer.	Fair: too clayey.
19A, 19B Suffolk	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
20A, 20B Tetotum	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
21 Tomotley	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
22 Wahee	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
23 Yemassee	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated]

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
1 Atlee	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Percs slowly	Wetness, erodes easily.	Erodes easily, percs slowly.
2*: Bibb	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Flooding	Wetness, flooding.	Wetness.
Levy	Slight	Severe: hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly, flooding.	Ponding, percs slowly.	Wetness, percs slowly.
3B Catpoint	Severe: seepage.	Severe: seepage.	Severe: cutbanks cave.	Deep to water	Droughty, fast intake, soil blowing.	Droughty.
4B Dogue	Moderate: seepage, slope.	Severe: wetness.	Severe: slow refill, cutbanks cave.	Slope	Wetness, soil blowing, slope.	Favorable.
5B Emporia	Moderate: seepage, slope.	Moderate: thin layer, piping.	Severe: no water.	Deep to water	Soil blowing, slope.	Percs slowly.
6B Kempsville	Moderate: seepage, slope.	Slight	Severe: no water.	Deep to water	Soil blowing, slope.	Favorable.
7 Kempsville	Moderate: seepage.	Slight	Severe: no water.	Deep to water	Soil blowing	Favorable.
8 Leaf	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
9 Lumbee	Severe: seepage.	Severe: wetness.	Slight	Cutbanks cave	Wetness	Wetness.
10 Nansemond	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness	Favorable.
11 Pamunkey	Severe: seepage.	Moderate: thin layer, piping.	Moderate: deep to water, slow refill.	Deep to water	Favorable	Favorable.
12*. Pits						
13 Rappahannock	Slight	Severe: excess humus, ponding.	Moderate: salty water.	Flooding, excess salt, excess sulfur.	Ponding, flooding, excess salt.	Wetness, excess salt.
14B Rumford	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Droughty.
15E* Rumford	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Slope, droughty.
16D*: Rumford	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Droughty, fast intake, slope.	Slope, droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Irrigation	Grassed waterways
16D*:						
Tetotum	Severe: slope.	Severe: wetness.	Severe: cutbanks cave.	Slope	Wetness, soil blowing, slope.	Slope.
17A Savannah	Moderate: seepage.	Severe: piping.	Severe: no water.	Favorable	Wetness, droughty, rooting depth.	Rooting depth.
17B Savannah	Moderate: seepage.	Severe: piping.	Severe: no water.	Slope	Wetness, rooting depth, slope.	Rooting depth.
18A State	Severe: seepage.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing	Favorable.
18B State	Severe: seepage.	Moderate: thin layer, piping.	Severe: cutbanks cave.	Deep to water	Soil blowing, slope.	Favorable.
19A, 19B Suffolk	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
20A Tetotum	Moderate: seepage.	Severe: wetness.	Severe: cutbanks cave.	Favorable	Wetness, soil blowing.	Favorable.
20B Tetotum	Moderate: seepage, slope.	Severe: wetness.	Severe: cutbanks cave.	Slope	Wetness, soil blowing, slope.	Favorable.
21 Tomotley	Moderate: seepage.	Severe: piping, wetness.	Severe: slow refill.	Favorable	Wetness, soil blowing.	Wetness.
22 Wahee	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
23 Yemassee	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Favorable	Wetness, soil blowing.	Wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
1----------------- Atlee	0-9	Silt loam--------	CL, CL-ML	A-4	0	95-100	95-100	60-100	55-90	10-25	2-10
	9-32	Silt loam, loam, clay loam.	CL, CL-ML	A-4, A-6	0	95-100	95-100	85-100	60-85	24-40	6-16
	32-63	Clay loam, silty clay loam, clay.	CL, ML, MH, CH	A-6, A-7	0	95-100	95-100	90-100	70-95	12-60	12-28
2*:											
Bibb------------	0-8	Loam-------------	SM, SM-SC, ML, CL-ML	A-2, A-4	0-5	95-100	90-100	60-90	30-60	<25	NP-7
	8-60	Sandy loam, loam, silt loam, sand.	SM, SM-SC, ML, CL-ML	A-2, A-4	0-10	60-100	50-100	30-100	5-90	<30	NP-7
Levy------------	0-6	Silt loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	98-100	85-100	30-65	12-35
	6-52	Silty clay, clay, silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	98-100	85-100	35-65	15-35
	52-60	Variable---------	---	---	---	---	---	---	---	---	---
3B--------------- Catpoint	0-9	Loamy sand-------	SM, SW-SM	A-1, A-2	0	85-100	75-100	40-70	10-35	<10	NP-5
	9-40	Sand, loamy fine sand, gravelly sand.	SM, SW, SW-SM	A-1, A-2, A-3	0	65-100	60-100	30-70	4-35	<10	NP-5
	40-72	Fine sand, gravelly sand, loamy sand.	GM, SM, GW-GM, SW-SM	A-1, A-2, A-3	0-5	25-100	15-100	8-65	4-35	<10	NP-5
4B--------------- Dogue	0-8	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0	95-100	75-100	50-100	20-50	<25	NP-10
	8-60	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
5B--------------- Emporia	0-9	Loam-------------	CL, SC, SM, ML	A-2, A-4	0-3	90-100	80-100	50-95	25-65	<25	NP-15
	9-22	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
	22-49	Sandy clay loam, clay loam, sandy clay.	SC, CL	A-2, A-4, A-6, A-7	0-2	90-100	80-100	45-95	30-80	25-50	8-30
	49-65	Stratified sandy loam to clay loam.	SM, SC, ML, CL	A-2, A-4, A-6	0-5	70-100	55-100	30-90	20-60	<40	NP-25
6B--------------- Kempsville	0-9	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
	9-58	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4	0-2	90-100	75-100	50-90	30-70	<22	NP-10
	58-68	Sandy clay loam, clay loam, loam.	SC, CL	A-2, A-6	0-2	90-100	75-100	55-95	30-75	25-40	10-20
7---------------- Kempsville	0-12	Loam-------------	SM, SM-SC, ML, CL-ML	A-2, A-4	0-2	90-100	75-100	45-85	25-65	<18	NP-7
	12-47	Sandy loam, fine sandy loam, loam.	SM, SC, ML, CL	A-2, A-4	0-2	90-100	75-100	50-90	30-70	<22	NP-10
	47-60	Sandy clay loam, clay loam, loam.	SC, CL	A-2, A-6	0-2	90-100	75-100	55-95	30-75	25-40	10-20

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
8---------------- Leaf	0-7	Silt loam--------	ML, CL	A-4, A-6	0	100	95-100	70-100	50-90	30-40	5-15
	7-67	Silty clay loam, silty clay, clay.	CL, CH	A-7	0	100	95-100	90-100	75-95	42-65	20-38
9---------------- Lumbee	0-9	Loam-------------	SM, SM-SC	A-2, A-4	0	100	85-100	65-98	15-45	<20	NP-7
	9-27	Sandy clay loam, sandy loam, clay loam.	SC, CL	A-4, A-6, A-7	0	100	90-100	65-98	36-60	19-45	7-25
	27-58	Loamy sand, sand, fine sand.	SP, SM, SP-SM	A-2, A-3	0	90-100	85-100	50-90	4-25	---	NP
10--------------- Nansemond	0-11	Fine sandy loam	SM, SM-SC	A-2, A-4	0	100	95-100	60-80	30-50	<25	NP-10
	11-30	Fine sandy loam, sandy loam.	SM, SM-SC, SC	A-2, A-4, A-6	0	100	95-100	60-85	30-50	<25	NP-15
	30-35	Loamy fine sand, loamy sand.	SM, SM-SC	A-2, A-4	0	100	95-100	45-95	15-50	<25	NP-10
	35-63	Sand, loamy fine sand, fine sandy loam.	SM, SM-SC, SP-SM	A-2, A-3, A-4, A-1	0	95-100	75-100	40-95	5-50	<25	NP-7
11--------------- Pamunkey	0-8	Loam-------------	ML, CL, CL-ML	A-4	0	95-100	90-100	65-95	50-85	18-30	2-10
	8-31	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
	31-60	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
12*. Pits											
13--------------- Rappahannock	0-16	Sapric material	Pt	A-8	0	---	---	---	---	---	---
	16-41	Sapric material, hemic material.	Pt	A-8	0	---	---	---	---	---	---
	41-63	Stratified sand to clay.	CL, SC, ML, SM	A-6, A-4, A-2	---	100	100	95-100	15-95	<40	NP-20
	63-80	Variable---------	---	---	---	---	---	---	---	---	---
14B-------------- Rumford	0-9	Loamy sand-------	SM	A-2, A-1	0	90-100	85-100	45-75	15-30	<20	NP
	9-27	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	80-100	75-100	55-85	30-50	<34	NP-12
	27-68	Stratified sandy loam to gravelly sand.	SM, SP, GP, GM	A-1, A-2, A-3, A-4	0	50-100	35-100	20-85	2-40	<25	NP-6
15E*------------- Rumford	0-13	Loamy sand-------	SM	A-2, A-1	0	90-100	85-100	45-75	15-30	<20	NP
	13-33	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	80-100	75-100	55-85	30-50	<34	NP-12
	33-68	Stratified sandy loam to gravelly sand.	SM, SP, GP, GM	A-1, A-2, A-3, A-4	0	50-100	35-100	20-85	2-40	<25	NP-6
16D*: Rumford---------	0-13	Loamy sand-------	SM	A-2, A-1	0	90-100	85-100	45-75	15-30	<20	NP
	13-33	Fine sandy loam, sandy loam, sandy clay loam.	SM, SC, SM-SC	A-2, A-4, A-6	0	80-100	75-100	55-85	30-50	<34	NP-12
	33-62	Stratified sandy loam to gravelly sand.	SM, SP, GP, GM	A-1, A-2, A-3, A-4	0	50-100	35-100	20-85	2-40	<25	NP-6

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
16D*:											
Tetotum----------	0-6	Sandy loam--------	SM, ML	A-2, A-4	0	85-100	75-100	45-85	25-55	<30	NP-7
	6-54	Sandy clay loam, clay loam, loam.	SC, CL	A-6, A-7	0-2	85-100	75-100	60-95	35-85	30-45	10-20
	54-60	Stratified 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
17A, 17B---------- Savannah	0-9	Fine sandy loam	SM, ML	A-2-4, A-4	0	100	100	60-85	30-55	<25	NP-4
	9-20	Sandy clay loam, clay loam, loam.	CL, SC, CL-ML	A-4, A-6	0	100	100	80-100	40-80	23-40	7-19
	20-60	Loam, sandy loam, sandy clay loam.	CL, SC, CL-ML	A-4, A-6, A-7	0	100	100	80-100	40-80	23-43	7-19
18A, 18B---------- State	0-10	Fine sandy loam	SM, ML, CL-ML, SM-SC	A-4	0	95-100	95-100	65-100	40-85	<35	NP-7
	10-46	Sandy loam, clay loam, sandy clay loam.	CL, SC	A-4, A-6	0	95-100	95-100	75-100	35-80	24-40	8-25
	46-65	Stratified sand to fine sandy loam.	SM, SM-SC, SP-SM	A-2, A-3, A-4	0	85-100	75-100	40-90	5-50	<25	NP-7
19A, 19B---------- Suffolk	0-8	Sandy loam--------	SM	A-4	0	90-100	90-100	70-85	36-45	<30	NP-4
	8-39	Sandy loam, fine sandy loam, loam	SM, SC, SM-SC	A-4	0	90-100	90-100	85-95	36-45	<30	NP-10
	39-57	Loamy sand	SM	A-2	0	90-100	90-100	50-75	15-30	<20	NP-4
	57-72	Sandy loam, sandy clay loam, loam.	SC, ML, CL, SM	A-4, A-6	0	90-100	90-100	70-80	36-55	30-40	6-15
20A, 20B---------- Tetotum	0-13	Fine sandy loam	SM, ML	A-2, A-4	0	85-100	75-100	45-85	25-55	<30	NP-7
	13-38	Sandy clay loam, clay loam, loam.	SC, CL	A-6, A-7	0-2	85-100	75-100	60-95	35-85	30-45	10-20
	38-67	Stratified 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
21---------------- Tomotley	0-7	Fine sandy loam	SM	A-2, A-4	0	98-100	95-100	75-98	25-50	<30	NP-7
	7-41	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
	41-60	Variable----------	---	---	---	---	---	---	---	---	---
22---------------- Wahee	0-6	Fine sandy loam	SM, SM-SC	A-2, A-4	0	100	95-100	50-85	30-50	<28	NP-7
	6-43	Clay, clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	85-100	50-90	38-60	18-32
	43-60	Variable----------	---	---	---	---	---	---	---	---	---
23---------------- Yemassee	0-16	Fine sandy loam	SM	A-2, A-4	0	100	100	75-100	25-50	<30	NP-7
	16-23	Sandy clay loam, clay loam, fine sandy loam.	CL, SC, CL-ML, SM-SC	A-2, A-4, A-6	0	100	100	75-100	30-70	16-38	4-18
	23-48	Sandy clay loam, fine sandy loam, sandy clay.	SC, SM, CL-ML, SM-SC	A-2, A-4, A-6	0	100	100	75-100	25-55	<35	NP-15
	48-60	Variable----------	---	---	---	---	---	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "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 <2mm	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH					Pct
1	0-9	7-15	1.10-1.30	0.6-2.0	0.14-0.20	3.6-6.0	Low	0.37	4	5	1-3
Atlee	9-32	10-30	1.20-1.40	0.6-2.0	0.14-0.20	3.6-5.5	Low	0.37			
	32-63	20-45	1.30-1.60	0.2-0.6	0.11-0.19	3.6-5.5	Moderate	0.37			
2*:											
Bibb	0-8	2-18	1.20-1.40	0.6-2.0	0.12-0.18	4.5-7.3	Low	0.20	5	---	.5-2
	8-60	2-18	1.30-1.40	0.6-2.0	0.12-0.20	4.5-7.8	Low	0.37			
Levy	0-6	27-50	0.50-1.00	0.06-0.2	0.16-0.22	4.5-6.5	High	0.32	5	4	3-15
	6-52	35-60	0.05-1.10	0.06-0.2	0.16-0.22	6.1-7.8	High	0.32			
	52-60	---	---	---	---	---	-----------	----			
3B	0-9	0-10	1.20-1.50	>6.0	0.06-0.10	4.5-6.5	Low	0.10	5	1	.5-1
Catpoint	9-40	0-10	1.45-1.65	>6.0	0.02-0.10	4.5-6.5	Low	0.10			
	40-72	0-10	1.45-1.65	>6.0	0.01-0.08	4.5-6.5	Low	0.10			
4B	0-8	5-10	1.35-1.50	2.0-6.0	0.08-0.15	3.6-5.0	Low	0.28	4	3	.5-1
Dogue	8-60	35-50	1.45-1.60	0.2-0.6	0.12-0.19	3.6-5.0	Moderate	0.28			
5B	0-9	7-18	1.30-1.40	2.0-6.0	0.10-0.17	4.5-5.5	Low	0.28	4	3	.5-1
Emporia	9-22	18-35	1.35-1.45	0.2-2.0	0.10-0.18	4.5-5.5	Low	0.28			
	22-49	21-40	1.45-1.60	0.06-0.6	0.10-0.16	4.5-5.5	Moderate	0.20			
	49-65	5-34	1.45-1.60	0.06-2.0	0.08-0.18	4.5-5.5	Moderate	0.20			
6B	0-9	5-18	1.30-1.40	2.0-6.0	0.10-0.16	4.5-5.5	Low	0.32	3	3	.5-2
Kempsville	9-58	12-24	1.30-1.45	2.0-6.0	0.12-0.18	4.5-5.5	Low	0.24			
	58-68	18-40	1.35-1.65	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.24			
7	0-12	5-18	1.30-1.40	2.0-6.0	0.10-0.16	4.5-5.5	Low	0.32	3	3	.5-2
Kempsville	12-47	12-24	1.30-1.45	2.0-6.0	0.12-0.18	4.5-5.5	Low	0.24			
	47-60	18-40	1.35-1.65	0.6-2.0	0.12-0.18	4.5-5.5	Low	0.24			
8	0-7	12-25	1.30-1.50	0.06-0.2	0.20-0.22	3.6-5.5	Low	0.32	4	---	1-3
Leaf	7-67	35-60	1.50-1.60	<0.06	0.18-0.21	3.6-5.5	High	0.32			
9	0-9	4-18	1.55-1.70	2.0-6.0	0.08-0.12	4.5-5.5	Low	0.24	5	---	1-4
Lumbee	9-27	18-35	1.30-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.32			
	27-58	1-10	1.60-1.75	6.0-20	0.03-0.06	4.5-5.5	Low	0.10			
10	0-11	6-15	1.20-1.50	2.0-6.0	0.08-0.13	4.5-5.5	Low	0.20	3	3	1-2
Nansemond	11-30	10-20	1.25-1.45	2.0-6.0	0.09-0.14	4.5-5.5	Low	0.17			
	30-35	4-12	1.30-1.55	2.0-6.0	0.05-0.10	3.6-5.5	Low	0.15			
	35-63	2-12	1.35-1.55	6.0-20	0.02-0.10	3.6-5.5	Low	0.15			
11	0-8	5-15	1.25-1.55	0.6-2.0	0.14-0.20	5.6-7.3	Low	0.28	4	3	.5-2
Pamunkey	8-31	20-35	1.35-1.65	0.6-2.0	0.13-0.19	5.6-7.3	Low	0.28			
	31-60	4-18	1.40-1.65	2.0-20	0.04-0.12	5.1-7.3	Low	0.28			
12*.											
Pits											
13	0-16	---	0.10-1.00	0.6-2.0	0.22-0.26	5.1-8.4	Low	----	---	---	20-65
Rappahannock	16-41	---	0.10-1.00	0.6-2.0	0.22-0.26	5.1-8.4	Low	----			
	41-63	5-40	1.20-1.50	0.6-2.0	0.08-0.20	5.1-8.4	Low	0.17			
	63-80	---	---	---	---	---	-----------	----			
14B	0-9	2-12	1.25-1.45	>6.0	0.06-0.10	3.6-5.5	Low	0.24	4	2	.5-2
Rumford	9-27	8-18	1.25-1.45	2.0-6.0	0.10-0.15	4.5-6.0	Low	0.17			
	27-68	2-18	1.25-1.50	>2.0	0.04-0.10	3.6-6.5	Low	0.17			

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay <2mm	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	G/cm3	In/hr	In/in	pH					Pct
15E*----------- Rumford	0-13	2-12	1.25-1.45	>6.0	0.06-0.10	3.6-5.5	Low-----------	0.24	4	2	.5-2
	13-33	8-18	1.25-1.45	2.0-6.0	0.10-0.15	4.5-6.0	Low-----------	0.17			
	33-68	2-18	1.25-1.50	>2.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
16D*:											
Rumford---------	0-13	2-12	1.25-1.45	>6.0	0.06-0.10	3.6-5.5	Low-----------	0.24	4	2	.5-2
	13-33	8-18	1.25-1.45	2.0-6.0	0.10-0.15	4.5-6.0	Low-----------	0.17			
	33-62	2-18	1.25-1.50	>2.0	0.04-0.10	3.6-6.5	Low-----------	0.17			
Tetotum---------	0-6	5-15	1.20-1.40	2.0-6.0	0.08-0.15	3.6-5.5	Low-----------	0.32	4	3	.5-2
	6-54	18-35	1.25-1.45	0.6-2.0	0.14-0.19	3.6-5.5	Low-----------	0.32			
	54-60	5-30	1.25-1.45	0.6-20	0.06-0.15	3.6-5.5	Low-----------	0.24			
17A, 17B--------- Savannah	0-9	3-16	1.45-1.65	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.24	3	---	.5-3
	9-20	18-32	1.55-1.75	0.6-2.0	0.13-0.20	4.5-5.5	Low-----------	0.28			
	20-60	18-32	1.60-1.80	0.2-0.6	0.05-0.10	4.5-5.5	Low-----------	0.24			
18A, 18B--------- State	0-10	5-15	1.25-1.40	0.6-6.0	0.10-0.20	4.5-5.5	Low-----------	0.28	4	3	<2
	10-46	18-34	1.35-1.50	0.6-2.0	0.14-0.19	4.5-5.5	Low-----------	0.28			
	46-65	2-15	1.35-1.50	>2.0	0.02-0.10	4.5-6.0	Low-----------	0.17			
19A, 19B--------- Suffolk	0-8	5-10	1.40-1.60	0.6-2.0	0.12-0.15	4.5-5.5	Low-----------	0.20	3	3	.5-2
	8-39	10-18	1.40-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.20			
	39-57	5-15	1.30-1.70	2.0-6.0	0.05-0.10	4.5-5.5	Very low-----	0.20			
	57-72	5-27	1.40-1.60	0.6-2.0	0.10-0.15	4.5-5.5	Low-----------	0.20			
20A, 20B--------- Tetotum	0-13	5-15	1.20-1.40	2.0-6.0	0.08-0.15	3.6-5.5	Low-----------	0.32	4	3	.5-2
	13-38	18-35	1.25-1.45	0.6-2.0	0.14-0.19	3.6-5.5	Low-----------	0.32			
	38-67	5-30	1.25-1.45	0.6-20	0.06-0.15	3.6-5.5	Low-----------	0.24			
21--------------- Tomotley	0-7	5-20	1.30-1.60	2.0-6.0	0.10-0.15	3.6-5.5	Low-----------	0.20	5	3	1-6
	7-41	18-35	1.30-1.50	0.6-2.0	0.12-0.18	3.6-5.5	Low-----------	0.20			
	41-60	---	---	---	---	---	--------------	----			
22--------------- Wahee	0-6	5-20	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low-----------	0.28	5	3	.5-5
	6-43	35-55	1.40-1.60	0.06-0.2	0.12-0.20	3.6-5.5	Moderate-----	0.28			
	43-60	---	---	0.2-0.6	0.12-0.20	3.6-5.5	Moderate-----	0.28			
23--------------- Yemassee	0-16	10-20	1.30-1.60	2.0-6.0	0.10-0.15	3.6-6.0	Low-----------	0.10	5	3	.5-4
	16-23	18-35	1.30-1.50	0.6-2.0	0.11-0.18	3.6-5.5	Low-----------	0.20			
	23-48	12-40	1.30-1.50	0.6-2.0	0.11-0.17	3.6-5.5	Low-----------	0.20			
	48-60	---	---	---	---	---	--------------	----			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--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]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Uncoated steel	Concrete
					Ft				
1 Atlee	C	None	---	---	1.5-2.5	Apparent	Nov-Mar	High	High.
2*:									
Bibb	C	Frequent	Brief	Dec-May	0.5-1.5	Apparent	Dec-Apr	High	Moderate.
Levy	D	Frequent	Very long	Jan-Dec	+2-+1	Apparent	Jan-Dec	High	High.
3B Catpoint	A	None	---	---	>4.0	Apparent	Feb-Apr	Low	Moderate.
4B Dogue	C	None	---	---	1.5-3.0	Apparent	Jan-Mar	High	High.
5B Emporia	C	None	---	---	3.0-4.5	Perched	Nov-Apr	Moderate	High.
6B, 7 Kempsville	B	None	---	---	>6.0	---	---	Low	Moderate.
8 Leaf	D	Rare	Brief	Jan-Apr	0.5-1.5	Apparent	Jan-Apr	High	Moderate.
9 Lumbee	D	Rare	Brief	Dec-May	0-1.5	Apparent	Nov-Apr	High	High.
10 Nansemond	C	None	---	---	1.5-2.5	Apparent	Dec-Apr	Moderate	High.
11 Pamunkey	B	None	---	---	4.0-6.0	Apparent	Dec-Mar	Moderate	Moderate.
12*. Pits									
13 Rappahannock	D	Frequent	Very brief	Jan-Dec	+2-0.5	Apparent	Jan-Dec	High	High.
14B, 15E* Rumford	A	None	---	---	>6.0	---	---	Low	High.
16D*:									
Rumford	A	None	---	---	>6.0	---	---	Low	High.
Tetotum	C	None	---	---	1.5-2.5	Apparent	Dec-Apr	High	High.
17A, 17B Savannah	C	None	---	---	1.5-3.0	Perched	Jan-Mar	Moderate	High.
18A, 18B State	B	None	---	---	4.0-6.0	Apparent	Dec-Jun	Moderate	High.
19A, 19B Suffolk	B	None	---	---	>6.0	---	---	Low	Moderate.
20A, 20B Tetotum	C	None	---	---	1.5-2.5	Apparent	Dec-Apr	High	High.
21 Tomotley	B/D	None	---	---	0-1.0	Apparent	Dec-Mar	High	High.

See footnote at end of table.

TABLE 15.--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				
22----------------- Wahee	D	None---------	---	---	0.5-1.5	Apparent	Dec-Mar	High------	High.
23----------------- Yemassee	B	None---------	---	---	1.0-1.5	Apparent	Dec-Mar	High------	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

[An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series]

Soil name	Family or higher taxonomic class
Atlee	Fine-loamy, siliceous, thermic Fragiaquic Paleudults
Bibb	Coarse-loamy, siliceous, acid, thermic Typic Fluvaquents
Catpoint	Siliceous, thermic Ultic Udipsamments
Dogue	Clayey, mixed, thermic Aquic Hapludults
Emporia	Fine-loamy, siliceous, thermic Typic Hapludults
Kempsville	Fine-loamy, siliceous, thermic Typic Hapludults
Leaf	Clayey, mixed, thermic Typic Albaquults
Levy	Fine, mixed, acid, thermic Typic Hydraquents
Lumbee	Fine-loamy over sandy or sandy-skeletal, siliceous, thermic Typic Ochraquults
Nansemond	Coarse-loamy, siliceous, thermic Aquic Hapludults
Pamunkey	Fine-loamy, mixed, thermic Ultic Hapludalfs
Rappahannock	Loamy, mixed, euic, thermic Terric Sulfihemists
Rumford	Coarse-loamy, siliceous, thermic Typic Hapludults
Savannah	Fine-loamy, siliceous, thermic Typic Fragiudults
State	Fine-loamy, mixed, thermic Typic Hapludults
*Suffolk	Fine-loamy, siliceous, thermic Typic Hapludults
Tetotum	Fine-loamy, mixed, thermic Aquic Hapludults
Tomotley	Fine-loamy, mixed, thermic Typic Ochraquults
Wahee	Clayey, mixed, thermic Aeric Ochraquults
Yemassee	Fine-loamy, mixed, thermic Aeric Ochraquults

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