SOIL SURVEY OF

Chesterfield County, Virginia

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

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

Major fieldwork for this soil survey was completed in the period 1972-73. Soil names and descriptions were approved in 1974. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1974. This survey was made cooperatively by the Soil Conservation Service and the Kentucky Agricultural Experiment Station. It is part of the technical assistance furnished to the Scott County Conservation District.

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

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Chesterfield County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in numerical order by map symbol and gives the capability unit and woodland group in which each soil has been placed. It also shows the pages on which each soil and its interpretive groups are described.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be placed over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and the woodland groups.

Foresters and others can refer to the section "Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife Habitat."

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and recreation areas in the section "Town and Country Planning."

Engineers and builders can find, under "Engineering," tables that contain estimates of soil properties and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation, Morphology, and Classification of the Soils."

Newcomers in Chesterfield County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "General Nature of the County."

Cover: **Rapid urban development on the better soils for farming creates strong competition for them because they generally have fewer limitations for urban development than other soils.**

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SOIL SURVEY OF CHESTERFIELD COUNTY, VIRGINIA

By R. L. Hodges, Virginia Polytechnic Institute and State University

Field Survey by R. L. Hodges, H. L. Mathews, D. F. Amos, J. P. Sutton, and W. J. Edmonds, Virginia Polytechnic Institute and State University

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

CHESTERFIELD COUNTY is in the Coastal Plain and Piedmont sections of east-central Virginia (fig. 1). It is bounded on the north by the City of Richmond and Henrico County; on the east by Henrico and Charles City Counties; on the south by Dinwiddie, Prince George, and Amelia Counties; and on the west by Amelia and Powhatan Counties. The James River forms the northern boundary, and the Appomattox River, the southern boundary. The county has an area of 300,400 acres.

From east to west, Chesterfield County is crossed by U.S. Highways 60 and 360; from north to south, by U.S. Highways 1 and 301 and Interstate Highway 95. The population in 1970 was 77,046. The largest towns are Chester, Midlothian, and Chesterfield Court House, the county seat.

Most people in the county derive their income from industry, farming, the sale of forest and horticultural products. About 78 percent of the county is in woodland; the sale of woodland and nursery products is a major source of farm income. Urban development has progressed rapidly during the past decade. Manufacturing is the fastest growing sector of the county's economy.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Chesterfield County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not.

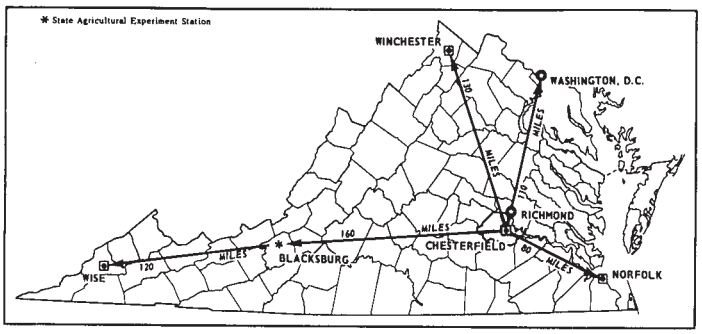

Figure 1.—**Location of Chesterfield County in Virginia.**

They observed the steepness, length, and shape of slopes; the size and speed of streams; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

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

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Appling and Cecil, for example, are the names of two soil series. All the soils in the United States having the same series name have essentially the same characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Appling sandy loam, 2 to 6 percent slopes, is one of several phases within the Appling series.

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

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

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Chesterfield County: soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Appling-Wedowee fine sandy loams, 6 to 12 percent slopes, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but that are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils or of two or more. If there are two or more dominant series represented in the group, the name of the group ordinarily consists of the names of the dominant soils, joined by "and." Ochrepts and Udults, sloping, is an undifferentiated group of soils that have not been classified at the series level.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the map and are described in the survey, but they are called miscellaneous areas and are given descriptive names. Made land is an example.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail on a given kind of soil, and they relate this to the slow permeability of the soil or its high water table. They see that streets, road pavements, and foundations for houses are cracked on a particular soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Chesterfield County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

The soil associations in this survey have been grouped into four general kinds of landscapes for broad interpretive purposes. Each of the broad groups and the soil associations in each group are described in the following pages.

Soils on Flood Plains and Terraces

The soils formed in water-deposited materials that range from sand to clay. They are mainly along the larger drainageways and streams throughout the county. However, one area of older alluvium in the north is above and some distance from the James River. The soils are commonly nearly level to sloping, and some are waterlogged or flooded during high water.

1. Fluvaquents-Hydraquents association

Deep, poorly drained and very poorly drained soils that are frequently flooded and that have a sandy, loamy, or clayey substratum; along drainageways and streams

This soil association is on narrow to broad flood plains along larger streams. The soils of this association are nearly level to gently sloping and receive seepage and runoff from surrounding higher lying areas. They are commonly flooded by nearby streams. Below the fall line along the Appomattox River and James River, the soils are covered or partly covered each day by tidal waters.

This association makes up about 10 percent of the county. It is about 73 percent Fluvaquents, 12 percent Hydraquents, and 15 percent soils of minor extent.

Fluvaquents are commonly on flood plains along streams above the fall line. These soils are mixed alluvium and range from sand to clay. They are flooded and ponded for long periods from December to May, and after large storms and prolonged wet periods throughout the remainder of the year. Some areas are covered by standing water for 9 months or more each year.

Hydraquents are on flood plains and tidal marshes below the fall line along the lower reaches of the Appomattox River and James River. They are made up of layers of sandy, loamy, clayey, and mucky alluvium. They are

continually waterlogged. Low areas are covered by tidal waters daily; higher areas are covered only by unusually high tides or by storm tides.

Among the soils of minor extent are Abell, Aquults, Buncombe, Chastain, Chewacla, Coxville, Lenoir, Pouncey, Roanoke, Toccoa, Udifluvents, and Worsham soils. They are commonly on slightly higher areas of the flood plains or on low terraces that are slightly above the flood plains. Some are better drained than Fluvaquents and Hydraquents, and most of them are not flooded for as long or as deeply as those soils.

Long, narrow areas of flood plains along many of the larger drainageways and small streams throughout the county are not shown on the general soil map because they are so small. Soils on these flood plains, however, are similar to those of this soil association.

Most areas of Fluvaquents are wooded. Hydraquents largely have a cover of reeds, cattails, arrowleaf, rushes, and marsh grasses. The association has little value for farming or urban development, and it is best suited to wildlife.

2. *Pamunkey-Lenoir-Dogue association*

Deep, well drained, moderately well drained, and somewhat poorly drained soils that have a dominantly loamy or clayey subsoil; on terraces

This soil association is along the Appomattox River and the James River. It is mainly on broad terraces that are not generally flooded. Slight concave areas are often wet, and a few of these areas pond for short periods. The soils are mostly nearly level to gently sloping. Short, sharp slopes are common along drainageways and small streams and on terrace breaks. These slopes are commonly 6 to 20 percent.

This association makes up about 2 percent of the county. It is 47 percent Pamunkey soils, 15 percent Lenoir soils, 8 percent Dogue soils, and 30 percent soils and miscellaneous areas of minor extent.

Pamunkey soils are nearly level and gently sloping throughout most of the association, but they are also on many of the short, sharp slopes and terrace breaks of the landscape. These soils are well drained and have a loamy subsoil. Lenoir and Dogue soils are in nearly level and slightly concave areas of the landscape. Lenoir soils are somewhat poorly drained and have a clayey subsoil. Dogue soils are moderately well drained and have a clayey subsoil.

Among the soils and miscellaneous areas of minor extent are Buncombe, Forestdale, Masada, Molena, Ochrepts, Tetotum, Toccoa, Udifluvents, and Udults soils and Made land. Buncombe and Toccoa soils are on high, sandy flood plains along streams. Forestdale and Tetotum soils are in positions similar to those of Lenoir and Dogue soils. Masada and Molena soils are in positions similar to those of Pamunkey soils. Ochrepts and Udults are on short, sharp slopes and terrace breaks. Udifluvents are on narrow flood plains along drainageways and small streams. Made land is somewhat extensive and is disturbed soils, areas of cut and fill, borrow pits, and sand and gravel pits. Many areas are near highways, military and industrial complexes, shopping centers, subdivisions, and other urban areas.

This association is mainly used for crops and livestock. Also, some areas are also used for industrial complexes, sand and gravel mining, and shopping centers and subdivisions.

3. *Masada-Edgehill-Turbeville association*

Deep, well drained soils that have a dominantly clayey or gravelly clayey subsoil; on high terraces

This soil association is in the northern part of the county. The topography is rolling. On broad ridges, slopes are 2 to 6 percent; on side slopes, they are 6 to 12 percent. Along drainageways and streams and along the boundaries of the association, the ridges are narrow and slopes are 2 to 12 percent. In such places the side slopes are steeper, and they commonly range from 12 to 40 percent. The association is at the highest elevation in the county. The soils formed in old alluvium that has been in place for some time. A gravel layer at the base of the alluvium has influenced some of the soils, particularly the soils on the narrower ridges and steeper side slopes.

This association makes up about 5 percent of the county. It is 37 percent Masada soils, 28 percent Edgehill soils, 13 percent Turbeville soils, and 22 percent soils of minor extent.

Masada and Turbeville soils are on broad ridges and milder side slopes throughout most of the association. Masada soils are well drained and have a clayey subsoil. Edgehill soils are on the narrower ridges and the stronger side slopes. These soils are well drained and have a gravelly, clayey subsoil. Turbeville soils are well drained and have a clayey subsoil.

Among the soils of minor extent are Appling, Augusta, Creedmoor, Mayodan, Pouncey, and Varina soils. Appling and Mayodan soils are on narrow to somewhat broad ridgetops and some side slopes at lower elevations in the association. Augusta soils are on small flats and in slightly concave areas throughout the association. Creedmoor and Varina soils are on broad ridges at lower elevations. They are commonly near Appling and Mayodan soils. Pouncey soils are in small, concave areas, generally along small drainageways.

Most of this association is wooded, but some small areas are used for general farming. The eastern part of the association, especially near Bon Air, is being developed for urban use.

Soils on Triassic Basin Material

The soils that formed in material weathered from Triassic sandstone and shale are in the western part of the county. Some of the soils are gravelly. The soils are on ridges and side slopes, and the topography is rolling.

4. *Creedmoor-Mayodan association*

Deep, well drained and moderately well drained soils that have a dominantly clayey subsoil; on uplands

This soil association is in the western part of the county. The topography is gently rolling and rolling. On broad ridges, slopes are 2 to 6 percent; on mild side slopes, they are 6 to 12 percent. Along the larger drainageways and small streams, the ridges are narrower and the side slopes are steeper. In such places, slopes commonly range from 12 to 40 percent. The soils of this association formed in material weathered from sandstone, sandstone conglomerate, shale, mudstone, and siltstone. Some of the soils have a high content of gravel either in the surface layer or in

both the surface layer and subsoil.

This association makes up about 12 percent of the county. It is 31 percent Creedmoor soils, 26 percent Mayodan soils, and 43 percent soils and miscellaneous areas of minor extent.

Creedmoor soils are on broad ridges and mild side slopes throughout most of the association. These soils are moderately well drained and have a firm, sticky and plastic, clayey subsoil. Mayodan soils are commonly on somewhat narrower ridges and slightly stronger side slopes. These soils are well drained and have a clayey subsoil. Creedmoor and Mayodan soils are commonly intricately mixed on the narrower ridges and steeper side slopes. They have a high content of gravel in some places.

Among the soils and miscellaneous areas of minor extent are Bourne, Fluvaquents, Pinkston, Roanoke, Udifluvents, and Worsham soils and the Orthents-Udults-Mine pits complex. Bourne soils are on broad ridges and mild side slopes. Fluvaquents and Udifluvents are in long, narrow areas of mixed alluvium along drainageways and small streams. Pinkston soils are on narrow ridges and stronger side slopes along drainageways and small streams. Roanoke and Worsham soils are on small, wet, low-lying flats and on narrow flood plains. The Orthents-Udults-Mine pits complex is soils, shafts and pits, and spoil dumps associated with the past mining of coal. Areas of this complex are commonly along the eastern edge of the Triassic Basin near Midlothian and Winterpock.

Most of this association is wooded, but some small areas are used for general farming. A small area near Swift Creek Reservoir is being developed for urban use.

5. *Mayodan-Creedmoor association*

Deep, well drained and moderately well drained soils that have a dominantly clayey or gravelly clayey subsoil; on uplands

This soil association is in the western part of the county. The topography is rolling. On somewhat broad to narrow ridges, slopes are 2 to 6 percent; on mild side slopes, they are 6 to 12 percent. Along drainageways and small streams, the ridges are narrower and the side slopes are steeper. In such places slopes commonly range from 12 to 40 percent. The soils of this association formed in material weathered from sandstone, sandstone conglomerate, shale, mudstone, and siltstone. Many of the soils have a high content of gravel either in the surface layer or in both the surface layer and subsoil.

This association makes up about 6 percent of the county. It is 48 percent Mayodan soils, 11 percent Creedmoor soils, and 41 percent soils and miscellaneous areas of minor extent.

Mayodan soils are on ridges and milder side slopes throughout most of the association. These soils are well drained and have a clayey subsoil. Creedmoor soils are on some of the broader ridges and mild side slopes. These soils are moderately well drained and have a very firm, sticky and plastic, clayey subsoil. Mayodan and Creedmoor soils are commonly intricately mixed on the narrower ridges and stronger side slopes, and they commonly have a high content of gravel.

Among the soils and miscellaneous areas of minor extent are Augusta, Bourne, Edgehill, Masada, Roanoke, Turbeville, and Worsham soils and the Orthents-Udults-Mine pits complex. Augusta, Roanoke, and Worsham soils are on small, wet, low-lying flats and on narrow flood plains. Bourne soils are on somewhat broad ridges and mild side slopes. Edgehill, Masada, and Turbeville soils are on ridges and side slopes, mainly in the northern part of the association. The Orthents-Udults-Mine pits complex is soils, shafts, and pits, and spoil dumps associated with the past mining of coal. Areas of this complex are commonly along the eastern edge of the Triassic Basin near Midlothian and Winterpock.

Most of this association is wooded, but some small areas are used for general farming.

Soils on the Piedmont Plateau

The soils that formed in material weathered from granite, gneiss, and schist are mainly in the central part of the county. Some soils, especially to the east, formed in thin, westward extensions of Coastal Plain sediment or other fluvial material. The soils are on ridges and slopes, and the topography is rolling.

6. *Cecil-Appling association*

Deep, well drained soils that have a dominantly clayey subsoil; on uplands

This soil association is in the western part of the county. The topography is rolling. On somewhat broad to narrow ridges, slopes are 2 to 6 percent; on side slopes, they are 6 to 20 percent. The soils of this association formed in material weathered from granite and granite gneiss.

This association makes up 3 percent of the county. It is 39 percent Cecil soils, 37 percent Appling soils, and 24 percent soils of minor extent.

Cecil and Appling soils are on ridges and side slopes throughout most of the association. These soils are well drained and have a clayey subsoil.

Among the soils of minor extent are Abell, Colfax, Cullen, Enon, Louisburg, Orange, Starr, Vance, and Worsham soils. Abell, Colfax, Starr, and Worsham soils are in small, slightly concave areas and along small drainageways. Cullen, Enon, Orange, and Vance soils are on ridges and milder side slopes throughout the association. Louisburg soils are on narrow ridges and some of the stronger slopes throughout the association.

This association is used mostly for woodland and general farming.

7. *Cullen-Appling-Colfax association*

Deep, well drained and somewhat poorly drained soils that have a dominantly clayey subsoil or that have a fragipan; on uplands

This association is in the west-central and southwestern parts of the county. The topography is gently rolling. On broad ridges, slopes are 2 to 6 percent; on side slopes, they are 6 to 20 percent. Small upland flats and low-lying slightly concave areas are along drainageways.

This association makes up about 2 percent of the county. It is 33 percent Cullen soils, 23 percent Appling soils, 17 percent Colfax soils, and 27 percent soils of minor extent.

Cullen and Appling soils are on ridges and side slopes throughout most of the association. These soils are well drained and have a clayey subsoil. Colfax soils are on small upland flats and in slightly concave areas along drainageways. These soils are somewhat poorly drained and have a fragipan.

Among the soils of minor extent are Enon, Louisburg, Orange, Starr, Vance, and Worsham soils. Enon, Orange, and Vance soils are in positions similar to those of Cullen and Appling soils. Louisburg soils are commonly on some of the stronger side slopes. Starr soils are in small, slightly concave areas and along small drainageways. Worsham soils are at the heads of drainageways and along small drainageways.

This association is mostly wooded, but small areas are used for general farming.

8. *Appling-Worsham-Colfax association*

Deep, well drained, somewhat poorly drained, and poorly drained soils that have a dominantly clayey subsoil or that have a fragipan; on uplands and upland flats

This soil association is in the north-central, central, and south-central parts of the county. It is on broad upland flats and broad ridges that have mild side slopes rising above the flats.

This association makes up about 3 percent of the county. It is 29 percent Appling soils, 27 percent Worsham soils, 22 percent Colfax soils, and 22 percent soils of minor extent.

Appling soils are on ridges and side slopes throughout the association. These soils are well drained and have a clayey subsoil. Worsham and Colfax soils are on flats. Worsham soils are poorly drained and have a clayey subsoil. Colfax soils are somewhat poorly drained and have a fragipan.

Among the soils of minor extent are Bourne, Cecil, Durham, Louisburg, Spotsylvania, Vance, and Varina soils. Bourne and Varina soils are on some of the higher ridges. Cecil, Durham, and Vance soils are in positions similar to those of Appling soils. Louisburg soils are on a few of the stronger side slopes. Spotsylvania soils are commonly near Bourne soils, but they are in a slightly lower position.

Most of this association is wooded, but in the north-central and central parts of the county some areas are being developed for urban use.

9. *Appling-Grover-Colfax association*

Deep, well drained and somewhat poorly drained soils that have a dominantly clayey or loamy subsoil or that have a fragipan; on uplands and upland flats

This soil association extends from the James River to the Appomattox River through the central and east-central parts of the county. The topography is gently rolling and rolling. On broad and somewhat broad ridges, slopes are 2 to 6 percent; on side slopes, they are 6 to 20 percent. Small upland flats and slightly concave areas are at the heads of drainageways and along drainageways and small streams. Along the larger drainageways and streams, the ridges are narrower and the side slopes are steeper. In such places, slopes commonly range from 12 to 40 percent. The soils of this association formed in material weathered from granite, granite gneiss, and schist.

This association makes up about 26 percent of the county. It is 74 percent Appling soils, 8 percent Grover soils, 7 percent Colfax soils, and 11 percent soils and miscellaneous areas of minor extent.

Appling and Grover soils are on ridges and side slopes throughout the association. Appling soils are well drained and have a clayey subsoil. Grover soils are well drained and have a loamy subsoil. Colfax soils are on small upland flats and on slightly concave areas at the heads of drainageways and along drainageways and small streams. These soils are somewhat poorly drained and have a fragipan.

Among the soils and miscellaneous areas of minor extent are Abell, Bourne, Cecil, Cullen, Kempsville, Louisa, Louisburg, Mayodan, Orange, Roanoke, Spotsylvania, Vance, Varina, Wedowee, and Worsham soils and Made land. Abell soils are on small toe slopes and along small drainageways. Bourne and Kempsville soils are on higher ridges throughout the association. Cecil, Cullen, Mayodan, Vance, and Varina soils are in positions similar to those of Appling soils. Louisa, Louisburg, and Wedowee soils are on some narrower ridges and stronger side slopes along larger drainageways and streams. Orange soils are on some of the broader, lower lying ridges. Roanoke and Worsham soils are on small upland flats and along drainageways and streams. Spotsylvania soils are commonly close to Bourne and Kempsville soils, but they are at a slightly lower elevation. Made land is commonly near highways, industrial complexes, shopping centers, and subdivisions.

The southern part of this association is mostly wooded, but small areas are used for general farming and small spots are urbanized. The northern part is largely urbanized.

Soils on the Coastal Plain

The soils that formed in Coastal Plain sediment are in the eastern half of the county. The soils range from sand to clay, and some are gravelly. They are on ridges and side slopes, and the topography is rolling and hilly.

10. *Faceville-Gritney-Kempsville association*

Deep, well drained soils that have a dominantly clayey or loamy subsoil; on uplands

This soil association is in the eastern part of the county. It extends from the City of Richmond to the Appomattox River. The topography is gently rolling. On broad ridges, slopes are 2 to 6 percent; on mild side slopes, they are 6 to 12 percent. Short, sharp, stronger side slopes are commonly along larger drainageways and small streams. The soils of this association formed mainly in loamy and clayey Coastal Plain sediment.

This association makes up about 12 percent of the county. It is 35 percent Faceville soils, 13 percent Gritney soils, 6 percent Kempsville soils, and 46 percent soils of minor extent.

Faceville, Gritney, and Kempsville soils are on ridges and mild side slopes throughout most of the association. Faceville and Gritney soils are well drained and have a clayey subsoil. Kempsville soils are well drained and have a loamy subsoil.

Among the soils of minor extent are Aquults, Bourne, Colfax, Craven, Dunbar, Norfolk, Ochrepts, Orangeburg, Udults, and Vaucluse soils. Aquults and Colfax soils are in small, wet, slightly concave positions on broad ridges and are at the heads of drainageways. Bourne, Orangeburg, and Vaucluse soils are in positions similar to those of Faceville, Gritney, and Kempsville soils. Craven, Dunbar, and Norfolk soils are on broad, flat to gently sloping ridges. Ochrepts and Udults are commonly on short, sharp, stronger side slopes along drainageways and small streams.

This association is used for woodland, for general farming, and for homesites. Much of the northern part of the association is urbanized.

11. *Bourne-Aquults-Tetotum association*

Deep, moderately well drained and poorly drained soils that have a fragipan or that have a loamy or clayey subsoil; on uplands and upland flats

This soil association is in the eastern part of the county. It extends from the City of Richmond to the Appomattox River and east to the James River. The association is broad flats and broad, low ridges above the flats. The soils of this association formed in mainly loamy and clayey Coastal Plain sediment.

This association makes up about 6 percent of the county. It is 44 percent Bourne soils, 22 percent Aquults, 7 percent Tetotum soils, and 27 percent soils of minor extent.

Bourne soils are on broad, low ridges throughout the association. They are moderately well drained and have a fragipan. Aquults and Tetotum soils are on broad, wet flats. Aquults are poorly drained and have a loamy and clayey subsoil. Tetotum soils are moderately well drained and have a loamy subsoil.

Among the soils of minor extent are Atlee, Colfax, and Dunbar soils on the flats and Faceville, Gritney, Norfolk, and Vaucluse soils on the broad, low ridges.

Much of this association is wooded, but small areas are used for general farming. Some areas, especially in the northern and eastern parts of the association, are urbanized.

12. *Tetotum-Bourne association*

Deep, moderately well drained soils that have a dominantly loamy subsoil or that have a fragipan; on uplands

This soil association is just south of the City of Richmond and just west of Colonial Heights. It is broad ridges that have short, mild side slopes and long, slightly concave slopes. The soils of this association formed in dominantly loamy Coastal Plain sediment.

This association makes up about 2 percent of the county. It is 72 percent Tetotum soils, 18 percent Bourne soils, and 10 percent soils and miscellaneous areas of minor extent.

Tetotum and Bourne soils are on ridges, mild side slopes, and slightly concave slopes throughout the association. Tetotum soils are moderately well drained and have a loamy subsoil. Bourne soils are moderately well drained and have a fragipan.

Among the soils and miscellaneous areas of minor extent are Aquults, Atlee, Dunbar, Faceville, Gritney, Norfolk, and Vaucluse soils and Made land. Aquults are on small, wet flats. Atlee, Dunbar, Faceville, Gritney, Norfolk, and Vaucluse soils are in positions similar to those of Tetotum and Bourne soils. Made land is somewhat extensive in this association and is disturbed soils, cut and fill, and borrow pits. Many areas are near highways, industrial complexes, shopping centers, subdivisions, and other urban areas.

This association is used for general farming (fig. 2), woodland, and urban development.

13. *Gritney-Atlee-Lenoir association*

Deep, well drained, moderately well drained, and somewhat poorly drained soils that have a clayey or loamy subsoil; on uplands

This soil association is in the eastern part of the county. It is very broad, nearly flat to gently sloping ridges that have mild side slopes. The soils of this association formed in dominantly loamy and clayey Coastal Plain sediment.

This association makes up about 4 percent of the county. It is 47 percent Gritney soils, 10 percent Atlee soils, 8 percent Lenoir soils, and 35 percent soils and miscellaneous areas of minor extent.

Gritney soils are on gently sloping ridges and mild side slopes throughout the association. These soils are well drained and have a clayey subsoil. Atlee and Lenoir soils are on very broad, nearly flat to very gently sloping ridges. Atlee soils are moderately well drained and have a loamy subsoil. Lenoir soils are somewhat poorly drained and have a clayey subsoil.

Among the soils and miscellaneous areas of minor extent are Bourne, Craven, Dunbar, Faceville, Kempsville, Masada, Norfolk, Orangeburg, and Tetotum soils and Made land. Bourne, Faceville, Kempsville, Masada, and Orangeburg soils are in positions similar to those of Gritney soils. Craven, Dunbar, Norfolk, and Tetotum soils

***Figure 2.*—The erosion and excessive siltation of these Coastal Plain soils are the result of rapid land development without proper measures to control erosion and sedimentation.**

are in positions similar to those of Atlee and Lenoir soils. Made land is commonly near highways, industrial sites, shopping centers, and subdivisions.

This association is used for general farming, woodland, and urban development. Some areas in the northern part are used for industry.

14. *Lucy-Orangeburg-Rumford association*

Deep, well drained and somewhat excessively drained soils that have a dominantly loamy subsoil; on uplands

This soil association is in the eastern and southwestern parts of the county. The topography is gently rolling. On broad ridges, slopes are 2 to 6 percent; on mild side slopes, they are 6 to 12 percent. The soils of this association formed in sandy and loamy Coastal Plain sediment.

This association makes up about 4 percent of the county. It is 24 percent Lucy soils, 23 percent Orangeburg soils, 12 percent Rumford soils, and 41 percent soils and miscellaneous areas of minor extent.

Lucy, Orangeburg, and Rumford soils are on ridges and side slopes throughout the association. Lucy and Orangeburg soils are well drained and have a loamy subsoil. Rumford soils are somewhat excessively drained and have a loamy subsoil.

Among the soils and miscellaneous areas of minor extent are Bourne, Colfax, Creedmoor, Faceville, Kempsville, Mayodan, Ochrepts, Tetotum, and Udults soils and Made land. Bourne, Faceville, and Kempsville soils are in positions similar to those of Lucy, Orangeburg, and Rumford soils. Colfax and Tetotum soils are on small flats throughout the association. Creedmoor and Mayodan soils are on ridges and side slopes, mainly in the southwestern part of the association. Ochrepts and Udults are on short, sharp slopes along drainageways and small streams. Made land is commonly near highways, shopping centers, and subdivisions.

Most of this association is used for general farming and woodland. Some small areas, especially in the eastern part of the association, are used for industrial sites and urban use.

15. *Ochrepts and Udults-Vaucluse association*

Deep, excessively drained, well drained, and moderately well drained soils that have a sandy, loamy, clayey, or gravelly subsoil or that have a fragipan; on uplands

This soil association is in the southeastern and eastern parts of the county. Topography is rolling to hilly. On narrow, winding ridges, slopes are 2 to 12 percent; on side slopes, they are 12 to 40 percent. The soils of this association formed in sandy, loamy, clayey, and gravelly Coastal Plain sediment.

This association makes up about 3 percent of the county. It is about 67 percent Ochrepts and Udults, 19 percent Vaucluse soils, and 14 percent soils of minor extent.

Ochrepts and Udults are on side slopes throughout most of the association. They are excessively drained to moderately well drained. Vaucluse soils are on narrow ridges and a few of the milder side slopes. They are well drained and have a fragipan.

Among the soils of minor extent are Bourne, Faceville, Gritney, Kempsville, and Rumford soils on narrow ridges and mild side slopes and Colfax, Craven, and Dunbar soils on small, nearly flat areas on ridges or on small areas at the heads of drainageways.

Most of this association is wooded, but some areas are used for general farming and some small areas are used for urban development.

Descriptions of the Soils

In this section, the soil series and mapping units in Chesterfield County are described. Each soil series is described in detail, and then, briefly, each mapping unit in that series is described. Unless specifically mentioned otherwise, it is to be assumed that what is stated about the soil series is true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underlying material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for moist soil unless otherwise stated. The profile described in the series is representative of mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit or they are apparent in the name of the mapping unit.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Fluvaquents and Made land, for example, do not belong to a soil series; nevertheless, they are listed in alphabetic order along with the soil series.

Preceding the name of each mapping unit is the symbol that identifies the mapping unit on the detailed soil map. Listed at the end of the description of each mapping unit are the capability unit and woodland group in which the mapping unit has been placed. The page for the description of each capability unit and woodland group can be found in the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*8*).[1]

Abell Series

The Abell series consists of deep, moderately well drained to well drained, gently sloping soils at the heads of drainageways, along small drainageways, and in small depressions. These soils have a dominantly loamy subsoil. They formed in material washed from surrounding soils on uplands that are commonly underlain by granite and gneiss.

In a representative profile the surface layer is dark yel-

[1] Italic numbers in parentheses refer to Literature Cited, p. 113.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Map symbol	Soil	Acres	Percent
65B	Abell sandy loam, 2 to 8 percent slopes	900	0.3
142B	Appling gravelly sandy loam, 2 to 6 percent slopes	1,700	.7
542B	Appling loam, 2 to 6 percent slopes	1,000	.3
542C	Appling loam, 6 to 12 percent slopes	1,300	.4
42B	Appling sandy loam, 2 to 6 percent slopes	20,700	7.0
42C	Appling sandy loam, 6 to 12 percent slopes	48,000	16.2
42D	Appling sandy loam, 12 to 20 percent slopes	2,390	.8
245B	Appling-Spotsylvania sandy loams, 2 to 6 percent slopes	900	.3
142C	Appling-Wedowee fine sandy loams, 6 to 12 percent slopes	1,000	.3
142D	Appling-Wedowee fine sandy loams, 12 to 20 percent slopes	620	.2
191	Aquults	7,580	2.5
21B	Atlee silt loam, 0 to 4 percent slopes	1,250	.4
167	Augusta fine sandy loam, high terrace, 0 to 4 percent slopes	750	.2
49B	Bourne fine sandy loam, 2 to 6 percent slopes	8,000	2.7
49C	Bourne fine sandy loam, 6 to 12 percent slopes	350	.1
169B	Bourne sandy loam, 2 to 6 percent slopes	500	.2
169C	Bourne sandy loam, 6 to 12 percent slopes	3,000	1.0
261B	Bourne-Colfax complex, 2 to 6 percent slopes	5,000	1.7
71B	Buncombe loamy fine sand, 0 to 4 percent slopes	250	.1
38B	Cecil fine sandy loam, 2 to 6 percent slopes	2,200	.7
38C	Cecil fine sandy loam, 6 to 12 percent slopes	1,600	.5
38D	Cecil fine sandy loam, 12 to 20 percent slopes	500	.2
31	Chastain loam	300	.1
28	Chewacla loam	500	.2
207C	Colfax sandy loam, 6 to 12 percent slopes	300	.1
7B	Colfax fine sandy loam, 2 to 6 percent slopes	9,876	3.4
80B	Colfax fine sandy loam, variant, 0 to 4 percent slopes	2,000	.7
33B	Coxville loam, 2 to 6 percent slopes	300	.1
41B	Craven fine sandy loam, 2 to 6 percent slopes	1,500	.5
61B	Creedmoor fine sandy loam, 2 to 6 percent slopes	5,200	1.7
61C	Creedmoor fine sandy loam, 6 to 12 percent slopes	2,000	.7
61C2	Creedmoor fine sandy loam, 6 to 12 percent slopes, eroded	1,000	.3
123B	Creedmoor gravelly fine sandy loam, 2 to 6 percent slopes	1,500	.5
123C	Creedmoor gravelly fine sandy loam, 6 to 12 percent slopes	1,100	.4
202B	Creedmoor-Worsham sandy loams, 2 to 6 percent slopes	200	.1
202C	Creedmoor-Worhsam sandy loams, 6 to 12 percent slopes	1,000	.3
340B	Cullen loam, 2 to 6 percent slopes	900	.3
340C	Cullen clay loam, 6 to 12 percent slopes, eroded	850	.3
340D	Cullen clay loam, 12 to 20 percent slopes, eroded	380	.1
68B	Dogue loam, variant, 0 to 4 percent slopes	500	.2
188	Dunbar fine sandy loam, 0 to 4 percent slopes	2,000	.7
45B	Durham-Bourne fine sandy loams, 2 to 6 percent slopes	700	.2
244B	Edgehill very gravelly fine sandy loam, 2 to 6 percent slopes	1,300	.4
244C	Edgehill very gravelly fine sandy loam, 6 to 12 percent slopes	1,300	0.4
244D	Edgehill very gravelly fine sandy loam, 12 to 20 percent slopes	1,675	.6
244E	Edgehill very gravelly fine sandy loam, 20 to 40 percent slopes	200	.1
50F	Enon-Louisburg complex, 12 to 40 percent slopes	400	.1
50C	Enon-Vance complex, 2 to 12 percent slopes	400	.1
162B	Faceville fine sandy loam, 2 to 6 percent slopes	1,200	.4
162C	Faceville fine sandy loam, 6 to 12 percent slopes	300	.1
157B	Faceville-Gritney fine sandy loams, 2 to 6 percent slopes	9,200	3.1
110B	Faceville-Gritney gravelly fine sandy loams, 2 to 6 percent slopes	1,350	.5
110C	Faceville-Gritney gravelly fine sandy loams, 6 to 12 percent slopes	600	.2
1A	Fluvaquents	20,832	7.0
3A	Fluvaquents, ponded	1,000	.3
37	Forestdale silt loam	1,000	.3
17B	Gritney fine sandy loam, 2 to 6 percent slopes	2,000	.7
17C	Gritney fine sandy loam, 6 to 12 percent slopes	1,000	.3
305B	Grover fine sandy loam, 2 to 6 percent slopes, eroded	235	.1
305C	Grover fine sandy loam, 6 to 12 percent slopes	3,200	1.1
305D	Grover fine sandy loam, 12 to 20 percent slopes	4,000	1.3
305E	Grover fine sandy loam, 20 to 35 percent slopes	1,000	.3
241C	Grover-Louisburg complex, 6 to 12 percent slopes, eroded	1,000	.3
100	Hydraquents	3,500	1.2
82B	Kempsville-Bourne complex, 2 to 6 percent slopes	4,000	1.3
82C	Kempsville-Bourne complex, 6 to 12 percent slopes	800	.3
67B	Lenoir loam, flooded, 0 to 4 percent slopes	850	.3
30B	Lenoir silt loam, 0 to 4 percent slopes	1,100	.4
505D	Louisa loam, variant, 12 to 20 percent slopes	200	.1
505F	Louisa loam, variant, 20 to 45 percent slopes	200	.1
105C	Louisburg sandy loam, 4 to 12 percent slopes	200	.1
105D	Louisburg sandy loam, 12 to 20 percent slopes	200	.1
105E	Louisburg sandy loam, 20 to 45 percent slopes	300	.1
212B	Lucy-Orangeburg loamy sands, 2 to 6 percent slopes	5,000	1.7
212C	Lucy-Orangeburg loamy sands, 6 to 12 percent slopes	500	.2
15	Made land	2,900	1.0
106B	Masada fine sandy loam, 2 to 6 percent slopes	4,000	1.3
106C	Masada fine sandy loam, 6 to 12 percent slopes	200	(1)
103B	Masada gravelly fine sandy loam, 2 to 6 percent slopes	1,000	.3
103C	Masada gravelly fine sandy loam, 6 to 12 percent slopes	200	.1
117B	Masada loam, 2 to 6 percent slopes	300	.1
117C	Masada loam, 6 to 12 percent slopes	200	.1
59B	Mayodan sandy loam, clayey substratum, 2 to 6 percent slopes	3,000	1.0

[1] Less than 0.1 percent.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Map symbol	Soil	Acres	Percent
59C	Mayodan sandy loam, clayey substratum, 6 to 12 percent slopes	4,000	1.3
59D	Mayodan sandy loam, clayey substratum, 12 to 20 percent slopes	1,400	.5
151B	Mayodan gravelly sandy loam, clayey substratum, 2 to 6 percent slopes	4,000	1.3
151C	Mayodan gravelly sandy loam, clayey substratum, 6 to 12 percent slopes	2,600	.9
151D	Mayodan gravelly sandy loam, clayey substratum, 12 to 20 percent slopes	700	.2
201B	Mayodan, clayey substratum-Creedmoor sandy loams, 2 to 6 percent slopes	200	.1
201C	Mayodan, clayey substratum-Creedmoor sandy loams, 6 to 12 percent slopes	1,000	.3
201D	Mayodan, clayey substratum-Creedmoor sandy loams, 12 to 20 percent slopes	1,500	.5
251C	Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 2 to 12 percent slopes	600	.2
251D	Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 12 to 20 percent slopes	400	.1
251F	Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 20 to 40 percent slopes	400	.1
201F	Mayodan, clayey substratum-Pinkston sandy loams, 20 to 45 percent slopes	200	.1
53B	Molena loamy sand, 2 to 6 percent slopes	250	.1
70B	Norfolk fine sandy loam, 0 to 6 percent slopes	3,300	1.1
172D	Ochrepts and Udults, sloping	2,975	1.0
172E	Ochrepts and Udults, strongly sloping	2,000	.7
172F	Ochrepts and Udults, steep	3,900	1.3
48B	Orange sandy loam, 2 to 6 percent slopes	500	.2
48C	Orange sandy loam, 6 to 12 percent slopes	200	.1
112B	Orangeburg-Faceville sandy loams, 2 to 6 percent slopes	11,000	3.8
112C	Orangeburg-Faceville sandy loams, 6 to 12 percent slopes	200	.1
16	Orthents-Udults-Mine pits complex	500	.2
51B	Pamunkey loam, 0 to 6 percent slopes	2,500	.8
51C	Pamunkey loam, 6 to 12 percent slopes	300	.1
51D	Pamunkey loam, 12 to 20 percent slopes	125	[1]
165C	Pinkston gravelly sandy loam, 6 to 12 percent slopes	400	.1
165D	Pinkston gravelly sandy loam, 12 to 20 percent slopes	500	.2
165F	Pinkston gravelly sandy loam, 20 to 45 percent slopes	300	.1
159B	Pouncey fine sandy loam, 0 to 6 percent slopes	300	0.1
137	Roanoke loam	3,000	1.0
92B	Rumford loamy fine sand, 2 to 6 percent slopes	1,300	.4
92C	Rumford loamy fine sand, 6 to 12 percent slopes	170	[1]
24B	Spotsylvania fine sandy loam, 2 to 6 percent slopes	900	.3
24C	Spotsylvania fine sandy loam, 6 to 12 percent slopes	300	.1
101B	Starr soils, clayey substratum, 2 to 6 percent slopes	700	.2
8B	Tetotum fine sandy loam, ponded	2,000	.7
158B	Tetotum loam, clayey substratum, 2 to 6 percent slopes	5,000	1.7
26B	Toccoa fine sandy loam, 0 to 4 percent slopes	400	.1
107B	Turbeville fine sandy loam, 2 to 6 percent slopes	1,000	.3
107C	Turbeville fine sandy loam, 6 to 12 percent slopes	500	.2
108B	Turbeville gravelly fine sandy loam, 2 to 6 percent slopes	500	.2
108C	Turbeville gravelly fine sandy loam, 6 to 12 percent slopes	200	.1
2	Udifluvents	250	.1
210B	Vance fine sandy loam, 2 to 6 percent slopes	1,900	.6
210C	Vance fine sandy loam, 6 to 12 percent slopes	1,100	.4
210D	Vance fine sandy loam, 12 to 20 percent slopes	170	[1]
66B	Varina fine sandy loam, 0 to 4 percent slopes	500	.2
163B	Vaucluse sandy loam, 2 to 6 percent slopes	900	.3
163C	Vaucluse sandy loam, 6 to 12 percent slopes	1,000	.3
142E	Wedowee gravelly fine sandy loam, 20 to 40 percent slopes	325	.1
6B	Worsham fine sandy loam, 0 to 4 percent slopes	5,600	1.9
	Water	2,997	-------
	Total	300,400	100.0

[1] Less than 0.1 percent.

lowish brown and brown sandy loam about 15 inches thick. The subsoil is about 45 inches thick. The upper 15 inches is yellowish brown, friable sandy clay loam; the next 10 inches is mottled, yellowish brown, strong brown, and light yellowish brown, friable clay loam; and the lower 20 inches is mottled, brownish yellow, yellowish brown, strong brown, yellowish red, and gray, friable clay.

Unless limed, Abell soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate, and available water capacity is medium. A seasonal high water table is at a depth of 2 to 3½ feet for brief periods during winter and spring.

Representative profile of Abell sandy loam, 2 to 8 percent slopes, in Lake Crystal subdivision, southwest of Route 672, 2/3 mile south of the junction of Routes 672 and 647:

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

A2—10 to 15 inches; brown (7.5YR 4/4) sandy loam; weak fine granular structure; very friable; few fine roots; few fine flakes of mica; very strongly acid; clear smooth boundary.

B1t—15 to 20 inches; yellowish brown (10YR 5/6) light sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B21t—20 to 30 inches; yellowish brown (10YR 5/5) sandy clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few fine flakes of mica; about 5 percent angular pebbles as much as 5 millimeters in diameter; very strongly acid; gradual smooth boundary.

IIB22t—30 to 40 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and light yellowish brown (10YR 6/4) clay loam; weak medium subangular blocky

structure; friable, slightly sticky and slightly plastic; few thin clay films; few fine flakes of mica; about 5 percent angular pebbles as much as 10 millimeters in diameter; very strongly acid; gradual smooth boundary.

IIB23t—40 to 60 inches; mottled brownish yellow (10YR 6/6), yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), yellowish red (5YR 5/8), and gray (10YR 6/1) clay; weak medium angular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few fine flakes of mica; 5 percent angular pebbles as much as 5 millimeters in diameter; very strongly acid.

The solum is 40 to more than 60 inches thick. Depth to the IIBt horizon ranges from 30 to 48 inches and is commonly 40 inches. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 5 percent, by volume, angular pebbles as much as 10 millimeters in diameter.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8. The Bt horizon has hue of 5YR to 10 YR, value of 4 to 6, and chroma of 6 to 8. It ranges from heavy sandy loam to clay loam. The IIBt horizon is commonly heavy clay loam or clay, but it is coarser textured in places. A thin stone line is at the contact between the Bt horizon and the IIBt horizon and the IIBt horizon in places.

Abell soils are similar to Dogue and Starr soils. Abell soils have a less clayey Bt horizon than Dogue soils. They are not so well drained as Starr soils, and they are not so red throughout the solum as those soils.

Abell soils are near Appling, Cecil, Colfax, Durham, Louisburg, and Wedowee soils. Abell soils are less well drained than Appling, Cecil, Durham, and Wedowee soils, and they have less clay in the subsoil than do Appling, Cecil, and Wedowee soils. They are better drained than Colfax soils, and they do not have the fragipan characteristic of those soils. They are less well drained, have a thicker solum, and have more clay throughout the solum than Louisburg soils.

65B—Abell sandy loam, 2 to 8 percent slopes. This soil is in small, rounded, concave areas at the heads of drainageways and in small depressions and in small, narrow, concave areas along small drainageways.

Included with this soil in mapping were scattered small areas of Starr and Colfax soils.

Runoff is medium, and this soil receives some seepage from surrounding, higher lying areas. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. The soil has a seasonal high water table at a depth of 2 to 3½ feet, and artificial drainage is sometimes beneficial if the soil is cultivated.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately drained, limed, and fertilized, it is suited to most locally grown crops. If grown, alfalfa generally is not long lived because wetness is excessive in winter and spring. Capability unit IIe–1; woodland group 2o1.

Appling Series

The Appling series consists of deep, well drained, gently sloping to moderately steep soils on Piedmont Uplands. These soils have a dominantly clayey subsoil. They formed in material weathered from granite and granite gneiss.

In a representative profile the surface layer is light olive brown and light yellowish brown sandy loam about 10 inches thick. The subsoil is about 50 inches thick. The upper 14 inches is yellowish brown and strong brown, friable clay loam; the next 18 inches is strong brown, friable to firm clay that is mixed with yellowish red and red in the lower part; and the lower 18 inches is red, friable clay loam. The substratum extends to a depth of 154 inches or more. It is yellowish red and strong brown sandy loam.

Unless limed, Appling soils have a very strongly acid to strongly acid subsoil. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Appling sandy loam, 2 to 6 percent slopes, in a loblolly pine planting, 500 feet south southeast of the junction of Routes 602 and 676:

A1—0 to 4 inches; light olive brown (2.5Y 5/4) sandy loam; weak fine granular structure; very friable; many very fine and fine roots; about 5 percent angular and rounded quartz pebbles as much as 40 millimeters across; very strongly acid; clear smooth boundary.

A2—4 to 10 inches; light yellowish brown (2.5Y 6/4) sandy loam; weak fine granular structure; very friable; many fine medium and coarse roots; upper part is about 15 percent angular and rounded quartz pebbles as much as 40 millimeters in diameter; very strongly acid; clear smooth boundary.

B1t—10 to 13 inches; yellowish brown (10YR 5/8) clay loam; weak fine subangular structure; friable, slightly sticky and slightly plastic; few fine and medium roots; about 5 percent angular quartz pebbles as much as 40 millimeters in diameter; thin patchy clay films; very strongly acid; gradual smooth boundary.

B21t—13 to 24 inches; strong brown (7.5YR 5/6) heavy clay loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; thin continuous clay films; very strongly acid; gradual smooth boundary.

B22t—24 to 30 inches; strong brown (7.5YR 5/8) clay; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; yellowish red (5YR 5/6) thin patchy clay films; very strongly acid; clear smooth boundary.

B23t—30 to 42 inches; strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and red (2.5YR 4/8) clay; moderate fine subangular and angular blocky structure; friable to firm, slightly sticky and slightly plastic; thin continuous clay films; very strongly acid; gradual smooth boundary.

B3t—42 to 60 inches; red (2.5YR 4/8) light clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films; very strongly acid; gradual smooth boundary.

C—60 to 154 inches; yellowish red and strong brown sandy loam; massive; very friable; very strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 5 feet. In many places the A horizon and upper part of the subsoil are 1 percent to about 30 percent, by volume, angular and rounded quartz pebbles as much as 40 millimeters in diameter.

The A horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 1 to 6. It is dominantly sandy loam but ranges to gravelly sandy loam, fine sandy loam, and loam. The B2t horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 6 to 8. High chroma mottles are in many places. The B3t horizon has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 6 to 8. The Bt horizon ranges from clay loam to clay. The C horizon is strongly weathered granite and granite-gneiss. It is commonly mixed red, brown, yellow, and gray sandy loam to clay loam.

Appling soils are similar to Cecil, Durham, Faceville, Masada, Mayodan, and Vance soils. Appling soils are not so red in the subsoil as Cecil soils, and they have more clay than Durham soils. They have a thinner solum than Faceville and Masada soils, and they are not so sticky in the Bt horizon as Masada soils. They have less exchangeable aluminum in the Bt horizon than Mayodan soils. The Bt horizon of Appling soils does not have the very firm consistency of the Bt horizon in Vance soils.

Appling soils are near Abell, Cecil, Colfax, Louisburg, Vance, Wedowee, and Worsham soils. Appling soils are better drained than Abell soils. They do not have the fragipan that is characteristic of Colfax soils. They have a thicker solum and more clay than Louisburg and Wedowee soils. They are not so poorly drained and not so gray throughout the solum as Worsham soils.

142B—Appling gravelly sandy loam, 2 to 6 percent slopes. This soil is on rather broad, convex ridgetops. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick. The surface layer is 15 to 30 percent, by volume, fine angular and rounded quartz pebbles.

Included with this soil in mapping were scattered small areas of Abell, Bourne, Colfax, Durham, Kempsville, and Varina soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–5; woodland group 3o1.

542B—Appling loam, 2 to 6 percent slopes. This soil is on rather broad, convex ridgetops. In some areas where the soil is moderately eroded, the surface layer is 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Abell, Colfax, Grover, and Vance soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–5; woodland group 3o1.

542C—Appling loam, 6 to 12 percent slopes. This soil is on narrow, winding, convex ridgetops and on short to moderately long, complex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Grover and Vance soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–6; woodland group 3o1.

42B—Appling sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Abell, Bourne, Colfax, Durham, Grover, Vance, and Varina soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

The soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–5; woodland group 3o1.

42C—Appling sandy loam, 6 to 12 percent slopes. This soil is on narrow, winding, convex ridgetops and on moderately long, complex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Abell, Colfax, Durham, Grover, Spotsylvania, and Vance soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–6; woodland group 3o1.

42D—Appling sandy loam, 12 to 20 percent slopes. This soil is on short to moderately long, complex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Grover, Louisburg, Spotsylvania, and Vance soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or is clean tilled.

This soil is poorly suited to cultivated crops because of droughtiness during the growing season, slope, and the erosion hazard. It is better suited to mixed hay, pasture, and woodland than to other uses. Capability unit IVe–1; woodland group 3r1.

245B—Appling-Spotsylvania sandy loams, 2 to 6 percent slopes. This complex is on broad, convex ridgetops. Appling and Spotsylvania soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Appling soils, 40 percent Spotsylvania soils, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Abell, Bourne, Colfax, and Kempsville soils.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or clean tilled.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

142C—Appling-Wedowee fine sandy loams, 6 to 12 percent slopes. This complex is on narrow, winding, convex ridgetops and short complex side slopes. Appling and Wedowee soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Appling soils, 40 percent Wedowee soils, and 15 percent other soils. The surface layer of these soils is as much as 15 percent, by volume, fine angular and rounded quartz pebbles.

Included with this complex in mapping were scattered small areas of Bourne, Grover, and Vance soils. Also included were small areas of soils with a surface layer that is 15 to 30 percent, by volume, fine angular and rounded quartz pebbles.

Runoff is medium to rapid. The hazard of erosion is severe where the soils are disturbed and exposed or are clean tilled.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–6; woodland group 3o1.

142D—Appling-Wedowee fine sandy loams, 12 to 20 percent slopes. This complex is on short, convex side slopes along drainageways. Appling and Wedowee soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Appling soils, 45 percent Wedowee soils, and 10 percent other soils. The surface layer of these solis is as much as 15 percent, by volume, fine angular and rounded quartz pebbles.

Included with this complex in mapping were scattered small areas of Grover and Louisburg soils. Also included were small areas of soils where the surface layer is 15 to 30 percent, by volume, fine angular and rounded quartz pebbles.

Runoff is rapid. The hazard of erosion is very severe where the soils are disturbed and exposed or clean tilled.

This complex is poorly suited to cultivated crops because of droughtiness during the growing season, slope, and the erosion hazard. It is better suited to mixed hay, pasture, and woodland. Capability unit IVe–1; woodland group 3r1.

Aquults

191—Aquults. These soils are deep, poorly drained, and nearly level to very gently sloping. They are in broad, wet, low lying areas. The soils are intermingled in such an intricate pattern that it was not practical to map them separately.

Color of the surface layer ranges from gray and light brownish gray to dark gray, dark grayish brown, and black. Texture ranges from silt loam and fine sandy loam to sandy loam and loam. The surface layer is commonly 8 to 12 inches thick. Color of the subsoil ranges from light gray and gray to dark gray. Texture ranges from silty clay loam and sandy clay loam to clay. The subsoil is commonly 30 to 60 inches thick. In many areas a thick hard layer is below a depth of about 24 inches. This layer is often dense enough to require blasting to penetrate or remove it. The substratum is layers of gray, light gray, and dark gray loamy sand, sandy loam, and clay.

Aquults are strongly acid to very strongly acid. These soils are medium in organic-matter content and low in natural fertility. Permeability is moderate to very slow in the subsoil, and the available water capacity is medium to high. The seasonal high water table is within 1½ feet of the surface for periods of 2 to 6 months (fig. 3). Aquults are frequently flooded. Runoff is slow, and the Aquults receive seepage and runoff from adjacent, higher lying areas.

Aquults are used mainly for woodland and wildlife. Excessive wetness and frequent flooding make them poorly suited to most farm uses. Capability unit Vw–1; woodland group 2w3.

Atlee Series

The Atlee series consists of deep, moderately well drained, nearly level to very gently sloping soils. These soils have a dominantly loamy subsoil. They formed in Coastal Plain sediment.

In a representative profile about 1 inch of partly decomposed forest litter overlies a surface layer of dark grayish brown to light yellowish brown silt loam about 11 inches thick. The subsoil is about 139 inches thick. The upper 9 inches is light yellowish brown and yellowish brown, friable heavy loam and clay loam; the next 9 inches is yellowish brown, strong brown, and light yellowish brown, friable heavy clay loam; the next 7 inches is yellowish brown, strong brown, yellowish red, and light brownish gray, firm heavy clay loam that is brittle and compact in place; and the lower 114 inches is yellowish red, light brownish gray, and pale brown, firm heavy clay loam. The substratum extends to a depth of about 163 inches or more. It is sandy clay loam Coastal Plain sediment.

Unless limed, Atlee soils are strongly acid to very

Figure 3.—**Even with central water and sewage facilities, the poorly drained Aquults are undesirable for homesites because they are seasonally wet.**

strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderately slow in the subsoil, and available water capacity is medium. The seasonal high water table is at a depth of 1½ to 2½ feet during wet periods.

Representative profile of Atlee silt loam, 0 to 4 percent slopes, just northwest of the junction of Routes 697 and 746:

O1—1 inch to 0; partly decomposed pine needles and oak leaves.
A1—0 to 2 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.
A2—2 to 11 inches; light yellowish brown (2.5Y 6/4) silt loam; weak fine granular structure; friable; many medium and large roots; strongly acid; clear smooth boundary.
B1t—11 to 14 inches; light yellowish brown (10YR 6/4) heavy loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many medium roots; strongly acid; clear smooth boundary.
B21t—14 to 20 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films on ped faces; many fine pores; many medium and large roots; very strongly acid; clear smooth boundary.
B22t—20 to 29 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), and light yellowish brown (10YR 6/4) heavy clay loam; moderate fine and medium angular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films; few fine roots; very strongly acid; gradual smooth boundary.
B23t—29 to 36 inches; mottled yellowish brown (10YR 5/4), strong brown (7.5YR 5/6), yellowish red (5YR 5/8), and light brownish gray (10YR 6/2) heavy clay loam; moderate fine and medium angular blocky structure; firm, slightly sticky and slightly plastic; compact in place, brittle; few medium roots; very strongly acid; gradual smooth boundary.
B3t—36 to 150 inches; mottled yellowish red (5YR 5/6), light brownish gray (10YR 6/2), pale brown (10YR 6/3) heavy clay loam; moderate very fine and fine angular blocky structure; firm, slightly sticky and slightly plastic; many plinthite nodules; few medium roots; very strongly acid.
IIC—150 to 163 inches; sandy clay loam Coastal Plain sediment.

The solum is 48 to more than 60 inches thick. Depth to bedrock is more than 5 feet. In places the solum is less than 1 percent to about 5 percent, by volume, fine rounded quartz pebbles.

The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 2 to 4. The Bt horizon above the brittle and compact layer has hue of 10YR and 7.5YR, value of 4 to 6, and chroma of 4 to 6. It is generally clay loam, silty clay loam, or loam. The brittle and compact part of the Bt horizon is clay loam to light clay. It is commonly mottled in shades of yellowish brown, olive brown, strong brown, light yellowish brown, pale brown, yellowish red, and gray. It is brittle and compact in less than 60 percent of the volume of the material. The C horizon is commonly clay, clay loam, sandy clay loam, or sandy clay Coastal Plain sediment.

Atlee soils are similar to Bourne, Craven, Kempsville, and Tetotum soils. Atlee soils have less sand and less silt than Bourne and Kempsville soils. Unlike Bourne soils, Atlee soils do not have a fragipan that is brittle and compact in more than 60 percent (by volume) of the material. Atlee soils have less clay than Craven soils, and they have a brittle and compact layer that Tetotum soils do not have.

Atlee soils are near Coxville, Craven, Dunbar, Gritney, and Tetotum soils. Atlee soils have less clay and are better drained than Coxville and Dunbar soils. They have less clay and are less well drained than Gritney soils.

21B—Atlee silt loam, 0 to 4 percent slopes. This soil is on broad, slightly convex ridgetops.

Included with this soil in mapping were scattered small areas of Coxville, Craven, Dunbar, Gritney, and Faceville soils.

Runoff is slow. A seasonal high water table is at a depth of 1½ to 2½ feet during wet periods, and drainage is desirable if the soil is used for farming. The soil is friable and easily tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa, if grown, generally does not live long because of excess wetness during winter and spring. Capability unit IIw–2; woodland group 3o1.

Augusta Series

The Augusta series consists of deep, somewhat poorly drained, nearly level to very gently sloping soils. These soils have a dominantly loamy subsoil. They formed in alluvium on high terraces, generally above and some distance away from present streams.

In a representative profile the surface layer is very dark gray and brown fine sandy loam about 10 inches thick. The subsoil is about 39 inches thick. The upper 4 inches is yellowish brown, friable sandy clay loam; the next 12 inches is mottled, dark yellowish brown, strong brown, and gray, friable clay loam; and the lower 23 inches is gray, friable clay loam and sandy clay loam that is mottled yellowish brown and strong brown. The substratum extends to a depth of 90 inches or more. It is gray sandy clay loam and gravelly sandy loam that is mottled with yellowish brown and strong brown.

Unless they are limed, Augusta soils are very strongly acid to extremely acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium. The seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods, and the soils are sometimes ponded for brief periods during winter and during heavy rainstorms.

Representative profile of Augusta fine sandy loam, high terrace, 0 to 4 percent slopes, southeast of the junction of U.S. 60 and Route 714, near TV transmission station:

A1—0 to 1 inch; very dark gray (10YR 3/1) fine sandy loam; moderate fine granular structure; many fine roots; very strongly acid; clear smooth boundary.
A2—1 inch to 10 inches; brown (10YR 5/3) fine sandy loam; moderate fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.
B1t—10 to 14 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; many fine and medium roots; about 1 percent rounded quartz pebbles as much as 25 millimeters in diameter; very strongly acid; clear smooth boundary.
B21t—14 to 26 inches; mottled dark yellowish brown (10YR 4/4), strong brown (7.5YR 5/8), and gray (10YR 5/1) clay loam; moderate medium and fine subangular blocky structure; friable, sticky and plastic; thin patchy clay films; common fine roots; very strongly acid; gradual smooth boundary.
B22tg—26 to 35 inches; gray (10YR 5/1) clay loam; many medium and fine distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate medium and fine subangular blocky structure; few fine roots, about 5 percent rounded quartz pebbles as much as 25 millimeters in diameter; thin continuous clay films; very strongly acid; clear smooth boundary.

B3tg—35 to 49 inches; gray (10YR 5/1) sandy clay loam; few medium and fine distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few thin clay films; about 5 percent rounded quartz pebbles as much as 15 millimeters in diameter; very strongly acid; gradual smooth boundary.

C1g—49 to 72 inches; gray (10YR 5/1) sandy clay loam; few medium and fine distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; massive; friable, compact in place; few fine roots; few clay balls and few clay flows; thin clay lenses; about 3 to 5 percent rounded quartz pebbles as much as 25 millimeters in diameter; very strongly acid; gradual smooth boundary.

C2g—72 to 90 inches; gray (10YR 5/1) gravelly sandy loam; few medium and fine yellowish brown and strong brown mottles; massive; friable, compact in place; about 30 percent round quartz pebbles as much as 50 millimeters in diameter; very strongly acid.

The solum is 45 to more than 60 inches thick. Depth to bedrock is more than 5 feet.

The A horizon has hue of 10YR and 2.5Y, value of 3 to 5, and chroma of 1 to 4. The Bt horizon has hue of 10YR, 7.5YR, or 25Y; value of 4 to 7; and chroma of 1 to 8. It is dominantly gray and has higher chroma mottles. The Bt horizon is commonly clay loam, but it ranges to sandy clay loam and is light clay in places. Also, it is gravelly in places. The C horizon is gray sandy clay loam, sandy loam, and gravelly sandy loam.

Augusta soils in this county have higher chroma matrix colors in the upper part of the B2t horizon and are more acid than is typical of the Augusta series. This difference, however, does not alter their use or management.

Augusta soils are similar to Coxville, Dunbar, Forestdale, and Worsham soils. Augusta soils have less clay and are better drained than Coxville, Forestdale, and Worsham soils. They have less clay than Dunbar soils.

Augusta soils are near Dogue, Forestdale, Masada, and Turbeville soils. They are not so well drained and have less clay than Dogue, Masada, and Turbeville soils.

167—Augusta fine sandy loam, high terrace, 0 to 4 percent slopes. This soil is on narrow, slightly concave side slopes along a broad ridge from Midlothian to Bon Air.

Included with this soil in mapping were scattered small areas of Bourne, Dogue, Masada, Turbeville, and Varina soils.

Runoff is slow. A seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods, and drainage is desirable if the soil is used for farming. The soil is friable and easily tilled.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops. Alfalfa, however, is short lived because of excess wetness. Capability unit IIIw–2; woodland group 2w1.

Bourne Series

The Bourne series consists of moderately well drained, gently sloping and sloping soils. These soils have a fragipan at a depth of 18 to 34 inches. They formed in loamy Coastal Plain sediment.

In a representative profile the surface layer is dark grayish brown and light yellowish brown fine sandy loam about 11 inches thick. The subsoil is about 33 inches thick. The upper 11 inches is yellowish brown, friable sandy clay loam that is mottled with pale brown in the lower part. The lower 22 inches is a fragipan of yellowish brown brittle and compact fine sandy loam that has many pale brown mottles. The substratum extends to a depth of about 72 inches or more. It is brownish yellow, red, and gray, very firm clay.

Bourne soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil above the fragipan, but it is slow to very slow in the fragipan. The available water capacity is low. Perched water tables are above the fragipan during wet periods.

Representative profile of Bourne fine sandy loam, 2 to 6 percent slopes, ¾ mile west of junction of Routes 10 and 611, south of power transmission line:

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

A2—2 to 11 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; clear smooth boundary.

B1t—11 to 15 inches; yellowish brown (10YR 5/4) light sandy clay loam; weak fine subangular blocky structure; common fine roots; friable, slightly sticky and slightly plastic; very strongly acid; clear smooth boundary.

B2t—15 to 22 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine faint pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin patchy clay films; very strongly acid; clear smooth boundary.

Bx—22 to 44 inches; yellowish brown (10YR 5/8) fine sandy loam; many medium and fine faint pale brown (10YR 6/3) and light gray (10YR 7/2) mottles; weak very coarse prismatic structure that parts to weak thin platy; firm, brittle and compact in place; many fine pores; few thin clay films; very strongly acid; clear smooth boundary.

IIC—44 to 72 inches; mottled brownish yellow (10YR 6/6), red (2.5YR 5/8), and gray (10YR 6/1) clay; massive; very firm, sticky and plastic, red clay very hard; occasional quartz cobble in lower part; thin clay flows in upper part; very strongly acid.

The solum is 40 to 70 inches thick. Depth to bedrock is more than 5 feet. The fragipan is at a depth of 18 to 34 inches. It ranges from about 15 to more than 35 inches in thickness. The solum is less than 1 percent to about 20 percent, by volume, rounded quartz pebbles, as much as 50 millimeters in diameter.

The A1 horizon or Ap horizon is brown (10YR 5/3), dark grayish brown (10YR 4/2), or grayish brown (10YR 5/2). The A2 horizon, where present, is light brownish gray (10YR 6/2) to light olive brown (2.5Y 5/4) fine sandy loam or sandy loam. The Bt horizon is yellowish brown (10YR 5/4 to 5/8) or strong brown (7.5YR 5/6 to 5/8) loam, clay loam, or sandy clay loam. The Bx horizon is commonly yellowish brown (10YR 5/6 or 5/8) light yellowish brown (10YR 6/4), or strong brown (7.5YR 5/6) and is mottled with pale brown (10YR 6/3) and light brownish gray (10YR 6/2). It ranges from fine sandy loam to sandy clay loam. The Bx horizon commonly has weak and moderate platy or prismatic structure that parts to weak thin platy structure or weak angular and subangular blocky structure. The IIB3t horizon, where present, is yellowish red, yellowish brown, strong brown, gray, and red sandy clay loam to clay. The C horizon ranges from clay to sandy loam and is gravelly or very gravelly in places.

Bourne soils are similar to Atlee, Colfax, Kempsville, and Vaucluse soils. Bourne soils have more sand and less silt than Atlee soils, and they have a fragipan that is brittle and compact in more than 60 percent of the volume of the material. They do not have gray mottles in the Bt horizon above the fragipan, which is characteristic of Colfax soils. They have a fragipan, which Kempsville soils do not have. They are not so red in the subsoil as Vaucluse soils, and they have mixed mineralogy, whereas Vaucluse soils have siliceous mineralogy.

Bourne soils are near Faceville, Kempsville, Orangeburg, Rumford, and Vaucluse soils. Bourne soils have a fragipan, which Faceville, Orangeburg, and Rumford soils do not have.

49B—Bourne fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops and on rather nar-

row, concave toe slopes. It has the profile described as representative of the series.

Included with this soil in mapping were scattered small areas of Augusta, Colfax, Dunbar, Kempsville, and Varina soils. Also included were small areas of soils that have slopes of less than 2 percent.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is at a depth of 1½ to 2½ feet during wet periods, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately drained, limed, and fertilized, it is suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIe–2; woodland group 4d1.

49C—Bourne fine sandy loam, 6 to 12 percent slopes. This soil is on moderately long to short, weakly convex and weakly concave side slopes.

Included with this soil in mapping were scattered small areas of Colfax, Faceville, Orangeburg, and Rumford soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is at a depth of 1½ to 2½ feet during wet periods, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIIe–4; woodland group 4d1.

169B—Bourne sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops.

Included with this soil in mapping were scattered small areas of Faceville, Kempsille, Orangeburg, Rumford, and Vaucluse soils. Also included were small areas of soils that have slopes of less than 2 percent.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is at a depth of 1½ to 2½ feet during wet periods, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately drained, limed, and fertilized, it is suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIe–2; woodland group 4d1.

169C—Bourne sandy loam, 6 to 12 percent slopes. This soil is on short to moderately long, weakly convex side slopes.

Included with this soil in mapping were scattered small areas of Faceville, Kempsville, Orangeburg, Rumford, and Vaucluse soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is at a depth of 1½ to 2½ feet during wet periods, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIIe–4; woodland group 4d1.

261B—Bourne-Colfax complex, 2 to 6 percent slopes. This complex is on short, weakly concave toe slopes and in weakly concave saddle positions. Bourne sandy loam and Colfax fine sandy loam are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Bourne sandy loam, 40 percent Colfax fine sandy loam, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Abell, Creedmoor, Mayodan, and Worsham soils. Also included are small areas of soils where the subsoil is sandy loam above the fragipan.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or are clean tilled. A seasonal high water table is at a depth of 1 foot to 2½ feet during wet periods, and drainage is desirable if the soils are used for farming.

This complex is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIIw–2; woodland group 4d1.

Buncombe Series

The Buncombe series consists of deep, excessively drained, nearly level and very gently sloping soils. These soils have a dominantly sandy substratum. They formed in alluvium on flood plains along the larger streams of the county.

In a representative profile about 3 inches of partly decayed pine needles and organic matter overlies a surface layer of brown loamy fine sand about 9 inches thick. The substratum extends to a depth of about 60 inches or more. The upper 48 inches is yellowish brown, loose loamy fine sand; and the lower 3 inches is brown, very friable sandy loam that is mottled with yellowish brown.

Unless limed, Buncombe soils are slightly acid to medium acid. These soils are low in organic-matter content and low in natural fertility. Permeability is rapid in the substratum, and available water capacity is low. The soils are frequently flooded.

Representative profile of Buncombe loamy fine sand, 0 to 4 percent slopes, on wooded flood plain, 300 yards east of Goode's bridge on U.S. Highway 360 over Appomattox River:

O1—3 inches to 1 inch; dark reddish gray (10R 3/1) partly decayed pine needles.
O2—1 inch to 0; dark reddish gray (10R 3/1) organic matter.
A1—0 to 9 inches; brown (10YR 5/3) loamy fine sand; weak very fine granular structure; very friable; many fine and medium roots; common fine and very fine flakes of mica; medium acid; abrupt smooth boundary.
C1—9 to 57 inches; yellowish brown (10YR 5/4) loamy fine sand; single grained; loose; common fine and medium roots; common fine flakes of mica; slightly acid; clear smooth boundary.
C2—57 to 60 inches; brown (7.5YR 5/4) sandy loam; few medium distinct yellowish brown (10YR 5/4) mottles; massive; very friable; about 15 percent by volume rounded quartz pebbles as much as 50 millimeters across; slightly acid.

Depth to bedrock is more than 5 feet. The A horizon ranges from light brown to dark brown. The C1 horizon is generally

dark brown to yellowish brown sand, loamy sand, and loamy fine sand. It has a few pebbles and cobbles. The C2 horizon generally has high chroma mottles. It ranges from sand to loam, and it is gravelly or very gravelly in a few places.

Buncombe soils are similar to Molena and Toccoa soils. Buncombe soils are more excessively drained than those soils, and they have more sand and less silt and clay throughout the solum.

Buncombe soils are near Chastain, Chewacla, and Toccoa soils. Buncombe soils are excessively drained; Chastain and Chewacla soils on the other hand, are moderately well drained to poorly drained.

71B—Buncombe loamy fine sand, 0 to 4 percent slopes. This soil is on flood plains of larger streams, generally close to the stream channel.

Included with this soil in mapping were scattered small areas of Chastain and Chewacla soils.

Runoff is slow. This soil is frequently flooded by overflow from nearby streams. It is droughty.

This soil is used for cultivated crops, pasture, and woodland. If protected from flooding and adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIs–1; woodland group 2s1.

Cecil Series

The Cecil series consists of deep, well drained, nearly level to moderately steep soils on Piedmont Uplands. These soils have a dominantly clayey subsoil. They formed in material weathered from granite gneiss and gneiss.

In a representative profile about 3 inches of partly decomposed forest litter overlies a surface layer of dark grayish brown and yellowish brown fine sandy loam about 9 inches thick. The subsoil is about 54 inches thick. The upper 5 inches is yellowish red, friable sandy clay loam; the next 25 inches is red, firm clay that is mottled with yellowish brown; and the lower 24 inches is red, friable clay that is mottled with yellowish brown and yellowish red. The substratum extends to a depth of 83 inches or more. It is red, yellowish brown, strong brown, and white, friable loam.

Unless limed, Cecil soils have a strongly acid to very strongly acid subsoil. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Cecil fine sandy loam, 2 to 6 percent slopes, west of Route 665, 1¼ miles west of junction of Routes 665 and 603:

O1—3 inches to 0; partly decomposed oak leaves and twigs matted with fine roots in lower part.

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

A2—1 inch to 9 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; common fine and medium pores; about 2 to 5 percent by volume angular quartz pebbles as much as 25 millimeters in diameter; very strongly acid; clear smooth boundary.

B1t—9 to 14 inches; yellowish red (5YR 4/8) sandy clay loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; many medium and large roots; few thin clay films; few fine pores; about 2 to 5 percent by volume angular quartz pebbles as much as 25 millimeters in diameter; very strongly acid; clear smooth boundary.

B21t—14 to 26 inches; red (2.5YR 4/6) clay; few fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; thin continuous clay films; few fine and medium roots; few fine and medium pores; very strongly acid; gradual smooth boundary.

B22—26 to 39 inches; red (2.5YR 4/6) clay; few fine distinct yellowish brown (10YR 4/6) mottles; moderate medium angular and subangular blocky structure; firm; sticky and plastic; thin continuous clay films; few medium roots; very strongly acid; gradual smooth boundary.

B3t—39 to 63 inches; red (2.5YR 5/6) clay; few fine distinct yellowish brown (10YR 5/6) and yellowish red (5YR 4/6) mottles; weak medium to coarse angular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; few weathered quartz and schist fragments; few fine pores; few fine flakes of mica; few thin clay films; very strongly acid; gradual smooth boundary.

C—63 to 83 inches; mottled red (2.5YR 4/6) yellowish brown (10YR 5/6) strong brown (7.5YR 5/8) and white (N 8/0) loam; massive; friable, slightly sticky and slightly plastic; thin clay flows in upper part; few weathered quartz and schist fragments; very strongly acid.

The solum ranges from about 40 to more than 60 inches in thickness. Depth to bedrock is more than 5 feet. Angular quartz pebbles, as much as 50 millimeters in diameter, make up less than 1 percent to about 10 percent, by volume, of the A horizon and the upper part of the Bt horizon.

The A horizon has hue of 10YR and 7.5YR, value of 4 and 5, and chroma of 2 to 6. The Bt horizon has hue of 2.5YR and 5YR, value of 4 and 5, and chroma of 6 to 8. High chroma mottles occur in many places. The Bt horizon is commonly clay or heavy clay loam. The C horizon ranges from loam to clay loam and sandy clay loam.

The Cecil soils in this county have high chroma mottles in the upper part of the B2t horizon and more clay in the lower part of the solum than is typical of the Cecil series. This difference, however, does not alter their use or management.

Cecil soils are similar to Cullen and Turbeville soils. Cecil soils are of kaolinitic mineralogy, whereas Cullen soils are of mixed mineralogy. They have a thinner solum than Turbeville soils, which also have mixed mineralogy.

Cecil soils are near Appling, Cullen, Colfax, Louisburg, and Vance soils. Cecil soils have a redder subsoil than Appling and Vance soils. They do not have the fragipan characteristic of Colfax soils, and they have more clay and a thicker solum than Louisburg soils.

38B—Cecil fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is eroded, however, the surface layer is only 6 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Cullen and Vance soils. Also included were small areas where the surface layer is gravelly fine sandy loam.

Runoff is medium. The hazard of erosion is moderate if the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

38C—Cecil fine sandy loam, 6 to 12 percent slopes. This soil is on narrow, convex ridgetops and on moderately long, somewhat complex side slopes. In some areas where the soil is eroded, the surface layer is 4 to 8 inches thick, and in a few areas where it is severely eroded the surface layer is clay loam.

Included with this soil in mapping were scattered small areas of Abell and Cullen soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 3o1.

38D—Cecil fine sandy loam, 12 to 20 percent slopes. This soil is on short, convex side slopes along drainageways. In some areas where the soil is eroded, the surface layer is 4 to 6 inches thick, and in a few areas where it is severely eroded, the surface layer is clay loam.

Included with this soil in mapping were scattered small areas of Cullen, Grover, and Louisburg soils.

Runoff is rapid, and this soil is somewhat droughty during the growing season. The hazard of erosion is very severe where the soil is disturbed and exposed or clean tilled.

This soil is commonly used for cultivated crops, pasture, and woodland. It is poorly suited to cultivated crops because of droughtiness, slope, and the erosion hazard. It is better suited to mixed hay, pasture, and woodland. Capability unit IVe–1; woodland group 3r1.

Chastain Series

The Chastain series consists of deep, poorly drained, nearly level soils. These soils have a clayey subsoil. They formed in clayey and loamy alluvium on flood plains along the larger streams of the county.

In a representative profile the surface layer is dark grayish brown and dark gray loam that is mottled with brown and reddish brown in the lower part. It is about 13 inches thick. The subsoil is about 23 inches thick. It is dark gray, friable to firm heavy clay loam that is mottled reddish brown and strong brown. The substratum extends to a depth of 80 inches or more. It is dark gray heavy clay loam.

Chastain soils are strongly acid to very strongly acid. These soils are medium in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium. A seasonal high water table is within 1 foot of the surface for long periods during the winter and spring. The soils are frequently flooded.

Representative profile of Chastain loam, 1/3 mile northwest of Powhite Parkway bridge, 400 yards south of James River:

A11—0 to 2 inches; dark grayish brown (10YR 4/2) loam; moderate fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

A12—2 to 13 inches; dark gray (10YR 4/1) loam; common medium prominent brown (7.5YR 5/4) and reddish brown (5YR 5/4) mottles; moderate fine granular structure; friable, slightly sticky and slightly plastic; few medium and fine roots; many fine pores; strongly acid; clear wavy boundary.

B21g—13 to 24 inches; dark gray (10YR 4/1) heavy clay loam; few fine prominent reddish brown (2.5YR 4/4) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine pores; very strongly acid; gradual smooth boundary.

B22g—24 to 36 inches; dark gray (N 4/0) heavy clay, loam; common medium prominent strong brown (7.5YR 5/6) mottles and few fine prominent reddish brown (2.5YR 4/4) mottles; weak coarse subangular blocky structure; firm, sticky and slightly plastic; few fine roots; many fine pores; few common fine oxide concretions; very strongly acid; gradual smooth boundary.

Cg—36 to 80 inches; dark gray (N 4/0) heavy clay loam; common medium prominent strong brown (7.5YR 5/8) mottles; massive; firm, sticky and plastic; few medium oxide concretions; very strongly acid.

The solum ranges from 36 to more than 60 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 10YR, value of 4 and 5, and chroma of 1 and 2. The lower part of this horizon is commonly mottled in hue of 5YR and 7.5YR, value of 4 to 6, and chroma of 4 to 8. The Bg horizon is neutral or has hue of 10YR, value of 4 and 5, and chroma of 0 to 2. It has mottles in hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It ranges from clay loam to light clay. The C horizon is gray and is mottled with brown. It ranges from clay to sand with or without gravel and cobbles.

Chastain soils are similar to Coxville, Forestdale, and Worsham soils. Chastain soils do not have the Bt horizon, which is characteristic of all those soils. They have a thinner solum than Coxville soils, are more acid in the lower part of the subsoil than Forestdale soils, and have more silt and less sand than Worsham soils.

Chastain soils are near Augusta, Buncombe, Chewacla, Dogue, and Pamunkey soils. Chastain soils are more poorly drained than all those soils.

31—Chastain loam. This soil is on low lying flood plains along the larger streams, generally away from the stream channel.

Included with this soil in mapping were scattered small areas of Chewacla and Forestdale soils and small areas of Fluvaquents.

Runoff is slow. A seasonal high water table is within 1 foot of the surface, and drainage is desirable if the soil is used for farming. The soil is frequently flooded. It is difficult to till, and is cloddy if tilled when too wet or too dry.

This soil is poorly suited to cultivated crops because of the seasonal high water table and frequent flooding. It is better suited to pasture and woodland. Capability unit IVw–3; woodland group 2w3.

Chewacla Series

The Chewacla series consists of deep, somewhat poorly drained, nearly level soils. These soils have a dominantly loamy subsoil. They formed in loamy alluvium on flood plains along the streams of the county.

In a representative profile the surface layer is dark brown loam about 5 inches thick. The subsoil is about 55 inches thick. The upper 8 inches is brown, friable sandy loam that is mottled with pale brown and dark yellowish brown; the next 13 inches is mottled, brown, pale brown, and light brownish gray, friable light sandy clay loam; the next 14 inches is mottled brown, light grayish brown, and grayish brown, friable light clay loam; and the lower 20 inches is mottled, yellowish brown, light brownish gray, and black light silty clay loam.

Unless limed, Chewacla soils are strongly acid to very strongly acid. These soils are medium in organic-matter content and medium in natural fertility. Permeability is moderate in the subsoil, and available water capacity is high. A seasonal high water table is at a depth of 1 foot to 1½ feet for brief periods. The soils are frequently flooded.

Representative profile of Chewacla loam, 1 mile northwest of Powhite Parkway bridge, about 600 feet south of the James River:

A1—0 to 5 inches; dark brown (7.5YR 3/2) loam; weak fine granular structure; very friable; many fine and medium roots; few fine pores; few fine flakes of mica; strongly acid; abrupt smooth boundary.

B1—5 to 13 inches; brown (10YR 5/3) fine sandy loam; com-

mon fine and medium faint pale brown (10YR 6/3) and dark yellowish brown (10YR 4/4) mottles; weak fine subangular blocky and weak fine granular structure; friable; common fine pores; few fine roots; few fine flakes of mica; strongly acid; clear smooth boundary.

B21—13 to 26 inches; mottled brown (10YR 4/3), pale brown (10YR 6/3), and light brownish gray (10YR 6/2) light sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine pores; few flakes of mica; strongly acid; clear smooth boundary.

B22g—26 to 40 inches; mottled brown (7.5YR 4/4), light brownish gray (10YR 6/2), and grayish brown (2.5Y 5/2) light clay loam; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common fine pores; few flakes of mica; strongly acid; gradual wavy boundary.

B3g—40 to 60 inches; mottled yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), and black (N 2/0) light silty clay loam; massive; friable, slightly sticky and slightly plastic; few flakes of mica; strongly acid.

The solum is 40 to more than 60 inches thick. Depth to bedrock is more than 5 feet. Few to common fine flakes of mica are throughout the solum.

The A horizon commonly is pale brown, brown, or dark brown. The B horizon is yellowish brown, dark yellowish brown, brown, dark brown, reddish brown, and grayish brown. Mottles of chroma 2 or less are within 20 inches of the surface. The soils are grayer as depth increases. They range from from sandy loam to light silty clay loam. The C horizon is commonly layers of sand, silt, and clay.

Chewacla soils are similar to Buncombe, Starr, and Toccoa soils. Chewacla soils are not so well drained as the similar soils. They have mottles of chroma 2 or less in the upper part of the subsoil, which those soils do not have.

Chewacla soils are near Buncombe, Chastain, Dogue, Forestdale, Pamunkey, and Toccoa soils. Chewacla soils are better drained and have less clay than Chastain and Forestdale soils. They have less clay than Dogue soils, and they are less well drained than Pamunkey soils.

28—Chewacla loam. This soil is on low lying flood plains along streams, generally back from the stream channel.

Included with this soil in mapping were scattered small areas of Buncombe, Chastain, and Toccoa soils. Also included were small areas of Fluvaquents and Hydraquents.

Runoff is slow. This soil receives seepage and runoff from adjacent, higher lying areas, and it is frequently flooded by nearby streams. A seasonal high water table is at a depth of 1 foot to 1½ feet, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, protected from flooding, limed, and fertilized, it is moderately well suited to most locally grown crops. Alfalfa is commonly short lived because of excess wetness and flooding. Capability unit IIIw–1; woodland group 1w1.

Colfax Series

The Colfax series consists of somewhat poorly drained to moderately well drained, gently sloping and sloping soils. These soils have a fragipan at a depth of 24 to 40 inches. They formed in material weathered from granite and granite gneiss.

In a representative profile about 2 inches of partly decomposed forest litter overlies a surface layer of dark gray and pale brown fine sandy loam about 8 inches thick. The subsoil is about 52 inches thick. The upper 5 inches is brownish yellow and pale brown, friable sandy clay loam; the next 11 inches is light yellowish brown and pale brown, friable clay loam that is mottled with light brownish gray; the next 16 inches is yellowish brown, light brownish gray, and pale brown sandy clay loam that is brittle and compact in place; and the lower 20 inches is light gray, firm clay that is mottled olive yellow, strong brown, and yellowish red. The substratum extends to a depth of 117 inches or more. The upper 26 inches is light gray clay, and the lower 31 inches is white sandy loam.

Unless limed, Colfax soils have a strongly acid to very strongly acid subsoil. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the upper part of the subsoil and slow in the lower part. Available water capacity is low. A seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods.

Representative profile of Colfax fine sandy loam, 2 to 6 percent slopes, north of Route 659, about 2/3 mile northeast of the junction of Routes 659 and 655:

O1—2 inches to 0; partly decomposed hardwood leaves, pine needles, and twigs; many fine roots in lower part.

A1—0 to 1 inch; dark gray (10YR 4/1) fine sandy loam; weak fine granular structure; very friable; many fine roots; about 1 percent by volume angular quartz pebbles as much as 50 millimeters in diameter; very strongly acid; clear smooth boundary.

A2—1 inch to 8 inches; pale brown (10YR 6/3) fine sandy loam; few fine faint brownish yellow (10YR 6/6) mottles; weak fine granular structure; very friable; many fine and medium roots; about 1 percent by volume angular quartz pebbles as much as 50 millimeters in diameter; very strongly acid; clear smooth boundary.

B1t—8 to 13 inches; mottled brownish yellow (10YR 6/6) and pale brown (10YR 6/3) light sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; about 1 percent by volume angular quartz pebbles as much as 45 millimeters in diameter; very strongly acid; clear smooth boundary.

B2t—13 to 24 inches; light yellowish brown (10YR 6/4) and pale brown (10YR 6/3) sandy clay loam; few fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many fine pores; few thin clay films on horizontal ped faces; about 5 percent by volume angular quartz pebbles as much as 50 millimeters in diameter; very strongly acid; abrupt smooth boundary.

Bx—24 to 40 inches; mottled yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), and pale brown (10YR 6/3) sandy clay loam; moderate medium platy structure; brittle and compact; very firm in place; thin vertical clay seams; few fine roots; many fine vesicular pores; few thin clay films on horizontal ped faces; about 5 percent by volume angular quartz pebbles as much as 50 millimeters in diameter; very strongly acid; clear smooth boundary.

IIIB3tg—40 to 60 inches; light gray (10YR 7/1) clay; common medium prominent olive yellow (2.5Y 6/6), strong brown (7.5Y 5/6), and yellowish red (5YR 4/6) mottles; weak coarse prismatic structure; firm, sticky and plastic; thick continuous clay films on ped faces; few fine flakes of mica; about 1 percent by volume angular quartz pebbles as much as 50 millimeters in diameter; very strongly acid; gradual smooth boundary.

IIC1—60 to 86 inches; light gray (10YR 7/1) clay; common medium prominent strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; massive; firm, sticky and plastic; few fine flakes of mica; about 1 percent by volume angular quartz fragments as much as 50 millimeters in diameter; very strongly acid; clear smooth boundary.

IIIC2—86 to 117 inches; white (10YR 8/1) sandy loam; few fine distinct yellowish brown (10YR 5/8) mottles; mas-

sive; friable; highly weathered granite gneiss; very strongly acid.

The solum is 40 to 60 inches thick. Depth to the fragipan ranges from 24 to 40 inches. Depth to bedrock is generally more than 5 feet. The solum is less than 1 percent to about 30 percent, by volume, angular and rounded quartz pebbles as much as 50 millimeters in diameter.

The A horizon has hue of 10YR or yellower, value of 4 to 7, and chroma of 1 to 4. It is fine sandy loam or sandy loam. The matrix of the B2t horizon has hue of 7.5YR or yellower, value of 5 or 6, and chroma of 4 to 6. The upper 10 inches of the B2t horizon has mottles with chroma of 2 or less. The Bt horizon ranges from sandy clay loam to loam. The Bx horizon has mottles that have hue of 10YR and 7.5YR, value of 5 and 6, and chroma of 2 to 8. It ranges from sandy loam to sandy clay loam. The IIIB3t horizon is commonly gray and has high chroma mottles. It is commonly clay but ranges to clay loam. The C horizon is commonly gray to white and ranges from clay to sandy loam.

Colfax sandy loam, 6 to 12 percent slopes, has a thicker fragipan and less clay in the texture control section than is typical of the Colfax series. This difference, however, does not alter its use or management.

Colfax soils are similar to Bourne and Vaucluse soils. Colfax soils are not so well drained as those soils, and they have mottles of chroma 2 or less in the Bt horizon above the fragipan which those soils do not have. Colfax soils are also similar to Colfax variant soils which have siliceous mineralogy instead of mixed mineralogy.

Colfax soils are near Appling, Bourne, Durham, and Worsham soils. Colfax soils are not so well drained as Appling and Durham soils, and they have a fragipan which Appling, Durham, and Worsham soils do not have. They are better drained than Worsham soils.

207C—Colfax sandy loam, 6 to 12 percent slopes. This soil is on concave toe slopes and in saddle positions. In some areas the surface layer is gravelly sandy loam.

Included with this soil in mapping were scattered small areas of Abell, Creedmoor, Mayodan, and Worsham soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods, and drainage is sometimes beneficial if the soil is used for farming. It is droughty during the growing season.

This soil is used for corn, small grain, mixed hay, and pasture. It is moderately well suited to the locally grown crops that are not deep rooted or sensitive to excess moisture. Capability unit IIIe–4; woodland group 3w1.

7B—Colfax fine sandy loam, 2 to 6 percent slopes. This soil is in slightly concave areas at the heads of drainageways, on concave toe slopes, and in saddle positions. It has the profile described as representative of the series. In some areas, however, the surface layer is gravelly sandy loam.

Included with this soil in mapping were scattered small areas of Abell, Durham, Orange, Vance, and Worsham soils.

Runoff is medium. This soil receives seepage and runoff from higher lying surrounding areas. A seasonal high water table is at a depth of 1 foot to 1½ feet, and drainage is desirable if the soil is used for farming. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. The soil is somewhat droughty during the growing season.

This soil is used for corn, small grain, mixed hay, and pasture. It is moderately well suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIIw–2; woodland group 3w1.

Colfax Variant

The Colfax variant soils are somewhat poorly drained, nearly level and very gently sloping. These soils have a fragipan at a depth of 16 to 26 inches. They formed in Coastal Plain sediment.

In a representative profile the surface layer is grayish brown fine sandy loam about 10 inches thick. The subsoil extends to a depth of 73 inches or more. The upper 11 inches is light yellowish brown, friable sandy clay loam that is mottled with light olive brown, light brownish gray, and yellowish brown; the next 31 inches is gray, yellow, and light olive brown sandy clay loam that is brittle and compact in place; and the lower 21 inches is gray, firm clay that is mottled yellowish brown and red.

Unless limed, Colfax variant soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the upper part of the subsoil, and it is slow in the lower part. Available water capacity is low. A seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods.

Representative profile of Colfax fine sandy loam, variant, 0 to 4 percent slopes, north of Route 602, about 1/3 mile west of the junction of Routes 602 and 629:

Ap—0 to 10 inches; grayish brown (10YR 5/2) fine sandy loam; moderate fine granular structure; friable, nonsticky and nonplastic; about 2 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; few fine roots; strongly acid; abrupt smooth boundary.

B1t—10 to 16 inches; light yellowish brown (2.5Y 6/4) light sandy clay loam; common fine and medium faint light olive brown (2.5Y 5/4) and light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; about 2 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; few fine roots; very strongly acid; gradual smooth boundary.

B2t—16 to 21 inches; light yellowish brown (2.5Y 6/4) sandy clay loam; common fine distinct yellowish brown (10YR 5/8), and light olive brown (2.5Y 5/4) mottles; moderate medium and coarse subangular blocky structure; friable, sticky and slightly plastic; about 2 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; very strongly acid; clear smooth boundary.

Bx—21 to 52 inches; mottled gray (10YR 5/1), yellow (2.5Y 7/6), and light olive brown (2.5Y 5/4) sandy clay loam; weak thick platy structure; brittle and compact in place, slightly sticky and slightly plastic; about 2 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; very strongly acid; gradual smooth boundary.

IIB3t—52 to 73 inches; gray (10YR 6/1) clay; common fine prominent yellowish brown (10YR 5/8) and red (2.5YR 5/8) mottles; weak coarse angular blocky structure; firm, sticky and plastic; about 2 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; very strongly acid.

The solum is 50 to more than 60 inches thick. Depth to the fragipan is 16 to 26 inches. Bedrock is at a depth of more than 5 feet. The solum is less than 1 percent to about 10 percent, by volume, fine rounded quartz pebbles.

The A horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 2 to 4. It is commonly fine sandy loam, but it ranges from sandy loam to loam. The B2t horizon has hue of 2.5Y and 10YR, value of 5 and 6, and chroma of 4 to 8. Mottles that have a chroma of 2 are within 10 inches of the top of the B2t horizon. The B2t horizon is commonly heavy sandy loam or sandy clay loam, but it ranges to clay loam. The fragipan is dominantly clay or is commonly mottled in gray,

yellow, and brown and, in a few places, is red. It ranges from sandy loam to sandy clay loam. The IIB3t horizon is generally clay, but texture of this horizon varies. The C horizon ranges from clay to sand and gravel.

Colfax variant soils are similar to Atlee, Bourne, and Vaucluse soils. Colfax variant soils are less well drained than all those soils. They have more sand and less silt than Atlee soils, and they have chroma 2 mottles in the B2t horizon which Bourne soils do not have. Also, they are yellower and grayer than Vaucluse soils. Colfax variant soils are also similar to other Colfax soils that have mixed mineralogy instead of siliceous mineralogy.

Colfax variant soils are near Dunbar, Kempsville, Lenoir, Orangeburg, and Rumford soils. Unlike the soils nearby, Colfax variant soils have a fragipan.

80B—Colfax fine sandy loam, variant, 0 to 4 percent slopes. This soil is on broad, weakly convex ridgetops and in weakly concave areas at the heads of drainageways and next to low lying, poorly drained areas.

Included with this soil in mapping were scattered small areas of Bourne, Coxville, Dunbar, Kempsville, Pouncey, and Tetotum soils.

Runoff is slow to medium. A seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, and pasture. If drained, limed, and fertilized, it is moderately well suited to locally grown crops that are not deep rooted or sensitive to excess moisture. Capability unit IIIw–2; woodland group 3w1.

Coxville Series

The Coxville series consists of deep, poorly drained, gently sloping soils. These soils have a thick, dominantly clayey subsoil. They formed in Coastal Plain sediment.

In a representative profile the surface layer is dark grayish brown loam about 10 inches thick. The subsoil extends to a depth of 75 inches or more. The upper 16 inches is grayish brown, friable clay loam and clay that has high chroma mottles. The lower 49 inches is light gray and gray, firm clay that also has high chroma mottles.

Unless limed, Coxville soils have a strongly acid to very strongly acid subsoil. These soils are medium in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium. A seasonal high water table is within 1 foot of the surface during winter and spring. The soils are frequently ponded.

Representative profile of Coxville loam, 2 to 6 percent slopes, at Virginia State College Farm at Ettrick:

Ap—0 to 10 inches; dark grayish brown (2.5Y 4/2) loam; moderate fine granular structure; friable; few fine roots; many fine pores; medium acid; abrupt smooth boundary.

B1tg—10 to 14 inches; grayish brown (2.5Y 5/2) clay loam; common medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few thin clay films; strongly acid; clear smooth boundary.

B21tg—14 to 26 inches; grayish brown (2.5Y 5/2) clay; common fine distinct yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; friable, sticky and plastic; few fine roots; thin continuous clay films; strongly acid; gradual smooth boundary.

B22tg—26 to 45 inches; light gray (10YR 6/1) clay; common medium and coarse distinct strong brown (7.5YR 5/8) mottles and few fine prominent red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; thin continuous clay films; very strongly acid; gradual irregular boundary.

B23tg—45 to 75 inches; gray (5Y 5/1) clay; common medium prominent strong brown (7.5YR 5/8) mottles and few fine prominent red (2.5YR 4/8) mottles; strong fine subangular blocky structure; firm, sticky and plastic; thin continuous clay films; very strongly acid.

The solum is more than 60 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 2.5Y and 10YR, value of 3 to 6, and chroma of 1 and 2. The matrix of the Bt horizon has hue of 10YR, 2.5Y, or 5Y (or may be neutral); value of 5 or 6; and chroma of 0 to 2. High chroma mottles, ranging from red to brown, are throughout the Bt horizon. The Bt horizon is commonly clay but ranges to heavy sandy clay loam.

Coxville soils are similar to Dunbar, Lenoir, Pouncey, and Worsham soils. Coxville soils are more poorly drained than Dunbar and Lenoir soils. They have a thicker solum than Pouncey and Worsham soils.

Coxville soils are near Dunbar, Lenoir, Pouncey, and Tetotum soils. Coxville soils are more poorly drained than Tetotum soils.

33B—Coxville loam, 2 to 6 percent slopes. This soil is in slightly concave depressions on uplands.

Included with this soil in mapping were scattered small areas of Dunbar, Lenoir, Pouncey, and Tetotum soils and small areas of Fluvaquents.

Runoff is slow. This soil receives seepage and runoff from higher lying surrounding areas. A seasonal high water table is within 1 foot of the surface, and the soil is frequently ponded.

This soil is used for corn, mixed hay, and pasture. It is poorly suited to most of the locally grown crops because of excess moisture and flooding. It is better suited to pasture and woodland than to other uses. Capability unit IVw–3; woodland group 2w3.

Craven Series

The Craven series consists of deep, moderately well drained, gently sloping soils. These soils have a dominantly clayey subsoil. They formed in Coastal Plain sediment.

In a representative profile about 1 inch of partly decomposed forest litter overlies a surface layer of dark gray and dark grayish brown fine sandy loam about 10 inches thick. The subsoil is about 59 inches thick. The upper 5 inches is light olive brown, friable sandy clay loam; the next 10 inches is yellowish brown, firm heavy clay loam; the next 19 inches is pale brown, yellowish brown, strong brown, and gray, firm clay; the next 15 inches is gray, strong brown, yellowish brown, and yellowish red, very firm clay; and the lower 10 inches is gray, yellowish brown, strong brown, and grayish brown, friable sandy clay loam. The substratum extends to a depth of 95 inches or more. It is brownish yellow, gray, yellowish brown, and pale brown sandy loam.

Unless limed, Craven soils have a strongly acid to very strongly acid subsoil. These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium. A seasonal high water table is at a depth of 2 to 3 feet for brief periods.

Representative profile of Craven fine sandy loam, 2 to 6 percent slopes, north of Route 746, ¾ mile east of interchange between Interstate 95 and Route 746:

O1—1 inch to 0; partly decomposed oak leaves, pine needles,

cedar needles, and twigs; matted with fine roots in lower part.

A1—0 to 1 inch; dark gray (10YR 4/1) fine sandy loam; weak fine granular structure; very friable; many medium and fine roots; strongly acid; clear smooth boundary.

A2—1 inch to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; strongly acid; clear smooth boundary.

B1t—10 to 15 inches; light olive brown (2.5Y 5/4) sandy clay loam; few fine faint yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few medium and fine roots; few thin clay films; very strongly acid; clear smooth boundary.

B21t—15 to 25 inches; yellowish brown (10YR 5/6) heavy clay loam; moderate fine and meduim subangular blocky structure; firm, slightly sticky and plastic; few fine and medium roots; thin patchy clay films; very strongly acid; clear smooth boundary.

B22t—25 to 44 inches; mottled pale brown (10YR 6/3), yellowish brown (10YR 5/4), strong brown (7.5YR 5/8), and gray (10YR 6/1) clay; moderate fine and medium angular blocky structure; firm, sticky and plastic; few fine and medium roots; moderately thick continuous clay films; small pockets of sand in lower part; very strongly acid; clear smooth boundary.

B23t—44 to 59 inches; mottled gray (10YR 6/1), strong brown (7.5YR 5/8), yellowish brown (10YR 5/4), and yellowish red (5YR 5/8) clay; strong medium angular blocky structure; very firm, sticky and plastic; few fine roots; moderately thick continuous clay films; very strongly acid; gradual smooth boundary.

IIB3t—59 to 69 inches; mottled gray (10YR 6/1), yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), and grayish brown (10YR 5/2) sandy clay loam; weak coarse angular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; very strongly acid; gradual smooth boundary.

11C—69 to 95 inches; brownish yellow (10YR 6/6), gray (10YR 6/1), yellowish brown (10YR 5/6), and pale brown (10YR 6/3) sandy loam; single grained; loose; few fine quartz pebbles as much as 5 millimeters in diameter; very strongly acid.

The solum is 40 to more than 60 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 1 to 4. The Bt horizon has hue of 10YR, 2.5Y, 7.5YR, and in a few places, 5YR. Value is 4 to 6, and chroma is 1 to 8. Mottles of chroma 2 or less are in the upper part of the Bt horizon and become more pronounced as depth increases. The B2t horizon ranges from heavy clay loam and heavy silty clay loam to silty clay and clay. The C horizon ranges from clay to sandy loam, and it has lenses and pockets of loamy sand and sand in places.

Craven soils in this county have a thicker solum than is typical of the Craven series. This difference, however, does not alter their use or management.

Craven soils are similar to Atlee, Gritney, Lenoir, and Norfolk soils. Craven soils have more clay than Atlee and Norfolk soils. They are not so well drained as Norfolk and Gritney soils, and they are better drained than Lenoir soils.

Craven soils are near Atlee, Coxville, Gritney, and Lenoir soils. Craven soils are better drained than Coxville soils, and they do not have as gray a subsoil as Coxville soils.

41B—Craven fine sandy loam, 2 to 6 percent slopes. This soil is on broad, slightly convex ridgetops and in saddle positions.

Included with this soil in mapping were scattered small areas of Atlee, Coxville, Faceville, Lenoir, and Tetotum soils.

Runoff is medium. The hazard of erosion is severe where the soil is disturbed and exposed or clean tilled. A seasonal high water table is at a depth of 2 to 3 feet, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops. Alfalfa is usually short lived because of excess wetness in winter and spring. Capability unit IIIe-4; woodland group 3w1.

Creedmoor Series

The Creedmoor series consists of deep, moderately well drained, gently sloping to steep soils. These soils have a dominantly clayey subsoil. They formed in material weathered from sandstone and shale.

In a representative profile the surface layer is grayish brown and light olive brown fine sandy loam about 10 inches thick. The subsoil is about 33 inches thick. The upper 5 inches is light yellowish brown, friable sandy clay loam; the next 13 inches is yellowish brown, firm clay; and the lower 15 inches is gray, very firm clay that is mottled with strong brown, yellowish red, and brownish yellow. The substratum extends to a depth of about 60 inches or more. It is gray clay loam that is mottled with yellowish brown, yellowish red, and reddish brown.

Unless limed, Creedmoor soils have a very strongly acid subsoil. These soils are low in organic-matter content and low in natural fertility. Permeability is very slow in the subsoil, and available water capacity is medium. A seasonal high water table is at a depth of 1 foot to 2 feet during wet periods.

Representative profile of Creedmoor fine sandy loam, 2 to 6 percent slopes, east of Route 605, 1⅛ miles south of the junction of Routes 605 and 604:

A1—0 to 3 inches; grayish brown (2.5Y 5/2) fine sandy loam; few fine faint light yellowish brown (2.5Y 6/4) mottles; weak fine granular structure; very friable; few fine and medium roots; very strongly acid; clear smooth boundary.

A2—3 to 10 inches; light olive brown (2.5Y 5/4) fine sandy loam; weak fine granular structure; friable; few fine and medium roots; very strongly acid; clear smooth boundary.

B1—10 to 15 inches; light yellowish brown (10YR 6/4) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) and yellowish brown (10YR 5/8) mottles; weak fine and medium subangular blocky structure; friable; few fine and medium roots; about 5 percent by volume angular quartz pebbles as much as 50 millimeters in diameter; very strongly acid; clear smooth boundary.

B21t—15 to 28 inches; yellowish brown (10YR 5/6) clay; few fine distinct yellowish red (5YR 4/6) and light yellowish brown (2.5Y 6/4) mottles; moderate medium angular and subangular blocky structure; firm, sticky and plastic; few fine and medium roots; thick continuous clay films; about 5 percent by volume angular quartz pebbles as much as 6 millimeters in diameter; extremely acid; gradual smooth boundary.

B22t—28 to 43 inches; gray (5Y 6/1) clay; common medium distinct strong brown (7.5YR 5/8), yellowish red (5YR 4/8), and brownish yellow (10YR 6/8) mottles; strong medium and coarse angular blocky structure; very firm; about 5 percent by volume angular quartz pebbles as much as 8 millimeters in diameter; few fine flakes of mica; extremely acid; gradual wavy boundary.

C—43 to 60 inches; gray (5Y 6/1) clay loam; common medium prominent yellowish brown (10YR 5/6), yellowish red (5YR 5/8), and reddish brown (5YR 5/4) mottles; massive; firm, sticky and plastic; few fine flakes of mica; extremely acid.

The solum is 36 to 50 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 60 percent, by volume, angular and rounded quartz pebbles as large as 50 millimeters in diameter.

The A horizon has hue of 5Y to 10YR, value of 4 to 6, and chroma of 2 to 4. It is dominantly fine sandy loam and sandy loam but ranges to gravelly fine sandy loam. The B1 horizon and the upper part of the B2t horizon are coarser, less firm,

and less plastic than the lower part of the B2t horizon. In the B1 horizon and the upper part of the B2t horizon hue is 10YR, 7.5YR, and 2.5YR; value is 4 or 5; and chroma is 4 to 8. Texture is commonly sandy clay loam or clay but ranges to gravelly sandy clay loam and gravelly clay. The lower part of the Bt horizon is commonly gray or light gray and has common to many high chroma mottles. It is firm to very firm clay. The C horizon is commonly gray clay loam. It has high chroma mottles, or it is mottled in gray, yellowish brown, yellowish red, and reddish brown.

Creedmoor soils are similar to Craven, Dogue, and Orange soils. Creedmoor soils have a thinner solum than Craven and Dogue soils, and they are more acid than Dogue soils. They are more acid then Orange soils, and they do not have the Chroma 2 mottles in the upper part of the Bt horizon of Orange soils.

Creedmoor soils are near Bourne, Masada, Mayodan, Turbeville, and Vance soils. Creedmoor soils do not have the fragipan that is characteristic of Bourne soils. They are not so well drained as Masada, Mayodan, Turbeville, and Vance soils, and they are not so red as Masada, Mayodan, and Turbeville soils.

61B—Creedmoor fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Colfax, Mayodan, and Worsham soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is at a depth of 1 foot to 2 feet during wet periods, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is usually short lived because of excess wetness. Capability unit IIe–2; woodland group 3w1.

61C—Creedmoor fine sandy loam, 6 to 12 percent slopes. This soil is on short to moderately long, complex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Abell, Bourne, Colfax, and Mayodan soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or clean tilled. A seasonal high water table is at a depth of 1 foot to 2 feet during wet periods.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops. Alfalfa is usually short lived because of excess wetness. Capability unit IIIe–4; woodland group 3w1.

61C2—Creedmoor fine sandy loam, 6 to 12 percent slopes, eroded. This soil is on short to moderately long, complex side slopes. The surface layer is commonly 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Colfax and Mayodan soils. Also included were small areas where the surface layer is gravelly sandy loam.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is at a depth of 1 foot to 2 feet during wet periods.

This soil is used for corn, small grain, mixed hay, and pasture. It is poorly suited to cultivated crops because of the erosion hazard and slope. It is better suited to small grain, mixed hay, and pasture. Capability unit IVe–4; woodland group 3w1.

123B—Creedmoor gravelly fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. The surface layer is 20 to 40 percent, by volume, fine angular and rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Colfax, and Mayodan soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or clean tilled. A seasonal high water table is at a depth of 1 foot to 2 feet during wet periods, and drainage is desirable if the soil is used for farming. The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is usually short lived because of excess wetness. Capability unit IIe–2; woodland group 3w1.

123C—Creedmoor gravelly fine sandy loam, 6 to 12 percent slopes. This soil is on short to moderately long, complex side slopes. The surface layer is 20 to 40 percent, by volume, fine angular and rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Colfax, and Mayodan soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or clean tilled. A seasonal high water table is at a depth of 1 foot to 2 feet during wet periods. The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops. Alfalfa is usually short lived because of excess wetness. Capability unit IIIe–4; woodland group 3w1.

202B—Creedmoor-Worsham sandy loams, 2 to 6 percent slopes. This complex is on narrow, convex ridgetops and in small, slightly concave depressions and low lying areas. Creedmoor and Worsham soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 60 percent Creedmoor soils, 30 percent Worsham soils, and 10 percent other soils.

Included with this complex in mapping were scattered small areas of Bourne, Colfax, Mayodan, and Pinkston soils.

Runoff is medium. A seasonal high water table is within 2 feet of the surface, and drainage is desirable if the soils are used for farming.

This complex is mainly woodland. It is poorly suited to cultivated crops because of excess wetness. It is better suited to pasture and woodland. Capability unit IVw–3; woodland group 3w1.

202C—Creedmoor-Worsham sandy loams, 6 to 12 percent slopes. This complex is on short, complex side slopes. Creedmoor and Worsham soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 60 percent

Creedmoor soils, 25 percent Worsham soils, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Bourne, Colfax, and Mayodan soils.

Runoff is medium to rapid. The hazard of erosion is very severe where the soils are disturbed and exposed or clean tilled. A seasonal high water table is within a depth of 2 feet of the surface.

This complex is mainly woodland. It is poorly suited to cultivated crops because of the erosion hazard and excess wetness. It is better suited to mixed hay, pasture, and woodland. Capability unit IVe–4; woodland group 3w1.

Cullen Series

The Cullen series consists of deep, well drained, gently sloping to moderately steep soils on Piedmont Uplands. These soils have a dominantly clayey subsoil. They formed in material weathered from hornblende gneiss, biotite gneiss, gabbro, greenstone, and sericite schist.

In a representative profile the surface layer is dark reddish brown loam about 7 inches thick. The subsoil is about 41 inches thick. The upper 18 inches is dark red, firm clay; the next 10 inches is red, friable clay loam that has high chroma mottles; and the lower 13 inches is yellowish red, light reddish brown, and dark red, friable loam. The substratum extends to a depth of 89 inches or more. It is brownish yellow, yellowish red, dark red, and light gray, friable loam.

Unless limed, Cullen soils have a strongly acid to very strongly acid subsoil. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and the available water capacity is medium.

Representative profile of Cullen loam, 2 to 6 percent slopes, east of Route 602, 1⅛ miles south of the junction of Routes 602 and 621:

Ap—0 to 7 inches; dark reddish brown (2.5YR 3/4) loam, moderate fine granular structure; friable, slightly sticky and slightly plastic; many fine roots; about 1 percent by volume angular quartz pebbles as much as 50 millimeters in diameter; strongly acid; abrupt smooth boundary.

B2t—7 to 25 inches; dark red (2.5YR 3/6) clay; moderate medium and fine subangular blocky structure; firm, sticky and plastic; many fine roots; thin continuous clay films; few coarse fragments of basic rock; strongly acid; gradual smooth boundary.

B31t—25 to 35 inches; red (2.5YR 4/6) clay loam; common medium faint red (2.5YR 4/8), yellowish red (5YR 4/8), and strong brown (7.5YR 5/6) mottles; clay loam matrix with clay flows and krotovinas; matrix structure is rock controlled; moderate medium angular blocky structure in clay flows and krotovinas; friable, slightly sticky and slightly plastic; thin, patchy clay films; very strongly acid; diffuse wavy boundary.

B32t—35 to 48 inches; yellowish red (5YR 5/8), light reddish brown (5YR 6/4), and dark red (2.5YR 3/6) loam; matrix is weathered material and has rock controlled structure, thick clay flows have weak fine and very fine subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; gradual smooth boundary.

C—48 to 89 inches; brownish yellow (10YR 6/6), yellowish red (5YR 5/8), dark red (2.5YR 3/6), and light gray (10YR 7/2) loam; rock controlled structure; friable, slightly sticky and slightly plastic.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 5 feet. In places the solum is less than 1 percent to about 10 percent, by volume, angular quartz pebbles.

The A horizon has hue of 2.5YR and 5YR, value of 3 to 5, and chroma of 2 to 6. It is commonly loam but ranges to clay loam in areas where the soil is moderately eroded. The Bt horizon commonly has hue of 2.5YR or 10YR, value of 3 or 4, and chroma of 6 to 8. The B2t horizon is commonly clay. The B3t horizon commonly has high chroma mottles that have hue of 5YR and 7.5YR. It ranges from clay and clay loam to loam. The C horizon is strongly weathered basic and acidic rock that crushes easily to loam.

Cullen soils in this county have redder hues throughout the solum than is typical of the Cullen series. This difference, however, does not alter their use or management.

Cullen soils are similar to Cecil, Faceville, and Turbeville soils. Cullen soils have a dark red Bt horizon that Cecil and Faceville soils do not have. They have mixed mineralogy whereas Cecil soils have kaolinitic mineralogy. They have a thinner solum than Turbeville soils.

Cullen soils are near Appling, Cecil, Starr, and Vance soils. Cullen soils are redder throughout the solum than Appling and Vance soils. They have more clay in the Bt horizon than Starr soils.

340B—Cullen loam, 2 to 6 percent slopes. This soil is on somewhat broad to narrow, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is clay loam and is only 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Louisa, and Vance soils. Also included are small spots of Rock outcrop and soils that have a thinner profile than the Cullen soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

340C—Cullen clay loam, 6 to 12 percent slopes, eroded. This soil is on short to moderately long, complex side slopes. In some areas where the soil is slightly eroded, the surface layer is loam and is 6 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Louisa, and Vance soils. Also included were small spots of Rock outcrop and small areas of soils that have a thinner profile than Cullen soils.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soil is disturbed and exposed or is clean tilled. The surface layer is sticky when wet and hard when dry. If it is worked when too wet, the surface puddles and plowshares fail to scour. If worked when too dry, it breaks up into clods that are difficult to work down into a seedbed.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. It is poorly suited to cultivated crops because of the erosion hazard, slope, and surface layer. It is better suited to mixed hay, pasture, and woodland. Capability unit IVe–3; woodland group 4c1.

340D—Cullen clay loam, 12 to 20 percent slopes, eroded. This soil is on short, complex side slopes. In some slightly eroded areas, the surface layer is loam and is 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Louisa, and Vance soils. Also included were small spots of Rock outcrop and small areas of soils that have a thinner profile than Cullen soils.

Runoff is rapid. The hazard of further erosion is very

severe where the soil is disturbed and exposed.

This soil is used for small grain, mixed hay, pasture, and woodland. It is best suited to pasture and woodland. Capability unit VIe–1; woodland group 4c1.

Dogue Variant

The Dogue variant soils are deep, moderately well drained, and nearly level to very gently sloping. These soils have a dominantly clayey subsoil. They formed in alluvium on low terraces along the larger streams of the county.

In a representative profile the surface layer is dark brown loam about 9 inches thick. The subsoil is about 53 inches thick. The upper 19 inches is yellowish brown, friable to firm silty clay loam and clay; and the lower 34 inches is yellowish brown, firm to friable clay and clay loam that is mottled with strong brown, gray, pale brown, and olive gray. The substratum extends to a depth of 110 inches or more. It is yellowish brown loam that has olive gray and pale brown mottles.

Unless limed, Dogue variant soils have a slightly acid to medium acid subsoil. These soils are low in organic-matter content and medium in natural fertility. Permeability is moderately slow in the subsoil, and available water capacity is medium. A seasonal high water table is at a depth of 2 to 3 feet during wet periods, and the soils are occasionally flooded.

Representative profile of Dogue loam, variant, 0 to 4 percent slopes, in a cultivated field at Bermuda Hundred, ¼ mile west of Allied Chemical Plant:

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

B1t—9 to 12 inches; yellowish brown (10YR 5/6) silty clay loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; few thin clay films; about 1 percent by volume rounded quartz pebbles as much as 15 millimeters in diameter; common to many fine flakes of mica; medium acid; clear smooth boundary.

B21t—12 to 28 inches; yellowish brown (10YR 5/6) clay; moderate fine and medium subangular blocky structure; firm, sticky and plastic; thin continuous clay films; about 1 percent by volume rounded quartz pebbles as much as 15 millimeters in diameter; few fine black oxide concretions; many fine flakes of mica; medium acid; clear smooth boundary.

B22t—28 to 42 inches; yellowish brown (10YR 5/6) clay; few fine distinct strong brown (7.5YR 5/6), gray (5Y 6/1), and pale brown (10YR 6/3) mottles; moderate medium and fine angular blocky structure; firm, sticky and plastic; common fine roots; thin continuous clay films; many coarse brown oxide concretions; common fine flakes of mica; medium acid; gradual smooth boundary.

B23t—42 to 62 inches: yellowish brown (10YR 5/6) clay loam; common medium distinct pale brown (10YR 6/3) and olive gray (5Y 5/2) mottles; weak coarse angular blocky structure; friable, sticky and slightly plastic; few very fine roots; thin patchy clay films on vertical ped faces; about 1 percent by volume rounded quartz pebbles as much as 15 millimeters in diameter; common fine and medium black and brown concretions; medium acid; gradual smooth boundary.

C—62 to 110 inches; yellowish brown (10YR 5/6) loam; common medium distinct olive gray (5Y 5/2) and pale brown (10YR 6/3) mottles; massive; friable; sticky and slighty plastic; medium acid.

The solum ranges from about 40 to more than 60 inches in thickness. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 10 percent, by volume, rounded quartz pebbles as much as 50 millimeters in diameter. Few to common flakes of mica are throughout the solum.

The A horizon has hue of 7.5YR or yellower, value of 4 to 7, and chroma of 1 to 6. The Bt horizon is commonly yellowish brown (10YR 5/6), but it ranges in hue from 2.5Y to 7.5YR and in value from 4 to 8. Chroma is 3 or more. Mottles of chroma 2 or lower are within the upper 24 inches of the Bt horizon. The B2t horizon ranges from silty clay loam to heavy clay loam and clay. The B3t horizon is dominantly gray in places, but it is commonly yellowish brown mottled with brownish gray, gray, and pale brown. It is commonly clay loam. The C horizon ranges from loam and sandy loam to sand to gravel.

Dogue variant soils are similar to Lenoir, Masada, and Tetotum soils. They are better drained than Lenoir soils and are not so gray throughout. Dogue variant soils are yellower than Masada soils and are not so well drained. They have more clay than Tetotum soils. They are higher in bases than other Dogue soils.

Dogue variant soils are near Augusta, Chewacla, Forestdale, Lenoir, and Pamunkey soils. Dogue variant soils have more clay and are better drained than Augusta and Chewacla soils. They are better drained than Forestdale soils and are not so gray. They are less well drained and have more clay than Pamunkey soils.

68B—Dogue loam, variant, 0 to 4 percent slopes. This soil is in slightly concave depressions and on broad, slightly concave terraces. In some areas where the soil is moderately eroded, the surface layer is only 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Lenoir (fig. 4) and Pamunkey soils.

Runoff is slow. A seasonal high water table is at a depth of 2 to 3 feet during wet periods, and drainage is desirable if the soil is used for farming. The soil is occasionally flooded.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is commonly short lived because of excess wetness. Capability unit IIw–2; woodland group 2w2.

Figure 4.—**The small concave spot of Lenoir soil included in mapping with Dogue loam, variant, 0 to 4 percent slopes, was ponded earlier in the growing season. The corn planted in it was drowned.**

Dunbar Series

The Dunbar series consists of deep, somewhat poorly drained, nearly level to very gently sloping soils. These soils have a dominantly clayey subsoil. They formed in Coastal Plain sediment.

In a representative profile the surface layer is dark grayish brown fine sandy loam about 12 inches thick. The subsoil extends to a depth of 72 inches or more. The upper 8 inches is light olive brown, friable sandy clay loam; the next 24 inches is light olive brown and gray, firm clay that is mottled with strong brown and yellowish brown; and the lower 28 inches is gray, firm sandy clay that is mottled with yellowish brown.

Unless limed, Dunbar soils have a strongly acid to very strongly acid subsoil. These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium. The seasonal high water table is at a depth of 1 foot to 2½ feet during winter and spring.

Representative profile of Dunbar fine sandy loam, 0 to 4 percent slopes, on the Virginia State College farm at Ettrick:

Ap—0 to 12 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; friable; few fine roots; strongly acid; abrupt smooth boundary.

B1t—12 to 15 inches; light olive brown (2.5Y 5/4) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; many fine and very fine pores; few thin clay films; about 1 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; strongly acid; clear smooth boundary.

B21t—15 to 20 inches; light olive brown (2.5Y 5/4) heavy sandy clay loam; common distinct fine and medium yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; many fine pores; thick patchy clay films; about 1 percent by volume rounded quartz pebbles as much as 20 millimeters in diameter; very strongly acid; clear smooth boundary.

B22t—20 to 31 inches; light olive brown (2.5Y 5/4) clay; many fine and medium distinct strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) mottles and few fine distinct grayish brown (2.5YR 5/2) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common fine pores; thick continuous clay films; about 1 percent by volume rounded quartz pebbles as much as 20 millimeters in diameter; very strongly acid; gradual wavy boundary.

B23tg—31 to 44 inches; gray (10YR 6/1) clay; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common medium and fine pores; common thin clay films; very strongly acid; gradual smooth boundary.

B3tg—44 to 72 inches; gray (N 6/0) sandy clay; common medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few fine pores; very strongly acid.

The solum is more than 60 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 5 percent, by volume, rounded quartz pebbles as much as 20 millimeters in diameter.

The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 1 to 3. The horizon is mottled light olive brown, light yellowish brown, strong brown, and gray. It has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 1 to 8. The color gray is dominant in the lower part of the Bt horizon. The Bt horizon is mainly clay but ranges to clay loam and sandy clay. The B3t horizon is gray in hue of 10YR to 5Y. It has brownish yellow to red mottles in many places. The B3t horizon is commonly sandy clay but ranges to sandy clay loam.

Dunbar soils are similar to Augusta and Lenoir soils. Dunbar soils have more clay and a thicker solum than Augusta soils. They have kaolinitic mineralogy, whereas Lenoir soils have mixed mineralogy.

Dunbar soils are near Bourne, Pouncey, Coxville, and Tetotum soils. Dunbar soils do not have the fragipan that is characteristic of Bourne soils. They are better drained than Pouncey and Coxville soils. They have more clay and are more poorly drained than Tetotum soils.

188—Dunbar fine sandy loam, 0 to 4 percent slopes. This soil is on broad ridges and in slightly concave positions around wet areas.

Included with this soil in mapping were scattered small areas of Colfax, Coxville, Pouncey, and Tetotum soils.

Runoff is slow. A seasonal high water table is at a depth of 1 foot to 2½ feet, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, and pasture. If the soil is adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is short lived because of excess wetness. Capability unit IIw–2; woodland group 2w1.

Durham Series

The Durham series consists of deep, well drained, gently sloping soils. These soils have a dominantly loamy subsoil. They formed in material weathered from granite and granite gneiss.[2] Durham soils in this county were mapped only in a complex with Bourne soils.

In a representative profile about ½ inch of partly decomposed forest litter overlies a surface layer of light brownish gray, light yellowish brown, and light olive brown fine sandy loam about 16 inches thick. The subsoil is about 44 inches thick. The upper 12 inches is yellowish brown, friable sandy clay loam; and the lower 32 inches is yellowish brown, strong brown, yellowish red, pale brown, and gray friable sandy clay loam. The substratum extends to a depth of 84 inches or more. It is red, gray, and pale brown clay.

Unless limed, Durham soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Durham fine sandy loam in an area of Durham-Bourne fine sandy loams, 2 to 6 percent slopes, about 200 feet south of the junction of Routes 662 and 654:

O1—½ inch to 0; hardwood leaf litter and decomposed organic residue.

A1—0 to 2 inches; light brownish gray (2.5Y 6/2) fine sandy loam; weak fine granular structure; very friable; many coarse medium and fine roots; very strongly acid; abrupt smooth boundary.

A2—2 to 13 inches; light yellowish brown (2.5Y 6/4) fine sandy loam; weak fine granular structure; friable; few medium and fine roots; common fine pores; very strongly acid; clear smooth boundary.

A3—13 to 16 inches; light olive brown (2.5Y 5/4) fine sandy loam; weak fine granular and weak fine subangular blocky structure; friable; few medium roots; common fine pores;

[2] Recent studies indicate that the Durham soils in this survey area may be formed in old Coastal Plain remnants on the Piedmont.

about 5 percent by volume angular quartz pebbles as much as 20 millimeters in diameter; very strongly acid; clear smooth boundary.

B1t—16 to 20 inches; yellowish brown (10YR 5/8) light sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; about 2 percent by volume angular quartz pebbles as much as 20 millimeters in diameter; very strongly acid; clear smooth boundary.

B21t—20 to 28 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine distinct strong brown (7.5YR 5/8) and pale yellow (2.5Y 7/4) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin patchy clay films; very strongly acid; clear smooth boundary.

B22t—28 to 39 inches; yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), yellowish red (5YR 4/8), and pale brown (10YR 6/3) heavy sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin continuous clay films; very strongly acid; gradual smooth boundary.

B3t—39 to 60 inches; strong brown (7.5YR 5/8), gray (10YR 6/1), and yellowish red (5YR 4/8) sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films; very strongly acid; clear wavy boundary.

C—60 to 84 inches; red (2.5YR 4/8), gray (10YR 6/1) and pale brown (10YR 6/3) clay; massive; rock controlled structure; thick clay lenses and clay flows in upper part; firm, sticky and plastic; very strongly acid.

The solum is 40 to more than 60 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 10 percent angular quartz pebbles, as large as 50 millimeters in diameter.

The A horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 1 to 4. The Bt horizon has hue of 10YR to 5YR, value of 5 and 6, and chroma of 3 to 8. It ranges from sandy clay loam to light clay loam. In many places it has mottles that are gray because of weathered parent material rather than wetness. The C horizon is strongly weathered granite and and gneiss. It is commonly mottled with red, brown, yellow, and gray. It ranges from sandy loam to clay.

Durham soils in this county have high chroma mottles in the lower part of the B2t horizon and a thicker B3t horizon than is typical of Durham soils. This difference, however, does not alter their use or management.

Durham soils are similar to Grover, Louisburg, and Vaucluse soils. They have a thicker solum than Grover and Louisburg soils. Durham soils have less mica throughout than Grover soils and more clay than Louisburg soils. They do not have the fragipan that is characteristic of Vaucluse soils.

Durham soils are near Appling, Bourne, Colfax, and Vance soils. Durham soils have less clay than Appling and Vance soils. They are better drained than Bourne and Colfax soils, and they do not have the fragipan that is characteristic of those soils.

45B—Durham-Bourne fine sandy loams, 2 to 6 percent slopes. This complex is on broad, slightly convex ridgetops and in saddle positions. Durham and Bourne soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Durham soils, 40 percent Bourne soils, and 15 percent other soils.

Included with these soils in mapping were scattered small areas of Abell, Colfax, and Vance soils.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or are clean tilled. Bourne soils have a seasonal high water table at a depth of 1½ to 2½ feet during wet periods, and drainage is desirable if the soils are used for farming.

This complex is used mainly for woodland. If adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is usually short lived because of excess wetness in the Bourne soil. Capability unit IIe–2; woodland group 4d1.

Edgehill Series

The Edgehill series are deep, well drained, gently sloping to steep soils on high terraces. These soils have a dominantly clayey subsoil that contains a large amount of pebbles and cobbles. They formed in Coastal Plain sediment.

In a representative profile about 3 inches of partly decomposed forest litter overlies a surface layer of dark grayish brown and pale brown very gravelly fine sandy loam about 17 inches thick. The subsoil is about 24 inches thick. The upper 3 inches is strong brown, firm very gravelly clay loam; and the lower 21 inches is red, firm gravelly clay. The substratum extends to a depth of 80 inches or more. It is strong brown, yellowish red, red, and yellowish brown very gravelly sandy loam.

Unless limed, Edgehill soils are very strongly acid to strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is low.

Representative profile of Edgehill very gravelly fine sandy loam, 2 to 6 percent slopes, 300 yards south of Route 902 and ¾ mile west of the junction of Routes 902 and 711:

O1 & O2—3 inches to 0; partly decomposed loose leaves and twigs underlain by very dark brown organic litter.

A1—0 to 2 inches; dark grayish brown (10YR 4/2) very gravelly fine sandy loam; weak very fine and fine granular structure; very friable; many fine roots; about 50 percent rounded pebbles as much as 2 inches in diameter; about 5 percent cobbles; very strongly acid; abrupt smooth boundary.

A2—2 to 17 inches; pale brown (10YR 6/3) very gravelly fine sandy loam; weak very fine and fine granular structure; very friable; common fine and medium roots; about 50 percent rounded pebbles as much as 2 inches in diameter; about 2 percent rounded cobbles; very strongly acid; clear smooth boundary.

B1t—17 to 20 inches; strong brown (7.5YR 5/6) very gravelly clay loam; weak fine and medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine and medium roots; about 50 percent rounded pebbles as much as 2 inches in diameter; about 2 percent cobbles; very strongly acid; clear wavy boundary.

B2t—20 to 41 inches; red (2.5YR 4/6) gravelly clay; weak fine subangular blocky structure; firm, sticky and plastic; few fine roots; about 40 percent rounded pebbles as much as 2 inches in diameter; 8 percent cobbles; pebbles and cobbles vary greatly in degree of weathering; thin patchy and continuous clay films on ped faces and coarse fragments; very strongly acid; gradual wavy boundary.

C—41 to 80 inches; strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and yellowish brown (10YR 5/6) very gravelly sandy loam; pockets of sandy clay loam to clay; massive and compact in place; friable or firm when removed, slightly sticky and slightly plastic; few fine roots; 65 percent by volume rounded pebbles as large as 2 inches in diameter and cobbles; very strongly acid.

The solum is 30 to 60 inches or more thick. Depth to bedrock is more than 5 feet. The solum ranges from more than 35 percent to as much as 70 percent, by volume, cobbles and coarse fragments of rounded quartz, quartzite, and gneiss pebbles as much as 2 inches in diameter.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 6, and chroma of 1 to 6. The B1 horizon, where present, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It is gravelly or very gravelly clay loam, loam, or sandy clay loam. The B2t horizon has hue of 2.5YR to 10YR, value of 3 to 6, and chroma of 4 to 8. In a few places the lower part of the Bt horizon is dark red (10YR 3/6). The B2t horizon is very gravelly clay loam or clay. The B3t horizon, where present, has the same color range as the B2t horizon. It is commonly very gravelly sandy clay loam or clay loam. Few to common fine flakes of mica are in the lower part of the B horizon and in places are throughout the solum. The C horizon varies widely in color, texture, and content of coarse fragments.

Edgehill soils are similar to Gritney and Spotsylvania soils. Edgehill soils have many more pebbles and cobbles throughout the solum than those soils.

Edgehill soils are near Appling, Cecil, Louisburg, Masada, and Turbeville soils. Edgehill soils also have many more pebbles and cobbles throughout the solum than those soils.

244B—Edgehill very gravelly fine sandy loam, 2 to 6 percent slopes. This soil is on narrow, winding, convex ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were scattered small areas of Appling, Creedmoor, Louisburg, Masada, Mayodan, and Turbeville soils.

Runoff is medium. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles and cobbles to dull and damage plowshares and to make tillage difficult. The soil is droughty during the growing season.

This soil is used mainly for woodland. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIs–2; woodland group 3o1.

244C—Edgehill very gravelly fine sandy loam, 6 to 12 percent slopes. This soil is on narrow, winding, convex ridgetops and on short, complex side slopes.

Included with this soil in mapping were scattered small areas of Appling, Creedmoor, Louisa, Louisburg, Masada, Mayodan, and Turbeville soils.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles and cobbles to dull and damage plowshares and to make tillage difficult. The soil is droughty during the growing season.

This soil is used mostly for woodland. It is poorly suited to cultivated crops and is better suited to mixed hay, pasture, and woodland. Capability unit IVe–1; woodland group 3o1.

244D—Edgehill very gravelly fine sandy loam, 12 to 20 percent slopes. This soil is on short, complex side slopes that are generally along drainageways below narrow, winding ridgetops.

Included with this soil in mapping were scattered small areas of Appling, Creedmoor, Louisa, Louisburg, Pinkston, Mayodan, and Wedowee soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is used mainly for woodland. Capability unit VIe–1; woodland group 3r1.

244E—Edgehill very gravelly fine sandy loam, 20 to 40 percent slopes. This soil is on short, complex side slopes that are along drainageways and small streams, below narrow winding ridgetops.

Included with this soil in mapping were scattered small areas of Creedmoor, Grover, Louisa, Louisburg, Mayodan, Pinkston, and Wedowee soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is used mainly for woodland. Capability unit VIIe–1; woodland group 3r1.

Enon Series

The Enon series consists of moderately deep, well drained, gently sloping to steep soils on Piedmont Uplands. These soils have a dominantly clayey subsoil. They formed in material weathered from hornblende gneiss and greenstone. Enon soils in this county were mapped only with Louisburg and Vance soils.

In a representative profile the surface layer is grayish brown and brown loam about 5 inches thick. The subsoil is about 17 inches of yellowish red and strong brown firm clay and heavy silty clay loam. The substratum is about 18 inches of strongly weathered hornblende gneiss that crushes easily to clay loam. Hornblende gneiss is at a depth of about 40 inches.

Unless limed, Enon soils are medium acid to slightly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium.

Representative profile of Enon loam in an area of Enon-Louisburg complex, 12 to 40 percent slopes, on the south bank of Swift Creek Reservoir, ¼ mile west of dam and ¼ mile north of U.S. Highway 360:

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

A2—2 to 5 inches; brown (10YR 5/3) loam; weak fine granular structure; friable; common fine and medium roots; medium roots; medium acid; clear smooth boundary.

B2t—5 to 12 inches; yellowish red (5YR 5/8) clay; moderate medium angular blocky structure; firm, sticky and plastic; common fine and medium roots; thin continuous clay films; slightly acid; gradual wavy boundary.

B3t—12 to 22 inches; strong brown (7.5YR 5/8) heavy silty clay loam; rock controlled structure with clay seams and flows; firm, sticky and plastic; few fine and medium roots; slightly acid; gradual wavy boundary.

C—22 to 40 inches; strong brown, yellowish brown, green, black, and white strongly weathered hornblende gneiss that crushes easily to clay loam; massive; friable, slightly sticky and slightly plastic; few fine flakes of mica; slightly acid.

R—40 inches; hornblende gneiss.

The solum is 20 to 40 inches thick. Depth to bedrock is 3 to 4 feet. The A horizon has hue of 10YR and 2.5Y, value of 3 to 5, and chroma of 2 to 4. The Bt horizon has hue of 7.5YR, 5YR, and 10YR; value of 4 and 5; and chroma of 6 to 8. It is clay, heavy clay loam, or heavy silty clay loam.

Enon soils are similar to Orange, Pamunkey, and Vance soils. Enon soils have a thinner solum than those soils. They are better drained than Orange soils, have more clay than Pamunkey soils, and have a base saturation of more than 35 percent, whereas Vance soils have a base saturation of less than 35 percent.

50F—Enon-Louisburg complex, 12 to 40 percent slopes. This complex is on short, complex side slopes and hillsides, generally along drainageways. Enon loam and Louisburg sandy loam are intermingled in such an intricate pattern that it was not practical to map them separately. The Enon soil has the profile described as representative of the Enon series. The complex is about 45 percent Enon loam, 40 percent Louisburg sandy loam, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Louisa, Orange, and Wedowee soils. Also included are small spots of Rock outcrop.

Runoff is rapid. The hazard of erosion is very severe where the soils are disturbed and exposed. The soils are droughty during the growing season.

This complex is used mainly for woodland. Capability unit VIIe–1; woodland group 4r1.

50C—Enon-Vance complex, 2 to 12 percent slopes.

This complex is on somewhat broad and narrow, convex ridges and on short, convex side slopes. Enon loam and Vance fine sandy loam are intermingled in such an intricate patten that it was not practical to map them separately. The complex is about 45 percent Enon loam, 40 percent Vance fine sandy loam, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Cullen and Orange soils. Also included were spots of Rock outcrop.

Runoff is medium to rapid. The hazard of erosion is severe where the soils are disturbed and exposed or clean tilled.

This complex is used for corn, small grain, mixed hay, and pasture. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–4; woodland group 4o1.

Faceville Series

The Faceville series consists of deep, well drained, gently sloping and sloping soils on Coastal Plain uplands. These soils have a dominantly clayey subsoil. They formed in Coastal Plain sediment.

In a representative profile about 1 inch of partly decomposed forest litter overlies a surface layer of dark gray loamy sand about 1 inch thick. The subsurface layer is yellowish brown and light yellowish brown fine sandy loam about 12 inches thick. The subsoil extends to a depth of about 100 inches. The upper 6 inches is yellowish red, friable sandy clay loam; and the lower 82 inches is red, friable to firm clay.

Unless limed, Faceville soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Faceville fine sandy loam, 2 to 6 percent slopes, 3,500 feet northeast of Lake Chesdin Dam and 2,500 feet south of junction of Routes 669 and 602, south of water main from Appomattox River Authority:

O2—1 to ½ inch; pine needles and hardwood leaves and twigs.

O1—½ inch to 0; decomposed organic residue of leaves and twigs matted with fine and medium roots.

A1—0 to 1 inch; dark gray (10YR 4/1) loamy sand; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many fine and medium roots; very strongly acid; smooth boundary.

A2—1 inch to 6 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; few fine roots; common fine pores; very strongly acid; clear smooth boundary.

A3—6 to 12 inches; light yellowish brown (10YR 6/4) fine sandy loam; few fine faint yellowish brown (10YR 5/4) and pale brown (10YR 6/3) mottles; weak fine granular structure; very friable, nonsticky and nonplastic; pockets of clean sand; few fine roots; few fine pores; very strongly acid; clear smooth boundary.

B1t—12 to 18 inches; yellowish red (5YR 5/6) sandy clay loam; weak medium and fine subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films; very strongly acid; gradual smooth boundary.

B21t—18 to 38 inches; red (2.5YR 4/6) clay; few medium and fine distinct strong brown (7.5YR 5/6) mottles; moderate medium and fine subangular blocky structure; friable to firm, slightly sticky and slightly plastic; few fine pores; few fine pebbles; thin continuous clay films; very strongly acid; smooth boundary.

B22t—38 to 100 inches; red (10R 4/6) clay; moderate fine angular blocky structure; firm to friable, slightly sticky and slightly plastic; few fine pockets of strong brown sand; few fine pores; few fine pebbles; thin continuous clay films; few plinthite nodules in lower part; very strongly acid.

The solum is more than 60 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 30 percent, by volume, rounded quartz pebbles as much as 50 millimeters in diameter.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 4. It is commonly fine sandy loam but ranges to sandy loam and gravelly fine sandy loam. The Bt horizon has hue of 5Y to 10R, value of 3 to 5, and chroma of 6 to 8. It ranges from clay and sandy clay to gravelly clay and gravelly sandy clay. The C horizon is commonly red to yellowish red clay loam and sandy clay loam to sand and gravel.

Faceville soils in Orangeburg-Faceville sandy loams, 2 to 6 percent slopes, and Orangeburg-Faceville sandy loams, 6 to 12 percent slopes, in this county have a browner Bt horizon than is in the color range for the Faceville series. This difference, however, does not change their use or management.

Faceville soils are similar to Lucy, Norfolk, Orangeburg, Turbeville, and Varina soils. Faceville soils are redder and have more clay than Lucy, Norfolk, and Orangeburg soils. They have kaolinitic mineralogy, whereas Turbeville soils have mixed mineralogy. They have a redder solum than Varina soils, and lack reticulate mottling in the lower part of the Bt horizon.

Faceville soils are near Gritney, Kempsville, Norfolk, Orangeburg, Tetotum, and Vaucluse soils. Faceville soils have a redder and thicker solum than Gritney, Kempsville, Tetotum, and Vaucluse soils. They have more clay than Kempsville, Tetotum, and Vaucluse soils.

162B—Faceville fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, the soil material is 15 to 30 percent, by volume, quartz pebbles.

Included with this soil in mapping were scattered small areas of Bourne, Gritney, Kempsville, Norfolk, Orangeburg, and Vaucluse soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco (fig. 5). If adequately limed and fer-

Figure 5.—**Tobacco nearing maturity on Faceville fine sandy loam, 2 to 6 percent slopes. The tobacco will be flue-cured.**

tilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

162C—Faceville fine sandy loam, 6 to 12 percent slopes. This soil is on moderately long, slightly convex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 8 inches thick. Also, this layer is 15 to 30 percent, by volume, quartz pebbles in some areas.

Included with this soil in mapping were scattered small areas of Bourne, Gritney, Kempsville, Norfolk, Orangeburg, and Vaucluse soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 3o1.

157B—Faceville-Gritney fine sandy loams, 2 to 6 percent slopes. This complex is on broad, convex ridgetops. Faceville and Gritney soils are intermingled in such an intricate pattern that it was not practical to map them separately. This complex is about 50 percent Faceville soils, 35 percent Gritney soils, and 15 percent other soils. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this complex in mapping were scattered small areas of Kempsville, Norfolk, Orangeburg, and Vaucluse soils.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or are clean tilled.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

110B—Faceville-Gritney gravelly fine sandy loams, 2 to 6 percent slopes. This complex is on narrow, convex ridgetops. Faceville and Gritney soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is 50 percent Faceville soils, 35 percent Gritney soils, and 15 percent other soils. The surface layer is 15 to 30 percent, by volume, rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this complex in mapping were scattered small areas of Appling, Bourne, Kempsville, Orangeburg, and Vaucluse soils.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or are clean tilled. The surface layer contains enough pebbles to dull and damage plowshares.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

110C—Faceville-Gritney gravelly fine sandy loams, 6 to 12 percent slopes. This complex is on short, slightly convex side slopes. Faceville and Gritney soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 50 percent Faceville soils, 30 percent Gritney soils, and 20 percent other soils. The surface layer is 15 to 30 percent, by volume, rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this complex in mapping were scattered small areas of Appling, Bourne, Kempsville, Orangeburg, and Vaucluse soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soils are disturbed and exposed or are clean tilled. The surface layer contains enough pebbles to dull and damage plowshares.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 3o1.

Fluvaquents

1A—Fluvaquents. Fluvaquents are low lying areas of mixed alluvium along streams, branches, and large drainageways. These areas are flooded and ponded for long periods from December to May and after large storms and prolonged wet periods throughout the rest of the year.

The alluvium ranges from sand to clay. It is often underlain by sand and gravel. The surface layer is commonly gray or dark gray, and the substratum is strongly gleyed and is gray, greenish gray or bluish gray. A mat of partly decayed organic material is on the surface in many places. Organic-matter content ranges from low to high, and the alluvium is commonly extremely acid or strongly acid.

Areas of Fluvaquents are commonly wooded, mostly with water tolerant hardwoods. Not assigned to a capability unit or woodland group.

3A—Fluvaquents, ponded. These Fluvaquents are low lying areas of mixed alluvium along major streams and branches. The areas are covered by standing water 9 months or more each year, except in periods of prolonged drought.

The surface layer is commonly black silt loam, and the substratum is commonly gray and ranges from sand to clay. The alluvium is underlain by layers of gray sand and gravel, silt, and clay. Organic-matter content is high, and natural fertility is low. The alluvium is very strongly acid.

Fluvaquents, ponded, are commonly wooded with water tolerant hardwoods, but in places there are areas of open water and areas covered by cattails, arrowleaf, marsh grasses, and other aquatic plants. Some drained areas are moderately well suited to cultivated crops and pasture. Not assigned to a capability unit or woodland unit.

Forestdale Series

The Forestdale series consists of deep, poorly drained, nearly level soils. These soils have a dominantly clayey subsoil. They formed in alluvium on low terraces along the larger streams of the county.

In a representative profile the surface layer is grayish brown and dark grayish brown silt loam about 9 inches thick. The subsoil is about 34 inches thick. The upper 9 inches is olive gray, firm silty clay that is mottled with yellowish brown; and the lower 25 inches is gray and dark gray, firm clay. The substratum extends to a depth of 74 inches or more. It is dark gray sand and gravel that has thin layers of sandy loam, clay loam, and clay.

Forestdale soils are strongly acid to medium acid. These

soils are medium in organic-matter content and medium in natural fertility. Permeability is very slow in the subsoil, and available water capacity is medium. The seasonal high water table is within 1 foot of the surface during winter and spring, and the soils are frequently flooded.

Representative profile of Forestdale silt loam, 200 feet north of the Appomattox River, 3 miles south of the junction of Routes 602 and 646:

Ap—0 to 9 inches; grayish brown (2.5Y 5/2) and dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.

B21tg—9 to 18 inches; olive gray (5Y 5/2) silty clay; common fine prominent yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common fine roots; thin patchy clay films; about 1 percent by volume rounded quartz pebbles as much as 20 millimeters in diameter; strongly acid; clear smooth boundary.

B22tg—18 to 38 inches; gray (N 5/0) clay; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few fine roots; thin patchy clay films; about 1 percent by volume rounded quartz pebbles as much as 20 millimeters in diameter; stronger acid; gradual smooth boundary.

B3tg—38 to 43 inches; dark gray (N 4/0) clay; weak coarse subangular blocky structure parting to massive; firm, sticky and plastic; few thin clay films; medium acid; abrupt smooth boundary.

IIC—43 to 74 inches; dark gray (N 4/0) sand and gravel, thin strata of sandy loam, clay loam, and clay; single grained; loose; medium acid.

The solum is 40 to 60 inches thick. Depth to bedrock is generally more than 5 feet. The solum is less than 1 percent to about 5 percent, by volume, rounded quartz pebbles as much as 50 millimeters in diameter. Few fine flakes of mica are throughout the solum in a few places.

The A horizon has hue of 10YR or yellower, value of 3 to 5, and chroma of 1 or 2. The Bt horizon has hue of 10YR, 2.5Y, 5Y, and N; value of 4 to 6; and chroma of 0 to 2. High chroma mottles are common. The Bt horizon is commonly clay, but it is also heavy silty clay loam, silty clay, and, in a few places heavy clay loam. The C horizon is typically light gray to gray, but it has the same color range as the Bt horizon in places. It ranges from sand and gravel to clay.

Forestdale soils in this county have a higher content of fine sand and are coarser textured in the lower part of the solum than is typical of the Forestdale series. This difference, however, does not alter their use or management.

Forestdale soils are similar to Coxville, Dunbar, Roanoke, and Worsham soils. Forestdale soils have a thinner solum than Coxville and Dunbar soils, and they are not so acid as those soils. They are not so acid in the lower part of the solum as Roanoke and Worsham soils.

Forestdale soils are near Augusta, Chewacla, Lenoir, and Pamunkey soils. Forestdale soils are more poorly drained than those soils. They have more clay than Augusta, Chewacla, and Pamunkey soils and a thinner solum than Lenoir soils.

37—Forestdale silt loam. This soil is in low, slightly concave areas and in slightly concave depressions on broad terraces. Slopes are dominantly 0 to 2 percent.

Included with this soil in mapping were scattered small areas of Augusta, Chewacla, and Lenoir soils.

Runoff is slow. A seasonal high water table is within 1 foot of the surface during winter and spring, and the soil is frequently flooded.

Most areas of this soil are in woodland, and some small areas are in pasture. Capability unit Vw–1; woodland group 1w2.

Gritney Series

The Gritney series consists of deep, well drained, gently sloping and sloping soils on Coastal Plain uplands. These soils have a dominantly clayey subsoil. They formed in Coastal Plain sediment.

In a representative profile the surface layer is brown fine sandy loam about 9 inches thick. The subsoil is about 43 inches thick. The upper 30 inches is yellowish red, firm clay that is mottled with red throughout and with gray in the lower part. The lower 13 inches is strong brown, yellowish red, red, and gray, friable sandy clay loam and clay loam. The substratum extends to a depth of 70 inches or more. It is yellowish red and gray loamy sand and gray and strong brown clay.

Unless limed, Gritney soils are very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium.

Representative profile of Gritney fine sandy loam, 2 to 6 percent slopes, 1/8 mile west of Route 145, 1/4 mile south of Route 1452, and 1 mile north of Centralia:

Ap—0 to 9 inches; brown (10YR 4/3) fine sandy loam; friable, nonsticky and nonplastic; many fine roots; common fine pores; about 2 percent by volume rounded quartz pebbles as large as 40 millimeters in diameter; very strongly acid; abrupt smooth boundary.

B21t—9 to 23 inches; yellowish red (5YR 4/8) clay; few fine distinct red (2.5YR 4/6) mottles; moderate medium and fine subangular blocky structure; firm, sticky and plastic; few very fine roots; few fine pores; thin continuous clay films; about 2 percent by volume rounded quartz pebbles as much as 40 millimeters in diameter; very strongly acid; clear smooth boundary.

B22t—23 to 32 inches; yellowish red (5YR 4/8) clay; common fine distinct red (2.5YR 4/6) mottles and few fine distinct light gray (10YR 6/1) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few fine pores; thin continuous clay films; about 2 percent by volume rounded quartz pebbles as much as 40 millimeters in diameter; very strongly acid; clear smooth boundary.

B23t—32 to 39 inches; yellowish red (5YR 4/8) clay; red (2.5YR 4/6), gray (10YR 6/1), and light brownish gray (10YR 6/2) ped interiors; moderate medium subangular blocky structure; firm, sticky and plastic; thin patchy clay films; very strongly acid; clear smooth boundary.

B3t—39 to 52 inches; strong brown (7.5YR 5/8), yellowish red (5YR 4/8), red (2.5YR 4/6), and gray (10YR 6/1) layers of light sandy clay loam and clay loam; moderate medium and thick platy structure; friable, sticky and slightly plastic; thin patchy clay films; very strongly acid; abrupt smooth boundary.

IIC1—52 to 59 inches; yellowish red (5YR 4/8) and gray (10YR 6/1) loamy sand; single grained; very friable, nonsticky and nonplastic; very strongly acid; abrupt smooth boundary.

IIIC2—59 to 70 inches; gray and strong brown clay; massive; firm, sticky and plastic; very strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 30 percent, by volume, rounded quartz pebbles as much as 50 millimeters in diameter.

The A horizon has hue of 10YR, value of 4 and 5, and chroma of 2 to 4. It is dominantly fine sandy loam but ranges to gravelly fine sandy loam. The B2t horizon ranges from yellowish red to strong brown and is commonly mottled with red. Gray mottles are in the lower part of the B2t horizon. Below a depth of 32 inches, the interior of the peds is red (10R or 2.5YR 4/6), gray (10YR 6/1), and light brownish gray (10YR 6/2). The B2t horizon is commonly clay or sandy

clay. The B3t horizon has a mottled matrix in hue of 7.5YR, 5YR, 10YR, and 2.5YR; value of 4 to 6; and chroma of 1 to 8. It ranges from sandy clay loam to clay. The C horizon is commonly yellowish red, gray, and strong brown stratified sand and clay.

Gritney soils are similar to Appling, Cecil, Edgehill, Mayodan, and Spotsylvania soils. Gritney soils have mixed mineralogy, whereas Appling, Cecil, Mayodan, and Spotsylvania soils have kaolinitic mineralogy. They have gray mottles in the B2t horizon, which those soils do not have. They have less pebbles throughout the solum than Edgehill soils, which are more than 35 percent pebbles in the upper part of the B2t horizon.

Gritney soils are near Atlee, Craven, Dunbar, Faceville, Lenoir, and Tetotum soils. Gritney soils have more clay and are better drained than Atlee and Tetotum soils. They are better drained than Craven, Dunbar, and Lenoir soils. They have a thinner solum than Faceville soils.

17B—Gritney fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Atlee, Craven, Dunbar, Faceville, Lenoir, and Tetotum soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

17C—Gritney fine sandy loam, 6 to 12 percent slopes. This soil is on short to moderately long, complex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Craven, Faceville, Lenoir, and Tetotum soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or clean tilled.

This soil is used for corn, small grain, mixed, hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 3o1.

Grover Series

The Grover series consists of deep, well drained, gently sloping to steep soils on Piedmont Uplands. These soils have a dominantly loamy subsoil. They formed in material weathered from granite and granite gneiss.

In a representative profile about 1 inch of partly decomposed forest litter overlies a surface layer of dark grayish brown and light yellowish brown fine sandy loam about 12 inches thick. The subsoil is about 24 inches thick. It is strong brown and yellowish red, friable sandy clay loam and clay loam. The substratum extends to a depth of 60 inches or more. It is yellowish red, red, and brownish yellow strongly weathered granite that crushes easily to sandy clay loam.

Unless limed, Grover soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Grover fine sandy loam, 12 to 20 percent slopes, in hardwood woodland in Pocohontas State Park along the south side of Swift Creek, 1¼ miles east of Route 10, ¾ mile north of Route 655:

O1—1 inch to 0; leaf litter layer from hardwoods underlain by matted roots, decomposed organic residue, and worm casts.

A1—0 to 3 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; very friable; many coarse medium and fine roots; strongly acid; abrupt smooth boundary.

A2—3 to 12 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak coarse subangular blocky structure parting to weak fine granular; very friable; common medium and fine roots; about 1 percent by volume angular quartz pebbles as much as 25 millimeters in diameter; strongly acid; clear smooth boundary.

B1—12 to 16 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium and fine subangular blocky structure; friable, slightly sticky and slightly plastic; few medium and fine roots; about 1 percent by volume angular quartz pebbles as much as 15 millimeters in diameter; very strongly acid; clear smooth boundary.

B2t—16 to 28 inches; yellowish red (5YR 4/8) clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin patchy clay films; common fine flakes of mica; very strongly acid; clear smooth boundary.

B3t—28 to 36 inches; yellowish red (5YR 4/6) light clay loam; weak coarse subangular blocky and angular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin patchy clay films; common fine flakes of mica; very strongly acid; gradual smooth boundary.

C—36 to 60 inches; yellowish red (5YR 4/6), red (2.5YR 4/6), and brownish yellow (10YR 6/6) strongly weathered granite that crushes easily to sandy clay loam; rock controlled structure; friable, slightly sticky and slightly plastic; many fine flakes of mica give the material a greasy feel; few highly weathered feldspar crystals; a few clay films following old root channels; very strongly acid.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 5 percent, by volume, angular quartz pebbles, as much as 50 millimeters in diameter. Fine flakes of mica increase as depth increases, and the material in the substratum feels greasy.

The A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. The Bt horizon has hue of 7.5YR and 5YR, value of 4 and 5, and chroma of 6 to 8. It is clay loam and sandy clay loam and and generally has common fine flakes of mica. The C horizon is yellowish brown to yellowish red, friable weathered granite or granite gneiss and mica gneiss that crushes easily to sandy clay loam, loam, or fine sandy loam.

Grover soils in this county have more clay in the lower part of the Bt horizon than is typical of the Grover series. This difference, however, does not alter their use or management.

Grover soils are similar to Durham, Louisa, and Louisburg soils. Grover soils have micaceous mineralogy, whereas Durham soils have siliceous mineralogy. They have a continuous Bt horizon, which Louisa and Louisburg soils do not have.

Grover soils are near Appling, Cecil, Colfax, Louisa, Louisburg, and Wedowee soils. Grover soils have less clay than Appling, Cecil, and Wedowee soils. They do not have the fragipan characteristic of Colfax soils.

305B—Grover fine sandy loam, 2 to 6 percent slopes, eroded. This soil is on somewhat broad to narrow, convex ridgetops. The surface layer is mainly 4 to 8 inches thick, but in some areas where the soil is only slightly eroded, the surface layer is 8 to 12 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Colfax, Louisa, and Louisburg soils.

Runoff is medium. The hazard of further erosion is moderate where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pas-

ture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–5; woodland group 3o1.

305C—Grover fine sandy loam, 6 to 12 percent slopes. This soil is on short to moderately long, complex side slopes. In some moderately eroded areas, the surface layer is 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Colfax, Louisa, Louisburg, and Wedowee soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–6; woodland group 3o1.

305D—Grover fine sandy loam, 12 to 20 percent slopes. This soil is on short, complex side slopes. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Louisa, Louisburg, and Wedowee soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or is clean tilled. The soil is somewhat droughty during the growing season.

This soil is poorly suited to cultivated crops because of droughtiness, slope, and the erosion hazard. It is better suited to small grain, mixed hay, pasture, and woodland. Capability unit IVe–1; woodland group 3r1.

305E—Grover fine sandy loam, 20 to 35 percent slopes. This soil is on short, complex side slopes and hillsides, generally along drainageways. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Louisa and Louisburg soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is used mainly for woodland. It is suited to pasture and woodland. Capability unit VIe–1; woodland group 3r1.

241C—Grover-Louisburg complex, 6 to 12 percent slopes, eroded. This complex is on short to moderately long, convex side slopes. Grover fine sandy loam and Louisburg sandy loam are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 50 percent Grover fine sandy loam, 30 percent Louisburg sandy loam, and 20 percent other soils.

Included with this complex in mapping were scattered small areas of Appling, Cecil, Colfax, Vance, and Wedowee soils.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soils are disturbed and exposed or clean tilled. Louisburg sandy loam is somewhat droughty during the growing season.

This complex is poorly suited to cultivated crops because of droughtiness and the erosion hazard. It is better suited to small grain, mixed hay, pasture, and woodland. Capability unit IVe–2; woodland group 3o2.

Hydraquents

100—Hydraquents. Hydraquents are low lying areas of mixed alluvium on flats. They are covered periodically by tidal waters. These areas are along the James River and the Appomattox River, below the fall line.

The mixed alluvium is commonly layers of sandy, loamy, clayey, and mucky material. The surface layer is generally gray to black and is often mucky. The substratum is strongly gleyed and is gray, greenish gray, and bluish gray. Layers of dark gray and black mucky material are at various depths.

Hydraquents are continually waterlogged. Low areas are covered by tidal waters daily; higher areas are covered only by uncommonly high tides or storm tides. Low areas commonly have a vegatative cover of reeds, cattails, arrowleaf, rushes, water lilies, marsh grasses, and other aquatic plants, and higher areas often support a few stunted trees. Not assigned to a capability unit or woodland group.

Kempsville Series

The Kempsville series consists of deep, well drained, gently sloping and sloping soils on Coastal Plain uplands. These soils have a dominantly loamy subsoil. They formed in Coastal Plain sediment. Kempsville soils in this county were mapped only with Bourne soils.

In a representative profile the surface layer and subsurface layer are dark grayish brown and light yellowish brown sandy loam about 19 inches thick. The subsoil is about 46 inches thick. The upper 10 inches is yellowish brown, friable sandy clay loam; the next 8 inches is yellowish brown sandy clay loam that is mottled with strong brown and pale brown and is slightly brittle and compact in place; and the lower 28 inches is yellowish brown, firm sandy clay that is mottled with strong brown and pale brown. The substratum extends to a depth of 234 inches or more. The upper 85 inches is red, gray, and yellowish brown sandy clay loam, and the lower 84 inches is yellow and white sand.

Unless limed, Kempsville soils are very strongly acid to strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Kempsville sandy loam in an area of Kempsville-Bourne complex, 2 to 6 percent slopes, at the end of Route 646 about 2 miles north of the Appomattox River and 1 mile south of the junction of Routes 646 and 602:

A1—0 to 3 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

A2—3 to 19 inches; light yellowish brown (2.5Y 6/4) sandy loam; weak fine granular structure; friable; many medium and fine roots; few old root channels; few vesicular pores; very strongly acid; gradual smooth boundary.

B1t—19 to 23 inches; yellowish brown (10YR 5/6) light sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and silghtly plastic; many medium roots; few old root channels; very strongly acid; gradual smooth boundary.

B21t—23 to 29 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine medium and coarse roots; common clay bridg-

ing; very strongly acid; gradual smooth boundary.
B22t—29 to 37 inches; yellowish brown (10YR 5/8) sandy clay loam; coarse medium distinct strong brown (7.5YR 5/8) and pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; slightly compact and slightly brittle in place; many vesicular pores; very strongly acid; gradual smooth boundary.
B3t—37 to 65 inches; yellowish brown (10YR 5/8) sandy clay; common medium distinct strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; very weak coarse subangular blocky structure; firm; sticky and slightly plastic; strong brown mottles increase and pale brown mottles decrease as depth increases; very strongly acid; gradual smooth boundary.
IIC1—65 to 150 inches; red (2.5YR 5/6), gray (10YR 6/1), and yellowish brown (10YR 5/6) sandy clay loam; gray material is sandy, and red is clayey and is less than 2 percent plinthite nodules; very strongly acid.
IIIC2—150 to 234 inches; yellow and white sand.

The solum is 42 to 60 inches or more thick. The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 2 to 4. The Bt horizon has hue of 10YR, value of 4 and 5, and chroma of 6 to 8. The lower part of the Bt horizon is mottled with pale brown and strong brown. The B2t horizon is commonly sandy clay loam or light clay loam. The B3t horizon ranges from sandy clay loam to sandy clay. The C horizon is commonly strong brown, gray, yellowish brown, and red. It ranges from sand and sand and gravel to sandy clay loam.

Kempsville soils are similar to Atlee, Bourne, Orangeburg, and Tetotum soils. Kempsville soils are better drained than Atlee and Tetotum soils, and they have more sand and less silt than Atlee soils. They do not have the fragipan that is characteristic of Bourne soils. They are not so red as Orangeburg soils, and they have a thinner solum than those soils.

Kempsville soils are near Bourne, Faceville, Gritney, Lucy, Norfolk, and Orangeburg soils. Kempsville soils have less clay than Faceville and Gritney soils. They have a thinner solum than Lucy and Norfolk soils.

82B—Kempsville-Bourne complex, 2 to 6 percent slopes. This complex is on broad, convex ridgetops. Kempsville sandy loam and Bourne fine sandy loam are intermingled in such an intricate pattern that it was not practical to map them separately. The Kempsville soil has the profile described as representative of the Kempsville series. The complex is about 45 percent Kempsville sandy loam, 40 percent Bourne fine sandy loam, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Faceville, Gritney, Lucy, Norfolk, and Orangeburg soils.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or clean tilled. The Bourne soil has a seasonal high water table at a depth of 1½ to 2½ feet, and drainage is desirable if the soil is used for farming.

This complex is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIe–2; woodland group 4d1.

82C—Kempsville-Bourne complex, 6 to 12 percent slopes. This complex is on short to moderately long, complex side slopes. Kempsville sandy loam and Bourne fine sandy loam are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Kempsville sandy loam, 40 percent Bourne fine sandy loam, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Faceville, Gritney, Lucy, Norfolk, and Orangeburg soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soils are disturbed and exposed or clean tilled. The Bourne soil has a seasonal high water table at a depth of 1½ to 2½ feet.

This complex is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIIe–4; woodland group 4d1.

Lenoir Series

The Lenoir series consists of deep, somewhat poorly drained, nearly level and very gently sloping soils. These soils have a dominantly clayey subsoil. They formed in alluvium on low terraces along the larger streams of the county.

In a representative profile the surface layer is dark grayish brown and light yellowish brown loam about 8 inches thick. The subsoil extends to a depth of 60 inches or more. The upper 8 inches is yellowish brown, pale brown, and light brownish gray, friable loam; the next 8 inches is light yellowish brown, yellowish brown, and gray, firm clay; the next 17 inches is gray, strong brown, and yellowish red, firm clay; and the lower 19 inches is gray, firm clay that is mottled with yellowish brown and strong brown.

Unless limed, Lenoir soils are very strongly acid to strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium. A seasonal high water table is at a depth of 1 foot to 2½ feet during winter and spring. Some areas of the soils are frequently flooded.

Representative profile of Lenoir loam, flooded, 0 to 4 percent slopes, in woodland along Route 711 by junction of unpaved road to James River, approximately 2,000 feet east of Powhatan County line:

A1—0 to 3 inches; dark grayish brown (2.5YR 4/2) loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.
A2—3 to 8 inches; light yellowish brown (2.5Y 6/4) loam; common medium distinct yellowish brown (10YR 5/8) mottles; weak fine granular structure; friable; about 3 percent fine soft oxide concretions; few fine medium and coarse roots; few fine pores; about 5 percent by volume rounded quartz pebbles as much as 5 millimeters in diameter; very strongly acid; clear smooth boundary.
B1t—8 to 16 inches; yellowish brown (10YR 5/8), pale brown (10YR 6/3), and light brownish gray (2.5Y 6/2) heavy loam; weak fine and medium subangular structure; friable, slightly sticky and slightly plastic; about 1 percent fine soft oxide concretions; few fine pores; few fine medium tree roots; few thin clay films; very strongly acid; clear smooth boundary.
B21t—16 to 24 inches; light yellowish brown (2.5Y 6/4), yellowish brown (10YR 5/6), and gray (10YR 6/1) clay; moderate fine and medium subangular blocky structure; firm, sticky and plastic; few medium roots; sand and silt coatings on some ped faces; thin continuous clay films; very strongly acid; clear smooth boundary.
B22tg—24 to 41 inches; gray (5Y 5/1) strong brown (7.5YR 5/8) and yellowish red (5YR 4/8) clay; moderate fine and medium subangular blocky structure; firm, sticky and

very plastic; few fine roots; thin continuous clay films; very strongly acid; gradual wavy boundary.

B23tg—41 to 60 inches; gray (N 6/0) clay; many medium coarse prominent yellowish brown (10YR 5/8) mottles and common fine distinct strong brown (7.5YR 5/6) mottles; moderate fine and medium angular and subangular blocky structure; firm, sticky and plastic; thin continuous clay films; very strongly acid.

The solum is more than 60 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 1 to 4. It is loam and silt loam. The B1t horizon and B21t horizon has dominant matrix colors of yellowish brown and light yellowish brown mottled with brownish gray, pale brown, gray, and black. The B22tg horizon and B23tg horizon is dominantly gray mottled with strong brown and yellowish red. The Bt horizon is dominantly clay.

Lenoir soils are similar to Augusta, Coxville, Dunbar, Forestdale, Roanoke, and Worsham soils. Lenoir soils have more clay than Augusta soils. They are better drained than Coxville, Forestdale, Roanoke, and Worsham soils. They have mixed mineralogy, whereas Dunbar soils have kaolinitic mineralogy.

Lenoir soils are near Atlee, Chastain, Chewacla, Coxville, Craven, and Forestdale soils. Lenoir soils are more poorly drained than Atlee and Craven soils, and they have more clay than Atlee soils. They are better drained than Chastain soils, and they have a Bt horizon which Chastain and Chewacla soils do not have. Lenoir soils contain more clay than Chewacla soils.

67B—Lenoir loam, flooded, 0 to 4 percent slopes. This soil is on low, broad, slightly concave terraces. It has the profile described as representative of the series.

Included with this soil in mapping were scattered small areas of Chastain, Chewacla, and Forestdale soils. Also included were small spots of soils that are 15 to 30 percent rounded quartz pebbles throughout.

Runoff is slow. This soil receives seepage and runoff from surrounding higher areas and is frequently flooded. A seasonal high water table is at a depth of 1 foot to 2½ feet, and drainage is desirable if the soil is used for farming.

This soil is used for corn, mixed hay, pasture, and woodland. If protected from flooding and adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops except those that are sensitive to excess moisture. Capability unit IIIw–1; woodland group 2w2.

30B—Lenoir silt loam, 0 to 4 percent slopes. This soil is in small- to medium-sized, slightly concave upland depressions.

Included with this soil in mapping were scattered small areas of Atlee, Coxville, and Craven soils.

Runoff is slow. This soil receives seepage and runoff from surrounding, higher lying areas. A seasonal high water table is at a depth of 1 foot to 2½ feet during winter and spring.

This soil is used for corn, small grain, mixed hay, pasture, and woodland. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops except those that are sensitive to excess moisture. Capability unit IIIw–2; woodland group 2w2.

Louisa Variant

The Louisa variant soils are deep, somewhat excessively drained, moderately steep and steep. They are on Piedmont Uplands. These soils have a dominantly loamy subsoil. They formed in micaceous material weathered from granite, granite gneiss, and schist.

In a representative profile the surface layer is dark grayish brown and yellowish brown loam about 5 inches thick. The subsoil is strong brown, friable loam about 7 inches thick. It has small pockets of yellowish brown and yellowish red heavy loam and clay loam. The substratum extends to a depth of 60 inches or more. It is strongly weathered micaceous schist that crushes to silt loam.

Louisa variant soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderately rapid, and available water capacity is medium.

Representative profile of Louisa loam, variant, 20 to 45 percent slopes, by the Appomattox River, 2 miles south of Route 602, ¾ mile southwest of Winterpock Creek, and 1 mile west of Lake Chesdin:

A1—0 to 1 inch; dark grayish brown (2.5Y 4/2) loam; weak fine granular structure; very friable, slighty sticky and slightly plastic; many fine and medium roots; about 1 percent by volume angular quartz pebbles as much as 75 millimeters in diameter; very strongly acid; abrupt smooth boundary.

A2—1 inch to 5 inches; yellowish brown (10YR 5/4) loam; weak fine granular structure; friable; slightly sticky and slightly plastic; common fine and medium roots; about 1 percent volume angular quartz pebbles as much as 50 millimeters in diameter; very strongly acid; clear wavy boundary.

B2—5 to 12 inches; strong brown (7.5YR 5/6) loam; streaked with yellowish brown (10YR 5/6); weak fine granular structure and weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common small pockets of yellowish brown and yellowish red heavy loam and clay loam; about 1 percent by volume angular quartz pebbles in veins as much as 75 millimeters in diameter; strongly acid; abrupt wavy boundary.

C1—12 to 24 inches; light yellowish brown (10YR 6/4) strongly weathered mica schist that crushes easily to silt loam; few fine roots; about 1 percent by volume angular quartz pebbles as much as 25 millimeters in diameter; strongly acid; gradual irregular boundary.

C2—24 to 35 inches; strong brown (7.5YR 5/8) weathered micaeous schist that crushes easily to silt loam; few fine roots; about 1 percent by volume angular quartz pebbles as much as 50 millimeters in diameter; medium, prominent black films; strongly acid; gradual irregular boundary.

C3—35 to 60 inches; olive brown, green, white, and black strongly weathered micaeous schist; crushes with difficulty to silty material; strongly acid.

The solum is 10 to 20 inches thick. Depth to bedrock is 5 feet or more. The solum and substratum are about 1 percent to about 15 percent, by volume angular quartz pebbles as much as 75 millimeters in diameter.

The A horizon has hue of 10YR and 2.5Y, value of 4 and 5, and chroma of 2 to 4. The B horizon has hue of 7.5YR and 10YR, value of 4 and 5, and chroma of 6 to 8. It is commonly loam but ranges to silt loam. It contains small pockets of yellowish brown to yellowish red heavy loam, heavy silt loam, clay loam, and silty clay loam. The C horizon is strongly weathered micaceous rock that crushes to silt loam or loam.

Louisa variant soils are similar to Louisburg and Pinkston soils. Louisa variant soils have more mica in the solum and substratum than those soils.

Louisa variant soils are near Enon, Grover, and Wedowee soils. Louisa variant soils have a thinner solum than those soils, and they do not have the continuous Bt horizon that is characteristic of those soils.

505D—Louisa loam, variant, 12 to 20 percent slopes. This soil is on short, complex side slopes.

Included with this soil in mapping were scattered small areas of Cullen, Enon, Louisburg, and Vance soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is used mainly for woodland. It is suited to pasture and woodland. Capability unit VIe–2; woodland group 4r1.

505F—Louisa loam, variant, 20 to 45 percent slopes. This soil is on short, complex side slopes and hillsides, generally along drainageways. It has the profile described as representative of the series.

Included with this soil in mapping were scattered small areas of Louisburg soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is used mainly for woodland. Capability unit VIIe–1; woodland group 4r1.

Louisburg Series

The Louisburg series consists of moderately deep, well drained to excessively drained, gently sloping to steep soils on Piedmont Uplands. These soils have a dominantly loamy subsoil. They formed in material weathered from granite and granite gneiss.

In a representative profile the surface layer is grayish brown and light yellowish brown sandy loam about 9 inches thick. The subsoil is yellowish brown, friable heavy sandy loam about 13 inches thick. It has small pockets of yellowish brown to yellowish red sandy clay loam. The substratum extends to a depth of 80 inches or more. It is weathered granite that crushes to sandy loam.

Unless limed, Louisburg soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is rapid, and available water capacity is low.

Representative profile of Louisburg sandy loam, 20 to 45 percent slopes, in Pocahontas State Forest, 1 mile east of Route 653 and 1 mile south of Route 651:

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

A2—2 to 9 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine granular structure; very friable; many fine and medium roots; common fine flakes of mica; very strongly acid; clear smooth boundary.

B2—9 to 22 inches; yellowish brown (10YR 5/4) heavy sandy loam; weak coarse subangular blocky and weak fine granular structure; friable; slightly sticky and slightly plastic; few fine and medium roots; common discontinuous pockets of yellowish brown (10YR 5/6) to yellowish red (5YR 5/6) sandy clay loam; common fine flakes of mica; about 5 percent by volume angular quartz pebbles as much as 5 millimeters in diameter very strongly acid; gradual smooth boundary.

C—22 to 80 inches; strong brown (7.5YR 5/6), brown (7.5YR 5/4), and yellowish brown (10YR 5/6) weathered granite that crushes with difficulty to sandy loam; rock controlled structure; few fine roots; common fine flakes of mica; very strongly acid.

The solum is 20 to 30 inches thick. Depth to bedrock ranges from 2 feet to more than 5 feet. The solum is less than 1 percent to about 30 percent, by volume, angular quartz and granite pebbles, cobbles, and stones in places. It has few to common fine flakes of mica throughout in places.

The A horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 2 to 4. The B horizon has hue of 10YR and 7.5YR, value of 4 and 5, and chroma of 4 to 8. It ranges from sandy loam and heavy sandy loam to gravelly sandy loam. Small pockets of yellowish brown to yellowish red sandy clay loam are in the lower part of the B horizon. The C horizon is weathered granite and granite gneiss that crushes to sandy loam.

Louisburg soils are similar to Louisa and Pinkston soils. Louisburg soils have less mica and silt than Louisa soils. They have less aluminum than Pinkston soils.

Louisburg soils are near Appling, Cecil, Grover, Louisa, and Wedowee soils. Louisburg soils have less clay than Appling, Cecil, Grover, and Wedowee soils. They do not have the continuous Bt horizon that is characteristic of those soils.

105C—Louisburg sandy loam, 4 to 12 percent slopes. This soil is on narrow, winding, convex ridgetops and on short, complex side slopes.

Included with this soil in mapping were scattered small areas of Cecil, Grover, Louisa, and Wedowee soils. Also included are small spots of soils that are less than 20 inches deep over bedrock and small spots of rock outcrop.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or clean tilled. The soil is droughty during the growing season.

This soil is used for corn, small grain, mixed hay, and pasture. It is poorly suited to cultivated crops because of droughtiness and the erosion hazard. It is better suited to small grain, mixed hay, pasture, and woodland. Capability unit IVe–2; woodland group 3o2.

105D—Louisburg sandy loam, 12 to 20 percent slopes. This soil is on short, complex side slopes.

Included with this soil in mapping were scattered small areas of Cecil, Grover, Louisa, and Wedowee soils. Also included were spots of soils that are less than 20 inches deep over bedrock and small spots of rock outcrop.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

Most areas of this soil are used for woodland, but small areas are in pasture. Capability unit VIe–2; woodland group 3r2.

105E—Louisburg sandy loam, 20 to 45 percent slopes. This soil is on short, complex side slopes and on hillsides, generally along drainageways. It has the profile described as representative of the series.

Included with this soil in mapping were scattered small areas of Louisa soils, small areas of soils that are less than 20 inches deep over bedrock, and small areas of rock outcrop.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is used mainly for woodland. Capability unit VIIe–1; woodland group 3r2.

Lucy Series

The Lucy series consists of deep, well drained, gently sloping and sloping soils on Coastal Plain uplands. These soils have a dominantly loamy subsoil. They formed in Coastal Plain sediment. The Lucy soils in this complex were mapped only with Orangeburg soils.

In a representative profile the surface layer and subsurface layer are dark gray and yellowish brown loamy sand about 26 inches thick. Brownish mottles are in the lower 8 inches. The subsoil is about 49 inches thick. It is yellowish red, friable sandy clay loam, sandy loam, and loamy sand. The substratum extends to a depth of 90 inches or more. It is strong brown, yellowish red, very pale brown, and brownish yellow loamy sand.

Unless limed, Lucy soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is low to medium.

Representative profile of Lucy loamy sand in an area of Lucy-Orangeburg loamy sands, 2 to 6 percent slopes, just north of Route 10, ½ mile east of interchange between Route 10 and Interstate 95:

A1—0 to 2 inches; dark gray (10YR 4/1) loamy sand; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and very fine roots; very strongly acid; clear smooth boundary.

A21—2 to 6 inches; yellowish brown (10YR 5/4) loamy sand; single grained; very friable, nonsticky and nonplastic; many fine and medium roots; very strongly acid; clear smooth boundary.

A22—6 to 18 inches; yellowish brown (10YR 5/6) loamy sand; single grained; slightly brittle; very friable, nonsticky and nonplastic; few medium and fine roots; many fine pores; few fine pale brown clean sand grains; very strongly acid; gradual smooth boundary.

A3—18 to 26 inches; yellowish brown (10YR 5/6) loamy sand; few fine distinct strong brown (7.5YR 5/6), dark brown (7.5YR 4/4), and very pale brown (10YR 7/3) mottles; single grained; slightly brittle, slightly compact, very friable, nonsticky and nonplastic; few fine and medium roots; many fine pores; very strongly acid; clear smooth boundary.

B2t—26 to 40 inches; yellowish red (5YR 4/6) light sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few pockets of clean sand grains; very strongly acid; gradual smooth boundary.

B31t—40 to 60 inches; yellowish red (5YR 4/8) sandy loam; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few thin clay films; strongly acid; gradual smooth boundary.

B32t—60 to 75 inches; yellowish red (5YR 5/8) loamy sand; single grained; very friable, nonsticky and nonplastic; sand grains are coated with clay; common clay bridging; some brownish yellow sand grains; strongly acid; diffuse smooth boundary.

C—75 to 90 inches; strong brown (7.5YR 5/6), yellowish red (5YR 5/6), very pale brown (10YR 7/4), and brownish yellow (10YR 6/6) loamy sand; single grained; very friable, nonsticky and nonplastic; strongly acid.

Depth to bedrock is more than 60 inches and the solum is more than 60 inches thick. The A horizon is 20 to 30 inches thick. It has hue of 10YR and 2.5Y, value of 4 to 5, and chroma of 1 to 6. The Bt horizon has hue of 5YR and 7.5YR, value of 4 to 8, and chroma of 6 to 8. It ranges from light sandy clay loam to loamy sand.

Lucy soils in this county have a higher base saturation and a thinner solum than is typical of the Lucy series. This difference, however, does not alter their use or management.

Lucy soils are similar to Orangeburg and Rumford soils. Lucy soils have a somewhat thinner solum and less clay than Orangeburg soils. They have a thicker solum and a redder subsoil than Runford soils.

Lucy soils are near Bourne, Faceville, Kempsville, Rumford, and Vaucluse soils. Lucy soils do not have the fragipan characteristic of Bourne and Vaucluse soils. They have less clay than Faceville soils. They have a thicker solum and a redder subsoil than Kempsville soils.

212B—Lucy-Orangeburg loamy sands, 2 to 6 percent slopes. This complex is on broad, convex ridgetops. Lucy soils and Orangeburg soils are intermingled in such an intricate pattern that it was not practical to map them separately. The Lucy soil has the profile described as representative of the series. The complex is about 45 percent Lucy soils, 40 percent Orangeburg soils, and 15 percent other soils.

Included with these soils in mapping were scattered small areas of Bourne, Faceville, Kempsville, and Rumford soils. Also included were small areas of soils that have slopes of less than 2 percent.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or are clean tilled. These soils are somewhat droughty during the growing season, and the thick surface layer dries out quickly during short, dry periods.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIs–1; woodland group 3s1.

212C—Lucy-Orangeburg loamy sands, 6 to 12 percent slopes. This complex is on moderately long to short side slopes. Lucy soils and Orangeburg soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Lucy soils, 40 percent Orangeburg soils, and 15 percent other soils.

Included with these soils in mapping were scattered small areas of Bourne, Faceville, Kempsville, and Rumford soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soils are disturbed and exposed or are clean tilled. These soils are somewhat droughty during the growing season, and the deep surface layer dries out quickly during short, dry periods.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIs–2; woodland group 3s1.

Made Land

15—Made land. Made land consists of areas where soil material has been removed or reworked by machinery. It is mostly cuts and fills, including borrow pits; industrial, commercial, and governmental complexes; and some subdivisions. Some fill areas consist of rubble, such as old building material and stumps, and uncontrolled fill of soil material. In other areas of Made land are major highway construction sites, both right-of-way and borrow areas outside the right-of-way; sand and gravel pits; and quarries.

In places cuts and excavations in areas of Made land are deep and extend into the underlying geologic material. These materials are either sandy, loamy, and clayey sediment; or they are bedrock and weathered bedrock formations.

The soil material in areas of Made land is variable and ranges from loamy sand to clay. Some areas are gravelly or very gravelly. Sediment production is medium to high on areas that do not have a vegetative cover.

Small areas of unworked soils within areas of Made land are commonly compacted and shaped to some extent, but otherwise they generally resemble soils of the immediate surrounding areas. Not assigned to a capability unit or woodland group.

Masada Series

The Masada series consists of deep, well drained, gently sloping and sloping soils on high terraces. These soils have a dominantly clayey subsoil. They formed in older

alluvium that is higher than and some distance from present flood plains.

In a representative profile the surface layer is dark grayish brown fine sandy loam about 10 inches thick. The subsoil is about 64 inches thick. The upper 8 inches is yellowish brown, friable clay loam; the next 37 inches is strong brown and yellowish red, firm clay; and the lower 19 inches is yellowish red, red, strong brown, and yellowish brown, firm clay. The substratum extends to a depth of 80 inches or more. It is light olive brown, yellowish brown, red, yellowish red, and strong brown very gravelly clay loam.

Unless limed, Masada soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Masada fine sandy loam, 2 to 6 percent slopes, south of U.S. Highway 60, ¾ mile east of the junction of U.S. Highway 60 and Route 607, in the Watkins Nursery:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 1 percent by volume rounded quartz pebbles, as much as 50 millimeters in diameter; strongly acid; clear smooth boundary.

B1t—10 to 18 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many worm holes and casts filled with material from Ap horizon; common fine and medium roots; about 1 percent by volume rounded quartz pebbles as much as 40 millimeters in diameter; strongly acid; gradual smooth boundary.

B21t—18 to 23 inches; strong brown (7.5YR 5/6) clay; weak medium subangular blocky structure; firm, sticky and slightly plastic; common fine and medium roots; few thin clay films; about 1 percent by volume rounded quartz pebbles as much as 40 millimeters in diameter; very strongly acid; gradual smooth boundary.

B22t—23 to 55 inches; yellowish red (5YR 4/6) clay; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular and angular blocky structure; firm, sticky and slightly plastic; few fine roots; many thin clay films; about 1 percent by volume rounded quartz pebbles as much as 40 millimeters in diameter; very strongly acid; gradual smooth boundary.

B23t—55 to 74 inches; mottled yellowish red (5YR 4/8), red (2.5YR 4/8), strong brown (7.5YR 5/8), and yellowish brown (10YR 5/8) clay; weak fine and medium subangular blocky structure; firm, sticky and slightly plastic; few fine roots; many thin clay films; about 1 percent by volume rounded quartz pebbles as much as 50 millimeters in diameter; very strongly acid; clear smooth boundary.

IIC—74 to 80 inches; mottled light olive brown (2.5Y 5/4), yellowish brown (10YR 5/6), red (2.5YR 5/6), yellowish red (5YR 4/6), and strong brown (7.5YR 5/6) very gravelly clay loam; massive; friable, sticky and slightly plastic; about 60 percent by volume rounded quartz pebbles as much as 50 millimeters in diameter; very strongly acid.

The solum is 40 to more than 80 inches thick. Depth to bedrock is more than 5 feet. Rounded quartz pebbles, as much as 50 millimeters in diameter, make up from about 1 percent to about 30 percent, by volume, of the solum and as much as 60 percent of the substratum.

The A horizon has hue of 10YR, value of 4 to 6, and chroma of 2 to 4. It is fine sandy loam, loam, or gravelly fine sandy loam. The Bt horizon has hue of 10YR, 7.5YR, and 5YR; value of 4 to 6; and chroma of 6 to 8. The lower part of the Bt horizon is commonly mottled in the same hue, value, and chroma. The C horizon is commonly mottled in olive brown, yellowish brown, red, yellowish red, and strong brown. It ranges from clay loam to very gravelly clay loam.

Masada soils are similar to Appling, Spotsylvania, and Vance soils. Masada soils have mixed mineralogy, whereas Appling and Spotsylvania soils have kaolinitic mineralogy. They do not have the very firm, sticky and plastic Bt horizon that is characteristic of Vance soils.

Masada soils are near Appling, Augusta, Cecil, Faceville, Norfolk, Tetotum, and Turbeville soils. Masada soils are better drained than Augusta soils. They have a yellower Bt horizon than Cecil, Faceville, and Turbeville soils. They have more clay in the subsoil than Norfolk and Tetotum soils, and they are better drained than Tetotum soils.

106B—Masada fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series. In some areas, however, the surface layer is gravelly fine sandy loam and in some areas where the soil is moderately eroded, the surface layer is only 4 to 6 inches thick.

Included with these soils in mapping were scattered small areas of Turbeville and Varina soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–5; woodland group 3o1.

106C—Masada fine sandy loam, 6 to 12 percent slopes. This soil is on moderately long, slightly convex side slopes. In some areas the surface layer is gravelly fine sandy loam, and in some areas where the soil is moderately eroded, the surface layer is only 4 to 6 inches thick.

Included with these soils in mapping were scattered small areas of Turbeville soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–6; woodland group 3o1.

103B—Masada gravelly fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. The surface layer is 15 to 25 percent, by volume, rounded quartz pebbles. In some areas the surface layer is fine sandy loam, and in some areas where the soil is moderately eroded, it is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Edgehill, Turbeville, and Varina soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–5; woodland group 3o1.

103C—Masada gravelly fine sandy loam, 6 to 12 percent slopes. This soil is on moderately long, slightly convex side slopes. The surface layer is 15 to 25 percent, by volume, rounded quartz pebbles. In some areas, it is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Edgehill and Turbeville soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, pas-

ture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe-6; woodland group 3o1.

117B—Masada loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Craven, Faceville, and Kempsville soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe-5; woodland group 3o1.

117C—Masada loam, 6 to 12 percent slopes. This soil is on moderately long, slightly convex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Faceville, Gritney, and Kempsville soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe-6; woodland group 3o1.

Mayodan Series

The Mayodan series consists of deep, well drained, gently sloping to steep soils on Piedmont Uplands. These soils have a dominantly clayey subsoil. They formed in material weathered from Triassic sandstone and shale.

In a representative profile the surface layer is dark gray, light yellowish brown, and brownish yellow sandy loam about 12 inches thick. The subsoil is about 32 inches thick. The upper 4 inches is yellowish brown, friable sandy clay loam; the next 19 inches is strong brown, firm clay that has yellowish red and red mottles; and the lower 9 inches is yellowish brown, strong brown, yellowish red, and red, firm clay. The substratum extends to a depth of 70 inches or more. It is yellowish brown, strong brown, yellowish red, red, and gray clay.

Unless limed, Mayodan soils are very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Mayodan sandy loam, clayey substratum, 2 to 6 percent slopes, 200 feet west and 200 feet south of Route 754, 1 mile north of Route 604:

A1—0 to 2 inches; dark gray (10YR 4/1) sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many medium and fine roots; very strongly acid; abrupt smooth boundary.

A2—2 to 9 inches; light yellowish brown (2.5Y 6/4) sandy loam; weak fine granular structure; very friable, slightly sticky and nonplastic; few medium roots; common fine pores; about 2 percent by volume angular quartz pebbles as much as 5 millimeters in diameter; very strongly acid; clear smooth boundary.

A3—9 to 12 inches; brownish yellow (10YR 6/8) heavy sandy loam; weak medium subangular blocky structure parting to weak fine granular; friable, slightly sticky and slightly plastic; about 5 percent by volume angular quartz pebbles as much as 25 millimeters in diameter; common fine pores; very strongly acid; clear smooth boundary.

B1t—12 to 16 inches; yellowish brown (10YR 5/8) heavy sandy clay loam; weak medium and fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin patchy clay films; about 5 percent by volume angular quartz pebbles as much as 25 millimeters in diameter; very strongly acid; clear smooth boundary.

B21t—16 to 24 inches; strong brown (7.5YR 5/6) clay; few fine distinct yellowish red (5YR 5/6) mottles; moderate to strong medium and fine subangular blocky structure; firm, sticky and plastic; few medium roots; thin continuous clay films; very strongly acid; gradual smooth boundary.

B22t—24 to 35 inches; strong brown (7.5YR 5/8) clay; many medium distinct yellowish red (5YR 5/8) mottles and few fine distinct red (2.5YR 4/8) mottles; moderate medium and fine angular blocky and subangular blocky structure; firm, sticky and plastic; few fine roots; thin continuous clay films; few fine flakes of mica; very strongly acid; gradual smooth boundary.

B3t—35 to 44 inches; mottled; yellowish brown (10YR 5/8), strong brown (7.5YR 5/8), yellowish red (5YR 5/8), and red (2.5YR 4/8) clay; moderate medium angular blocky structure; firm, sticky and plastic; few fine roots; thin continuous clay films; few fine flakes of mica; few fine distinct light gray (10YR 7/2) mottles in lower part; very strongly acid; gradual smooth boundary.

C—44 to 70 inches; mottled and streaked yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), yellowish red (5YR 4/6), red (2.5YR 4/6), and gray (10YR 5 1) clay; massive; very firm, sticky and plastic; many fine flakes of mica; common strongly weathered shale fragments; very strongly acid.

The solum is 30 to 60 inches thick. Depth to bedrock is more than 5 feet. Angular and rounded quartz pebbles, as much as 75 millimeters in diameter, make up from about 2 percent to about 60 percent, by volume, of the surface layer, and from about 3 percent to about 30 percent, by volume, of the subsoil.

The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 1 to 8. It is sandy loam, gravelly sandy loam, and very gravelly sandy loam. The B2t horizon has hue of 7.5YR and 5YR, value of 4 to 6, and chroma of 6 to 8. Red mottles are in the lower part of the B2t horizon in many places. The B3t horizon is commonly mottled in hue of 10YR, 7.5YR, 5YR, and 2.5YR; value of 4 to 6; and chroma of 6 to 8. A few light gray or gray mottles are in the lower part of the B3t horizon in many places. The B3t horizon is clay to heavy clay loam. The C horizon is mottled with yellowish brown, strong brown, yellowish red, red, and gray. It is commonly clay.

Mayodan soils are similar to Appling, Cullen, Faceville, Vance, and Wedowee soils. Mayodan soils have less exchangeable aluminum in the lower part of the Bt horizon than Appling and Wedowee soils. They have a yellower subsoil than Cullen and Faceville soils and have a thinner solum than Faceville soils. They do not have the very firm and sticky lower part of the Bt horizon that is characteristic of Vance soils.

Mayodan soils are near Bourne, Colfax, Creedmoor, Edgehill, Pinkston, and Worsham soils. Mayodan soils do not have the fragipan characteristic of Bourne and Colfax soils. They do not have the very firm and plastic lower part of the Bt horizon that is characteristic of Creedmoor soils. They are less than 35 percent, by volume, quartz pebbles in the upper part of the Bt horizon, whereas Edgehill soils are more than 35 percent quartz pebbles in this horizon. They have more clay and a continuous Bt horizon, which Pinkston soils do not have. They are better drained than Worhsam soils.

59B—Mayodan sandy loam, clayey substratum, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 6 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Bourne and Creedmoor soils.

Runoff is medium. The hazard of erosion is moderate

where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–5; woodland group 3o1.

59C—Mayodan sandy loam, clayey substratum, 6 to 12 percent slopes. This soil is on moderately long to short, slightly convex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Bourne and Creedmoor soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–6; woodland group 3o1.

59D—Mayodan sandy loam, clayey substratum, 12 to 20 percent slopes. This soil is on short, complex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Creedmore and Pinkston soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or is clean tilled. The soil is somewhat droughty during the growing season.

This soil is poorly suited to cultivated crops because of the erosion hazard, slope, and droughtiness. It is better suited to small grain, mixed hay, pasture, and woodland. Capability unit IVe–1; woodland group 3r1.

151B—Mayodan gravelly sandy loam, clayey substratum, 2 to 6 percent slopes. This soil is on broad, slightly convex ridgetops. The surface layer is 20 to 35 percent, by volume, angular and rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Colfax, and Creedmoor soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIe–5; woodland group 3o1.

151C—Mayodan gravelly sandy loam, clayey substratum, 6 to 12 percent slopes. This soil is on moderately long to short, slightly convex side slopes. The surface layer is 20 to 35 percent, by volume, angular and rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Colfax, and Creedmoor soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–6; woodland group 3o1.

151D—Mayodan gravelly sandy loam, clayey substratum, 12 to 20 percent slopes. This soil is on short, complex side slopes. The surface layer is 20 to 35 percent, by volume, angular and rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Creedmor and Pinkston soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles to dull and damage plowshares. The soil is somewhat droughty during the growing season.

The soil is poorly suited to cultivated crops because of the erosion hazard, slope, and droughtiness. It is better suited to small grain, mixed hay, pasture, and woodland. Capability unit IVe–1; woodland group 3r1.

201B—Mayodan, clayey substratum-Creedmoor sandy loams, 2 to 6 percent slopes. This complex is on broad, convex ridgetops. Mayodan and Creedmoor soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 40 percent Mayodan soils, 35 percent Creedmoor soils, and 25 percent other soils. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this complex in mapping were scattered small areas of Bourne, Colfax, and Pinkston soils.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or are clean tilled. Creedmoor soils have a seasonal high water table at a depth of 1 foot to 2 feet during wet periods.

This complex is used mainly for woodland. If adequately limed and fertilized, it is suited to most locally grown crops. Alfalfa is usually short lived on Creedmoor soils because of excess wetness. Capability unit IIe–2; woodland group 3o1.

201C—Mayodan, clayey substratum-Creedmoor sandy loams, 6 to 12 percent slopes. This complex is on short to moderately long, complex side slopes. Mayodan and Creedmoor soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 40 percent Mayodan soils, 30 percent Creedmoor soils, and 30 percent other soils. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this complex in mapping were scattered small areas of Bourne, Colfax, and Pinkston soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soils are disturbed and exposed or clean tilled. Creedmoor soils have a seasonal high water table at a depth of 1 foot to 2 feet during wet periods.

This complex is used mainly for woodland. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Alfalfa is usually short lived on Creedmoor soils because of excess wetness. Capability unit IIIe–4; woodland group 3o1.

201D—Mayodan, clayey substratum-Creedmoor sandy loams, 12 to 20 percent slopes. This complex is on short, complex side slopes. Mayodan and Creedmoor soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 40 percent Mayodan soils, 30 percent Creedmoor soils, and 30 percent other soils. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this complex in mapping were scattered small areas of Edgehill and Pinkston soils.

Runoff is rapid. The hazard of erosion is very severe where the soils are disturbed and exposed or clean tilled. Creedmoor soils have a seasonal high water table at a depth of 1 foot to 2 feet during wet periods. The soils are somewhat droughty during the growing season.

This complex is used mainly for woodland. It is poorly suited to cultivated crops because of the erosion hazard, slope, and droughtiness. It is better suited to small grain, mixed hay, and pasture. Capability unit IVe–4; woodland group 3r1.

251C—Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 2 to 12 percent slopes. This complex is on narrow, convex ridgetops and on short, complex side slopes. Mayodan, Creedmoor, and Edgehill soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 35 percent Mayodan soils, 30 percent Creedmoor soils, 25 percent Edgehill soils, and 10 percent other soils. The surface layer of these soils is more than 50 percent, by volume, rounded and angular quartz pebbles.

Included with this complex in mapping were scattered small areas of Masada, Pinkston, and Turbeville soils.

Runoff is medium to rapid. The hazard of erosion is very severe where the soils are disturbed and exposed or are clean tilled. Creedmoor soils have a seasonal high water table at a depth of 1 foot to 2 feet during wet periods. The surface layer of these soils contains enough pebbles to dull and damage plowshares. The soils are droughty during the growing season.

This complex is used mainly for woodland. It is poorly suited to cultivated crops because of the erosion hazard, pebbles, and droughtiness. It is better suited to mixed hay, pasture, and woodland. Capability unit IVe–4; woodland group 3o1.

251D—Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 12 to 20 percent slopes. This complex is on short, complex side slopes. Mayodan, Creedmoor, and Edgehill soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 35 percent Mayodan soils, 30 percent Creedmoor soils, 25 percent Edgehill soils, and 10 percent other soils. The surface layer of these soils is more than 50 percent, by volume, rounded and angular quartz pebbles.

Included with this complex in mapping were scattered small areas of Masada, Pinkston, and Turbeville soils.

Runoff is rapid. The hazard of erosion is very severe where the soils are disturbed and exposed. Creedmoor soils have a seasonal high water table at a depth of 1 foot to 2 feet during wet periods. The soils are droughty during the growing season.

This complex is used mainly for woodland. It is best suited to pasture, woodland, and wildlife. Capability unit VIe–1; woodland group 3r1.

251F—Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 20 to 40 percent slopes. This complex is on short, complex side slopes and on hillsides generally along drainageways. Mayodan, Creedmoor, and Edgehill soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 30 percent Mayodan soils, 25 percent Creedmoor soils, 25 percent Edgehill soils, and 20 percent other soils. The surface layer of these soils is more than 50 percent, by volume, rounded and angular quartz pebbles.

Included with this complex in mapping were scattered small areas of Pinkston and Wedowee soils.

Runoff is rapid. The hazard of erosion is very severe where the soils are disturbed and exposed. Creedmoor soils have a seasonal high water table at a depth of 1 foot to 2 feet during wet periods. The soils are droughty during the growing season.

This complex is used mainly for woodland and wildlife. Capability unit VIIe–1; woodland group 3r1.

201F—Mayodan, clayey substratum-Pinkston sandy loams, 20 to 45 percent slopes. This complex is on short, complex side slopes and on hillsides generally along drainageways. Mayodan and Pinkston soils are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 45 percent Mayodan soils, 40 percent Pinkston soils, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Creedmoor, Edgehill, and Wedowee soils.

Runoff is rapid. The hazard of erosion is very severe where the soils are disturbed and exposed. The soils are droughty during the growing season.

This complex is used mainly for woodland and wildlife. Capability unit VIIe–1; woodland group 3r1.

Molena Series

The Molena series consists of deep, somewhat excessively drained, gently sloping soils. These soils have a dominantly sandy subsoil. They formed in sandy alluvium on terraces along the larger streams of the county.

In a representative profile the surface layer is dark brown loamy sand about 11 inches thick. The subsoil extends to a depth of 72 inches. It is brown and strong brown, loose loamy sand.

Unless limed, Molena soils are strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is rapid in the subsoil, and available water capacity is low.

Representative profile of Molena loamy sand, 2 to 6 percent slopes, near small field used for wildlife refuge, 700 feet east of where Appomattox River bends to the south, 3,200 feet northeast of Bevils Bridge:

Ap1—0 to 5 inches; dark brown (7.5YR 3/2) loamy sand; weak fine granular structure; loose; many fine roots, few medium roots; strongly acid; gradual wavy boundary.

Ap2—5 to 11 inches; dark brown (7.5YR 3/2) loamy sand; common coarse distinct dark brown (10YR 3/3) mottles; weak fine granular structure; loose; common fine roots, few medium roots; strongly acid; abrupt smooth boundary.

B1—11 to 22 inches; brown (7.5YR 4/4) loamy sand; single grained; loose; few medium roots; strongly acid; diffuse smooth boundary.

B2t—22 to 72 inches; strong brown (7.5YR 5/8) loamy sand; moderate medium granular structure; few medium roots; sand grains coated and bridged with clay; very strongly acid.

The solum is more than 40 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 10YR and 7.5YR, value of 3 and 4, and chroma of 2 to 4. The B horizon has hue of 7.5YR, 10YR, and 5YR; value of 4 and 5; and chroma of 4 to 8. It is commonly loamy sand but ranges to loamy fine sand. The C horizon is commonly sand or sand and gravel.

Molena soils are similar to Buncombe and Rumford soils. Molena soils have a Bt horizon which Buncombe soils do not have. They have more sand and less silt and clay than Rum-

ford soils.

Molena soils are near Buncombe, Chastain, Chewacla, Dogue, Forestdale, Lenoir, Pamunkey, and Toccoa soils. Molena soils are more excessively drained and have less silt and clay than Chastain, Chewacla, Dogue, Forestdale, Lenoir, Pamunkey, and Toccoa soils.

53B—Molena loamy sand, 2 to 6 percent slopes. This soil is on broad, slightly convex terraces along the larger streams of the county.

Included with this soil in mapping were scattered small areas of Bourne and Pamunkey soils.

Runoff is slow to medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. The soil is droughty.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIs–1; woodland group 3s1.

Norfolk Series

The Norfolk series consists of deep, well drained, nearly level and gently sloping soils on Coastal Plain uplands. These soils have a loamy and clayey subsoil. They formed in Coastal Plain sediment.

In a representative profile the surface layer is dark grayish brown, grayish brown, and brown fine sandy loam about 11 inches thick. The subsoil is about 79 inches thick. The upper 20 inches is yellowish brown, friable sandy clay loam that is mottled with strong brown; the next 16 inches is yellowish brown, firm clay that is mottled with yellowish red, strong brown, and pale brown; and the lower 43 inches is red, strong brown, yellowish red, yellowish brown, and gray, firm clay. The substratum extends to a depth of 107 inches or more. It is strong brown sandy loam that is mottled with yellowish red, reddish yellow, yellowish brown, and light gray.

Unless limed, Norfolk soils are very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and the available water capacity is medium.

Representative profile of Norfolk fine sandy loam, 0 to 6 percent slopes, on edge of the Southside Nursery, ¼ mile west of Route 145, 1/3 mile south of Route 611:

O1—1 inch to 0; fresh and partly decomposed pine needles and black organic matter.

Ap1—0 to 1 inch; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

Ap2—1 inch to 8 inches; grayish brown (2.5Y 5/2) fine sandy loam; weak fine granular structure; very friable; few fine and medium roots; very strongly acid; abrupt smooth boundary.

A2—8 to 11 inches; brown (10YR 5/3) fine sandy loam; few fine faint yellowish brown (10YR 5/4) and pale brown (10YR 6/3) mottles; weak fine granular structure; very friable; few fine and medium roots; few fine and medium pores; very strongly acid; clear smooth boundary.

B1t—11 to 16 inches; yellowish brown (10YR 5/6) light sandy clay loam; few fine faint strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; common fine and medium pores; very strongly acid; clear smooth boundary.

B21t—16 to 31 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine faint strong brown (7.5YR 5/6) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few medium and fine pores; thin patchy clay films; very strongly acid; clear smooth boundary.

B22t—31 to 47 inches; yellowish brown (10YR 5/6) clay; common medium distinct yellowish red (5YR 4/6) mottles and common medium faint strong brown (7.5YR 5/6) and pale brown (10YR 6/3) mottles; moderate medium and fine subangular and angular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; few fine pores; thin continuous clay films; very strongly acid; clear smooth boundary.

B23t—47 to 70 inches; red (2.5YR 4/6), strong brown (7.5YR 5/6), yellowish red (5YR 5/6), yellowish brown (10YR 5/8), and gray (10YR 6/1) clay; strong fine angular blocky structure, tendency toward thick platy structure; firm, slightly sticky and slightly plastic; thin continuous clay films; very strongly acid; gradual smooth boundary.

B3t—70 to 90 inches; red (2.5YR 4/6), strong brown (7.5YR 5/6), yellowish red (5YR 5/6), yellowish brown (10YR 5/6), and gray (10YR 6/1) clay; weak coarse subangular blocky structure; firm, sticky and plastic; thick clay films; very strongly acid; gradual smooth boundary.

IIC—90 to 107 inches; strong brown (7.5YR 5/6) sandy loam; common medium distinct yellowish red, reddish yellow, yellowish brown, and light gray mottles; massive; few thin lenses of clay; very strongly acid.

The solum is more than 60 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 2 to 4. The upper part of the Bt horizon has hue of 10YR and 7.5YR, value of 4 and 5, and chroma of 6 to 8. It is commonly sandy clay loam but ranges to clay loam. The lower part of the Bt horizon is commonly variegated or mottled in red, strong brown, yellowish red, yellowish brown, and gray. It is commonly clay but ranges to heavy clay loam. The C horizon ranges from sandy loam and gravelly sandy loam to clay.

Norfolk soils in this county have more clay in the lower part of the Bt horizon than is typical of the Norfolk series. This difference, however, does not alter their use or management.

Norfolk soils are similar to Atlee, Faceville, Orangeburg, and Varina soils. Norfolk soils do not have the brittle and compact layer in the upper part of the subsoil that is characteristic of Atlee soils, and they are better drained than those soils. They have less clay in the upper part of the Bt horizon than Faceville and Varina soils. They have more clay in the lower part of the Bt horizon than Orangeburg soils, and they have a yellower solum than those soils.

Norfolk soils are near Bourne, Craven, Dunbar, Faceville, Gritney, Kempsville, Masada, and Tetotum soils. Norfolk soils do not have the fragipan that is characteristic of Bourne soils. They have less clay in the upper part of the Bt horizon and are better drained than Craven and Dunbar soils. They have less clay in the upper part of the Bt horizon than Gritney and Masada soils. They have more clay in the lower part of the Bt horizon than Kempsville and Tetotum soils, and they are better drained than the Tetotum soils.

70B—Norfolk fine sandy loam, 0 to 6 percent slopes. This soil is on broad, slightly convex ridgetops.

Included with this soil in mapping were scattered small areas of Bourne, Faceville, Kempsville, and Tetotum soils.

Runoff is slow to medium. The hazard of erosion is moderate where the soil is disturbed and exposed or clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 2o1.

Ochrepts and Udults

Ochrepts and Udults formed in interbedded layers of sandy, loamy, clayey, and gravelly Coastal Plain sediment. They are sloping to steep. They are along the larger, more deeply incised drainageways and between

uplands and flood plains and terraces along the larger streams.

The surface layer mainly ranges from loamy sand to clay. In places it is gravelly to very gravelly. The surface layer ranges from gray, pale brown, and brown, to yellowish red. The subsoil and substratum mainly range from sand to clay, and in some places they are gravelly to very gravelly. They are gray to red, and many of the loamy and clayey subsoils and substrata are mottled with gray. Springs and seepage areas are common, especially along the lower parts of the stronger slopes.

Ochrepts and Udults are moderately well drained to excessively drained. The subsoil and substratum are commonly strongly acid to extremely acid, but they range to medium acid on some lower parts of slopes in the landscape that are influenced by marl. Permeability ranges from moderately rapid to moderately slow, and available water capacity ranges from low to medium.

172D—Ochrepts and Udults, sloping. These soils are on narrow, winding, convex ridgetops and on short to moderately long, complex side slopes. Ochrepts make up about 45 percent of the total acreage of this unit, and Udults make up about 40 percent. They occur either together or separately. Slopes are dominantly 6 to 12 percent.

Included with this soil in mapping were scattered small areas of Bourne, Craven, Edgehill, Gritney, Kempsville, Orangeburg, Rumford, and Spotsylvania soils. Also included were small areas of Ochrepts and Udults that have slopes of less than 6 percent. These inclusions make up about 15 percent of this unit.

Runoff is medium to rapid. The hazard of erosion is very severe where the soils are disturbed and exposed or are clean tilled.

These soils are used mainly for woodland, but small areas are in corn, small grain, mixed hay, and pasture. They are poorly suited to cultivated crops. Capability unit IVe–1; woodland group 2o1.

172E—Ochrepts and Udults, strongly sloping. These soils are on short to moderately long, complex side slopes. Ochrepts make up about 45 percent of the total acreage of this unit, and Udults make up about 40 percent. They occur together or separately. Slopes are dominantly 12 to 20 percent.

Included with this soil in mapping were scattered small areas of Creedmoor, Edgehill, and Mayodan soils. These inclusions make up about 15 percent of this unit.

Runoff is rapid. The hazard of erosion is very severe where the soils are disturbed and exposed. The soils are somewhat droughty during the growing season.

These soils are used mainly for woodland and wildlife. Capability unit VIe–1; woodland group 2r1.

172F—Ochrepts and Udults, steep. These soils are on short to moderately long, complex side slopes and hillsides, generally along drainageways. Ochrepts make up about 50 percent of the total acreage of this unit, and Udults make up about 40 percent. They occur together or separately. Slopes are dominantly 20 to 35 percent.

Included with these soils in mapping were scattered small areas of Creedmoor, Edgehill, and Mayodan soils. Also included were small areas of Ochrepts and Udults that have slopes of more than 35 percent. These inclusions make up about 10 percent of this unit.

Runoff is rapid. The hazard of erosion is very severe where the soils are disturbed and exposed. The soils are droughty during the growing season.

These soils are used mainly for woodland and wildlife. Capability unit VIIe–1; woodland group 2r1.

Orange Series

The Orange series consists of deep, somewhat poorly drained to moderately well drained, gently sloping and sloping soils. These soils have a dominantly clayey subsoil. They formed in material weathered from greenstone schist and hornblende gneiss.

In a representative profile the surface layer is brown sandy loam about 8 inches thick. The subsoil is about 21 inches thick. It is yellowish red and yellowish brown, very firm clay that is mottled with grayish brown, olive, gray, light brownish gray, light olive brown, and light yellowish brown. The substratum is 12 inches thick. It is strongly weathered greenstone schist that crushes easily to silty clay loam. Hard greenstone schist is at a depth of about 41 inches.

Unless limed, Orange soils are strongly acid to neutral. These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium. A seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods.

Representative profile of Orange sandy loam, 2 to 6 percent slopes, just southwest of Route 603, 1 mile southeast of Powhatan County boundary:

Ap—0 to 8 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; very friable, slightly sticky and nonplastic; common coarse and medium roots; few fine weathered oxide concretions in lower part; about 5 percent by volume angular quartz pebbles as much as 10 millimeters in diameter; very strongly acid; abrupt smooth boundary.

B21t—8 to 15 inches; yellowish red (5YR 5/6) clay; common medium distinct grayish brown (2.5Y 5/2) and olive (5Y 5/3) mottles and few fine distinct gray (5Y 6/1) mottles; moderate fine and medium angular blocky structure; very firm, sticky and very plastic; few fine roots; few thin clay films; very strongly acid; clear smooth boundary.

B22t—15 to 25 inches; yellowish brown (10YR 5/6) clay; common medium distinct light brownish gray (10YR 6/2) and olive gray (5Y 5/2) mottles; moderate fine and medium angular blocky structure; very firm, sticky and very plastic; few thin clay films; very strongly acid; clear smooth boundary.

B3t—25 to 29 inches; yellowish brown (10YR 5/6) clay; many medium distinct light olive brown (2.5Y 5/4) and light yellowish brown (2.5Y 6/4) mottles; weak coarse angular blocky structure; very firm, sticky and very plastic; few slickensides; strongly acid; abrupt irregular boundary.

C—29 to 41 inches; light olive brown (2.5Y 5/4) strongly weathered greenstone schist that crushes easily to silty clay loam; massive; firm, sticky and slightly plastic; neutral.

R—41 inches; greenstone schist.

The solum is 20 to 36 inches thick. Depth to bedrock is 3½ to 5 feet. The solum and substratum are less than 1 percent to about 5 percent, by volume, angular quartz pebbles, as much as 50 millimeters in diameter.

The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 1 to 4. The B horizon has hue of 5YR, 7.5YR, and 10YR; value of 4 to 6; and chroma of 6 to 8. Both low- and high-chroma mottles are common in the B horizon. The C horizon is commonly strongly weathered greenstone schist or hornblende gneiss that crushes to silty clay loam, clay loam, or loam.

Orange soils in this county have redder hues in the upper part of the B2t horizon and are more acid in the lower part of the solum than is typical of the Orange series. This difference, however, does not alter their use or management.

Orange soils are similar to Creedmoor, Enon, and Vance soils. Orange soils have less exchangeable aluminum than Creedmoor soils, and they have montmorillonitic mineralogy, whereas Creedmoor soils have mixed mineralogy. They are less well drained than Enon and Vance soils.

Orange soils are near Appling, Cullen, Enon, Louisburg, Vance, and Worsham soils. Orange soils are less well drained than Appling and Cullen soils. They have more clay and are less well drained than Louisburg soils. They are not so poorly drained as Worsham soils.

48B—Orange sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops and toe slopes and in convex saddle positions. This soil has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Cullen, Enon, Vance, and Worsham soils.

Runoff is medium. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tiled. A seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods, and drainage is desirable if the soil is cultivated.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops except deep rooted crops and crops that are sensitive to excess moisture. Capability unit IIIe–4; woodland group 4w1.

48C—Orange sandy loam, 6 to 12 percent slopes. This soil is on short complex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Cullen, Enon, Vance, and Worsham soils.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or clean tilled. A seasonal high water table is at a depth of 1 foot to 1½ feet during wet periods.

This soil is poorly suited to cultivated crops because of the slope and erosion hazard. It is better suited to mixed hay and pasture. Capability unit IVe–4; woodland group 4w1.

Orangeburg Series

The Orangeburg series consists of deep, well drained, gently sloping and sloping soils on Coastal Plain uplands. These soils have a dominantly loamy subsoil. They formed in Coastal Plain sediment. Orangeburg soils in this county were mapped only with Faceville soils and with Lucy soils.

In a representative profile the surface layer is grayish brown and light olive brown sandy loam about 16 inches thick. The subsoil extends to a depth of 100 inches or more. The upper 51 inches is yellowish brown, strong brown, and yellowish red, friable sandy clay loam. The lower 33 inches is red, reddish brown, and yellowish brown, friable sandy clay loam.

Unless limed, Orangeburg soils are very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and the available water capacity is medium.

Representative profile of Orangeburg sandy loam in an area of Orangeburg-Faceville sandy loams, 2 to 6 percent slopes, just east of Route 669, ¾ mile north of the junction of Routes 669 and 602:

Ap—0 to 12 inches; grayish brown (10YR 5/2) sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine roots; very strongly acid; abrupt smooth boundary.

A2—12 to 16 inches; light olive brown (2.5Y 5/4) sandy loam; common medium distinct pale brown (10YR 6/3) mottles; weak fine granular structure; friable, nonsticky and nonplastic; common fine pores; common fine roots; very strongly acid; clear smooth boundary.

B1t—16 to 24 inches; yellowish brown (10YR 5/4) sandy clay loam; common fine faint pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; very strongly acid; gradual smooth boundary.

B21t—24 to 43 inches; strong brown (7.5YR 5/6) heavy sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plasitc; common fine roots; many fine pores; few thin clay films; very strongly acid; diffuse smooth boundary.

B22t—43 to 67 inches; yellowish red (5YR 5/6) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; many fine pores; few thin clay films; about 1 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; very strongly acid; clear smooth boundary.

B23t—67 to 100 inches; red (2.5YR 4/6), reddish brown (2.5YR 4/4), and yellowish brown (10YR 5/6) sandy clay loam; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; about 1 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; very strongly acid.

The solum is 60 to 100 inches or more thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 10YR and 2.5Y, value of 5 and 6, and chroma of 2 to 4. It is sandy loam and loamy sand. The B1t horizon has hue of 10YR and 7.5YR, value of 5 and 6, and chroma of 4 to 8. The B2t horizon has hue of 7.5YR, 5YR, and 2.5YR; value of 4 and 5; and chroma of 4 to 8. The Bt horizon is commonly sandy clay loam but ranges to light clay loam and heavy sandy loam.

Orangeburg soils in this county have high chroma mottles in the B1t horizon and a hue of 7.5YR in the B2t horizon, which is not typical of the Orangeburg series. This difference, however, does not alter their use or management.

Orangeburg soils are similar to Faceville, Norfolk, Rumford, and Vaucluse soils. Orangeburg soils have less clay than Faceville soils. They have a redder subsoil than Norfolk and Rumford soils, and they have a thicker solum than the Rumford soils. They do not have the fragipan that is characteristic of Vaucluse soils.

Orangeburg soils are near Faceville, Kempsville, Lucy, Norfolk, Rumford, and Vaucluse soils. Orangeburg soils have a redder subsoil and a thicker solum than Kempsville soils. They have more clay in the subsoil than Lucy soils.

112B—Orangeburg-Faceville sandy loams, 2 to 6 percent slopes. This complex consists of Orangeburg and Faceville soils that are intermingled in such an intricate pattern that it was not practical to map them separately. The Orangeburg soil has the profile described as representative of the series. The complex is about 50 percent Orangeburg soils, 35 percent Faceville soils, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Bourne, Kempsville, and Norfolk soils.

Runoff is medium. The hazard of erosion is moderate where the soils are disturbed and exposed or are clean tilled.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized,

it is suited to most locally grown crops. Capability unit IIe–1; woodland group 2o1.

112C—Orangeburg-Faceville sandy loams, 6 to 12 percent slopes. This complex consists of Orangeburg and Faceville soils that are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 50 percent Orangeburg soils, 35 percent Faceville soils, and 15 percent other soils.

Included with this complex in mapping were scattered small areas of Bourne, Kempsville, and Norfolk soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soils are disturbed and exposed or clean tilled.

This complex is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 2o1.

Orthents

16—Orthents-Udults-Mine pits complex. This complex is in the Triassic Basin, near the communities of Midlothian and Winterpock. It is in the western part of the county where coal seams occur in the sandstone and shale. It consists of mine pits and shafts, mounds of mine spoil, and soils that are intermingled in such an intricate pattern that it was not practical to map them separately. The complex is about 36 percent Orthents, 35 percent Udults, and 29 percent Mine pits and associated mine spoils. Colfax, Creedmoor, Mayodan, and Pinkston, and other soils are in this complex. Slopes range from about 2 percent to about 25 percent.

Runoff ranges from slow to rapid. This complex is strongly acid to extremely acid. Permeability is moderate to very slow. The hazard of erosion is severe where the complex is disturbed and exposed. Old mine shafts and tunnels are commonly filled with water and constitute a hazard to use.

Most areas of this complex are wooded. Not assigned to a capability unit or woodland group.

Pamunkey Series

The Pamunkey series are deep, well drained, nearly level to moderately steep soils. These soils have a dominantly loamy subsoil. They formed in alluvium on terraces along the larger streams of the county.

In a representative profile the surface layer is dark brown loam about 14 inches thick. The subsoil is about 44 inches thick. The upper 36 inches is yellowish red, friable clay loam and loam; and the lower 8 inches is yellowish red and strong brown, friable fine sandy loam. The substratum extends to a depth of 108 inches or more. It is yellowish red and black loamy fine sand.

Unless limed, Pamunkey soils are slightly acid to strongly acid. These soils are medium in organic-matter content and medium in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Pamunkey loam, 0 to 6 percent slopes, in a cultivated field on Presque Island Farm, Bermuda Hundred, 125 feet north of old railroad bed and 500 yards west of James River:

Ap—0 to 14 inches; dark brown (7.5YR 4/4) loam; moderate fine granular structure; very friable; many fine roots; about 1 percent by volume rounded quartz pebbles and cobbles; neutral; clear smooth boundary.

B21t—14 to 29 inches; yellowish red (5YR 5/6) light clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; thin patchy clay films; about 2 percent by volume rounded quartz pebbles and cobbles; many thin black films and fine oxide concretions; few fine flakes of mica; slightly acid; gradual smooth boundary.

B22t—29 to 50 inches; yellowish red (5YR 5/6) loam; weak fine subangular blocky and weak coarse angular blocky structure; friable, slightly sticky and slightly plastic; many fine pores; few thin clay films; about 4 percent by volume rounded quartz pebbles and cobbles; few thin black films; many fine flakes of mica; medium acid; gradual smooth boundary.

B3t—50 to 58 inches; yellowish red (5YR 4/6) and strong brown (7.5YR 5/6) fine sandy loam; weak coarse subangular blocky structure; very friable, slightly sticky and slightly plastic; few fine roots, common fine pores; few thin clay films; many fine flakes of mica; strongly acid; gradual smooth boundary.

C—58 to 108 inches; yellowish red (5YR 5/6) and black (10YR 2/1) loamy fine sand; single grained; very friable, nonsticky and nonplastic; many fine flakes of mica; many fine black oxide concretions; strongly acid.

The solum is 40 to more than 60 inches thick. Depth to bedrock is more than 5 feet. The solum is about 1 percent to about 15 percent, by volume, rounded quartz pebbles and rounded cobbles as much as 6 inches in diameter. Fine flakes of mica are in the lower part of the solum and in the substratum.

The A horizon has hue of 7.5YR and 10YR, value of 4 to 6, and chroma of 2 to 4. The B2t horizon has hue of 5YR and 7.5YR, value of 4 to 6, and chroma of 4 to 8. It is clay loam to sandy clay loam and loam. The C horizon ranges from loamy fine sand to clay, and it is sand and gravel in places.

Pamunkey soils are similar to Abell, Dogue, Masada, Orangeburg, and Rumford soils. Pamunkey soils have a higher base saturation than Abell, Masada, Orangeburg, and Rumford soils. They are better drained than Abell soils, have less clay than Masada soils, have a thinner solum than Orangeburg soils, and have less sand than Rumford soils. They are better drained and have less clay than Dogue soils.

Pamunkey soils are near Chastain, Chewacla, Dogue, Forestdale, Lenoir, Molena, and Toccoa soils. Pamunkey soils are better drained and have less clay than Chastain, Forestdale, and Lenoir soils. They are better drained than Chewacla soils, and they have less sand than Molena soils. They have a Bt horizon which Toccoa soils do not have.

51B—Pamunkey loam, 0 to 6 percent slopes. This soil is on broad, nearly level to slightly convex terraces along the major streams. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Dogue, Lenoir, Molena, and Toccoa soils.

Runoff is slow to medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland group 2o1.

51C—Pamunkey loam, 6 to 12 percent slopes. This soil is on moderately short to long, slightly convex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Dogue soil and small areas where the surface layer and subsoil are 15 to 35 percent pebbles and cobbles.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 2o1.

51D—Pamunkey loam, 12 to 20 percent slopes. This soil is on short side slopes and on terrace breaks. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of soils that have a thinner profile and small areas of soils where the surface layer and subsoil are 15 to 50 percent pebbles and cobbles.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or is clean tilled. The soil is somewhat droughty during the growing season.

This soil is poorly suited to cultivated crops because of the erosion hazard, slope, and droughtiness. It is better suited to small grain, mixed hay, and pasture. Capability unit IVe–1; woodland group 2r1.

Pinkston Series

The Pinkston series consists of well drained to excessively drained, moderately deep, sloping to steep soils on Piedmont Uplands. These soils have a dominantly loamy subsoil. They formed in material weathered from arkosic sandstone of Triassic age.

In a representative profile the surface layer is grayish brown and light yellowish brown gravelly sandy loam about 8 inches thick. The subsoil is very pale brown and yellowish brown, friable sandy loam and gravelly sandy loam about 12 inches thick. It has pockets of yellowish brown, friable sandy clay loam. The substratum is 10 inches thick. It is weathered sandstone conglomerate that crushes to gravelly sandy loam. Sandstone conglomerate is at a depth of about 30 inches.

Pinkston soils are very strongly acid to strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderately rapid in the subsoil, and available water capacity is low.

Representative profile of Pinkston gravelly sandy loam, 12 to 20 percent slopes, on south side of Tomahawk Creek, just south of bridge on Route 667:

A1—0 to 3 inches; grayish brown (10YR 5/2) gravelly sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine roots; few coarse roots; about 25 percent by volume sandstone and quartz pebbles as much as 75 millimeters in diameter; very strongly acid; abrupt smooth boundary.

A2—3 to 8 inches; light yellowish brown (2.5Y 6/4) gravelly sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine roots; about 20 percent by volume sandstone and quartz pebbles as much as 10 millimeters in diameter; very strongly acid; clear smooth boundary.

B1—8 to 12 inches; very pale brown (10YR 7/3) sandy loam; weak medium subangular blocky structure; very friable, slightly sticky and nonplastic; very strongly acid; clear smooth boundary.

B2—12 to 20 inches; yellowish brown (10YR 5/8) gravelly sandy loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; about 30 percent by volume sandstone and quartz pebbles as much as 75 millimeters in diameter; few cobbles; lenses and small pockets of yellowish brown friable sandy clay loam; very strongly acid; clear smooth boundary.

C—20 to 30 inches; yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), white (10YR 7/2), and brownish yellow (10YR 6/6) weathered sandstone conglomerate that crushes to gravelly sandy loam; rock controlled structure; compact; few fine flakes of mica; very strongly acid.

R—30 inches; sandstone conglomerate.

The solum is 12 to 25 inches thick. Depth to bedrock is commonly 2 to 3½ feet. The solum is about 5 percent to about 35 percent, by volume, angular and rounded sandstone and quartz pebbles and cobbles.

The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 2 to 4. The B horizon has hue of 10YR and 7.5YR, value of 4 to 6, and chroma of 4 to 8. A B1 horizon is present in places and often has higher values than those in the rest of the B horizon. It ranges from sandy loam and gravelly sandy loam to fine sandy loam and cobbly sandy loam. The Bt horizon is discontinuous and is commonly lenses and pockets of sandy clay loam. The C horizon is weathered sandstone or sandstone conglomerate that crushes to sandy loam, gravelly sandy loam, or cobbly sandy loam.

Pinkston soils are similar to Louisa and Louisburg soils. Pinkston soils have less mica than Louisa soils, and they have more aluminum than Louisburg soils.

Pinkston soils are near Creedmoor, Colfax, Mayodan, Turbeville, and Worsham soils. Pinkston soils are better drained and have less clay than Creedmoor and Worsham soils. They are better drained than Colfax soils, and they do not have the fragipan that is characteristic of those soils. Pinkston soils have less clay and a thinner solum than Mayodan and Turbeville soils, and they do not have the continuous Bt horizon that is characteristic of those soils.

165C—Pinkston gravelly sandy loam, 6 to 12 percent slopes. This soil is on narrow, winding, convex ridgetops and on short, complex side slopes. In some areas of moderately eroded soils, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Creedmoor, Edgehill, and Mayodan soils.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or clean tilled. The surface layer contains enough pebbles to dull and damage plowshares. The soil is droughty during the growing season.

This soil is poorly suited to cultivated crops because of the erosion hazard and droughtiness. It is better suited to small grain, mixed hay, pasture, and woodland. Capability unit IVe–2; woodland group 4d2.

165D—Pinkston gravelly sandy loam, 12 to 20 percent slopes. This soil is on short, complex side slopes. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Creedmoor, Edgehill, and Mayodan soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is used mainly for woodland. Capability unit VIe–2; woodland group 4r2.

165F—Pinkston gravelly sandy loam, 20 to 45 percent slopes. This soil is on short, complex side slopes, generally along drainageways.

Included with this soil in mapping were scattered small areas of Creedmoor, Edgehill, and Mayodan soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

It is used mainly for woodland. Capability unit VIIe–1; woodland group 4r2.

Pouncey Series

The Pouncey series consists of moderately deep, poorly drained, nearly level and gently sloping soils. These soils have a dominantly clayey subsoil. They formed in a mantle of fluvial material in upland depressions.

In a representative profile the surface layer is dark gray and light gray fine sandy loam about 18 inches thick. The subsoil is dark grayish brown, firm clay that is mottled with dark gray and is about 7 inches thick. White and gray, weakly cemented sandstone is at a depth of about 25 inches. This sandstone crushes with difficulty to fine sandy loam.

Pouncey soils are extremely acid to very strongly acid. These soils are medium in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is low. A seasonal high water table is within 1 foot of the surface during wet periods.

Representative profile of Pouncey fine sandy loam, 0 to 6 percent slopes, in a stand of mixed oaks and pine, ¼ mile east of Route 150, 2/3 mile north of U.S. Highway 60:

A1—0 to 6 inches; dark gray (10YR 4/1) fine sandy loam; weak fine and medium granular structure; very friable; common fine and medium roots; less than 1 percent by volume rounded quartz pebbles as much as 5 millimeters in diameter; extremely acid; clear wavy boundary.

A2g—6 to 18 inches; light gray (10YR 7/1) fine sandy loam; weak medium granular structure; friable; few fine roots; many fine and medium pores; less than 1 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; extremely acid; clear wavy boundary.

Btg—18 to 25 inches; dark grayish brown (2.5Y 4/2) clay; many medium faint dark gray (10YR 4/1) mottles; moderate medium and coarse subangular blocky and angular blocky structure; firm, sticky and plastic; common fine and medium roots; thin continuous clay films; extremely acid; abrupt smooth boundary.

IIR—25 inches; white (N 8/0) and gray (10YR 5/1) weakly cemented sandstone that crushes with difficulty to fine sandy loam; extremely hard; extremely acid.

The solum is 24 to 40 inches thick. Depth to sandstone bedrock ranges from 2 to 3½ feet. The solum is less than 1 percent to about 5 percent, by volume, rounded quartz pebbles as much as 50 millimeters in diameter.

The A horizon has hue of 10YR, 2.5Y, and 5Y; value of 4 to 7; and chroma of 1 or 2. The Bt horizon has hue of 2.5Y, 10YR, and 5Y; value of 4 or 5; and chroma of 1 or 2. It is commonly clay but ranges to sandy clay and heavy clay loam. The weakly cemented sandstone cannot be crushed in places, and it generally requires blasting for removal.

Pouncey soils are similar to Colfax, Coxville, and Worsham soils. Pouncey soils are more poorly drained than Colfax soils, and they have a thinner solum than Coxville and Worsham soils.

Pouncey soils are near Bourne, Colfax, Coxville, Dunbar, and Tetotum soils. Pouncey soils are more poorly drained than Bourne, Dunbar, and Tetotum soils. They lack the fragipan that is characteristic of Bourne soils, and they have a thinner solum than Dunbar and Tetotum soils.

159B—Pouncey fine sandy loam, 0 to 6 percent slopes. This soil is in broad, slightly concave upland depressions.

Included with this soil in mapping were scattered small areas of Colfax, Coxville, and Worsham soils.

Runoff is slow to medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is within 1 foot of the surface during wet seasons. The soil is droughty during the growing season.

This soil is poorly suited to cultivated crops. It is better suited to mixed hay, pasture, and woodland. Capability unit IVw–3; woodland group 2w3.

Roanoke Series

The Roanoke series consists of deep, poorly drained, nearly level and very gently sloping soils. These soils have a dominantly clayey subsoil. They formed in alluvium above and some distance from present stream channels.

In a representative profile the surface layer is very dark gray loam about 4 inches thick. The subsoil is dark gray and gray, firm clay that is mottled with olive brown, yellowish brown, strong brown, and yellowish red. It is about 56 inches thick. The substratum extends to a depth of 70 inches or more. It is gray, firm gravelly clay that is mottled with strong brown and light olive brown.

Roanoke soils are very strongly acid to strongly acid. These soils are medium in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium. A seasonal high water table is within 1 foot of the surface during winter and spring (fig. 6). The soils are frequently flooded.

Representative profile of Roanoke loam north of Route 711, ¼ mile northwest of junction of Routes 711 and 147:

Ap—0 to 4 inches; very dark gray (10YR 3/1) loam; weak fine granular structure; friable, nonsticky and nonplastic; common fine roots; less than 1 percent by volume rounded

Figure 6.—**Proper house footings are difficult to establish on the poorly drained Roanoke loam because of the seasonal high water table.**

quartz pebbles as much as 25 millimeters in diameter; very strongly acid; abrupt wavy boundary.

B21tg—4 to 10 inches; dark gray (10YR 4/1) clay; common fine distinct olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/4) mottles; weak medium subangular blocky structure; firm, sticky and plastic; very strongly acid; clear wavy boundary.

B22tg—10 to 20 inches; dark gray (10YR 4/1) heavy clay loam; common fine distinct yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and yellowish red (5YR 5/6) mottles; weak fine subangular blocky structure; firm, sticky and plastic; less than 1 percent by volume rounded quartz pebbles as much as 25 millimeters in diameter; very strongly acid; clear wavy boundary.

B23tg—20 to 35 inches; gray (10YR 5/1) heavy clay loam; common medium distinct strong brown (7.5YR 5/6) and yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; firm, sticky and plastic; less than 1 percent by volume rounded quartz pebbles as much as 25 millimeters in diameter; very strongly acid; clear smooth boundary.

B24tg—35 to 60 inches; gray (10YR 5/1) clay; common medium to coarse distinct strong brown (7.5YR 5/6) and yellowish red (5YR 4/6) mottles; moderate medium and coarse subangular blocky structure; firm, sticky and plastic; less than 1 percent by volume rounded quartz pebbles as much as 25 millimeters in diameter; very strongly acid; clear wavy boundary.

Cg—60 to 70 inches; gray (10YR 5/1) gravelly clay; common fine distinct light olive brown (2.5Y 5/4) mottles; massive; firm, sticky and plastic; about 20 percent by volume rounded quartz pebbles as much as 50 millimeters in diameter; very strongly acid.

The solum is about 40 to 60 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 5 percent, by volume, rounded quartz pebbles as much as 50 millimeters in diameter.

The A horizon has hue of 10YR and 2.5Y, value of 3 to 5, and chroma of 1 to 2. The Bt horizon has hue of 10YR and 8.5Y. High chroma mottles are common. The Bt horizon ranges from heavy clay loam to clay. The C horizon is commonly gray, and it ranges from clay to sand and gravel.

Roanoke soils are similar to Augusta, Dunbar, Forestdale, Lenoir, and Worsham soils. Roanoke soils are more poorly drained than Augusta, Dunbar, and Lenoir soils, and they have more clay than Augusta soils. They have less base saturation than Forestdale soils and less sand and more silt than Worsham soils.

Roanoke soils are near Augusta, Masada, and Varina soils. Roanoke soils are more poorly drained than Masada and Varina soils.

137—Roanoke loam. This soil is in broad, slightly concave depressions on uplands. Slopes are dominantly 0 to 4 percent.

Included with this soil in mapping were scattered small areas of Augusta and Varina soils. Also included were small areas of poorly drained and very poorly drained soils.

Runoff is slow. A seasonal high water table is within 1 foot of the surface during winter and spring. Some areas of the soil are ponded for 3 to 5 months during winter and spring and after heavy rain.

This soil is used mainly for woodland. Capability unit Vw–1; woodland group 2w3.

Rumford Series

The Rumford series consists of deep, somewhat excessively drained, gently sloping and sloping soils on Coastal Plain uplands. These soils have a dominantly loamy subsoil. They formed in Coastal Plain sediment.

In a representative profile the surface layer is dark grayish brown loamy fine sand about 10 inches thick. The subsoil is about 30 inches thick. The upper 11 inches is strong brown loamy fine sand. The next 16 inches is yellowish red and strong brown, very friable fine sandy loam. The lower 3 inches is strong brown and yellowish brown, very friable loamy fine sand. The substratum extends to a depth of 132 inches or more. It is brownish yellow and yellow fine sand and sand.

Unless limed, Rumford soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderately rapid in the subsoil, and available water capacity is low.

Representative profile of Rumford loamy fine sand, 2 to 6 percent slopes, in the Arrowhead Nursery, about ¼ mile north of Colonial Heights, ¼ mile east of U.S. Highways 1 and 301:

Ap—0 to 10 inches; dark grayish brown (10YR 4/2) loamy fine sand; weak fine granular structure; very friable to loose; many medium and fine roots and few coarse roots; strongly acid; clear smooth boundary.

B1—10 to 21 inches; strong brown (7.5YR 5/6) loamy fine sand; weak fine granular structure; very friable; many medium and fine roots and few coarse roots; very strongly acid; clear smooth boundary.

B21t—21 to 27 inches; strong brown (7.5YR 5/6) fine sandy loam; weak coarse subangular blocky structure; very friable; many medium and coarse roots; sand grains coated with clay; very strongly acid; clear smooth boundary.

B22t—27 to 37 inches; yellowish red (5YR 4/8) fine sandy loam; weak coarse subangular blocky structure; very friable; slightly sticky and slightly plastic; few fine roots; many medium and coarse roots; sand grains coated and bridged with clay; very strongly acid; clear smooth boundary.

B3—37 to 40 inches; strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) loamy fine sand; weak coarse subangular blocky structure parting to single grained; very friable to loose; few medium and large roots; very strongly acid; clear smooth boundary.

C1—40 to 74 inches; brownish yellow (10YR 6/6) fine sand; single grained; loose; very strongly acid; gradual smooth boundary.

IIC2—74 to 132 inches; yellow (10YR 7/6) and brownish yellow (10YR 6/6) sand; single grained; loose; very strongly acid.

The solum is about 28 to 40 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 to 4. The B horizon has hue of 7.5YR and 5YR, value of 4 and 5, and chroma of 6 to 8. The C horizon ranges from brownish yellow, yellow, and yellowish brown to strong brown. It is commonly fine sand and sand.

Rumford soils are similar to Kempsville, Lucy, Molena, and Pamunkey soils. Rumford soils are more excessively drained than Kempsville, Lucy, and Pamunkey soils. They have less clay than Kempsville and Pamunkey soils and a thinner solum than Lucy soils. They have somewhat more clay in the Bt horizon than Molena soils.

Rumford soils are near Faceville, Orangeburg, and Lucy soils. Rumford soils have less clay and a thinner solum than Faceville and Orangeburg soils.

92B—Rumford loamy fine sand, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series.

Included with this soil in mapping were scattered small areas of Bourne, Faceville, and Orangeburg soils. Also included were small areas of soils that have slopes of less than 2 percent.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. The soil is somewhat droughty during the growing season.

This soil is used for corn, small grain, mixed hay, pas-

ture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

92C—Rumford loamy fine sand, 6 to 12 percent slopes. This soil is on short to moderately long, slightly convex side slopes.

Included with this soil in mapping were scattered small areas of Bourne, Faceville, and Orangeburg soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or clean tilled. The soil is droughty during the growing season.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 3o1.

Spotsylvania Series

The Spotsylvania series consists of deep, well drained, gently sloping and sloping soils on Piedmont Uplands. These soils have a dominantly clayey subsoil. They formed in a thin fluvial mantle and the underlying material weathered from granite and granite gneiss.

In a representative profile the surface layer is dark grayish brown and light olive brown fine sandy loam about 10 inches thick. The subsoil extends to a depth of 48 inches or more. The upper 4 inches is yellowish brown, friable loam; the next 17 inches is strong brown, friable clay loam; and the lower 17 inches is red, strong brown, and brownish yellow, firm clay.

Unless limed, Spotsylvania soils are strongly acid to very strongly acid. These soils are low in organic matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Spotsylvania fine sandy loam, 2 to 6 percent slopes, 300 yards east of creek, 400 yards south of Route 630, and ¾ mile southwest of the junction of Routes 630 and 628:

A1—0 to 3 inches; dark grayish brown (2.5Y 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; about 5 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; strongly acid; abrupt smooth boundary.

A2—3 to 10 inches; light olive brown (2.5Y 5/4) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; few coarse roots; about 10 percent by volume rounded quartz pebbles as much as 75 millimeters in diameter; strongly acid; clear smooth boundary.

B1—10 to 14 inches; yellowish brown (10YR 5/6) loam; few medium distinct strong brown (7.5YR 5/8) mottles; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; about 5 percent by volume rounded quartz pebbles as much as 25 millimeters in diameter; slight compaction in upper part; very strongly acid; clear smooth boundary.

B21t—14 to 23 inches; strong brown (7.5YR 5/6) clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few thin clay films; about 3 percent by volume rounded quartz pebbles as much as 15 millimeters in diameter; very strongly acid; gradual smooth boundary.

B22t—23 to 31 inches; strong brown (7.5YR 5/8) clay loam; moderate fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; slightly compact in place; thin patchy clay films; about 1 percent by volume rounded quartz pebbles as much as 10 millimeters in diameter; very strongly acid; clear smooth boundary.

IIB23t—31 to 48 inches; mottled red (2.5YR 4/8), strong brown (7.5YR 5/8), and brownish yellow (10YR 6/6) clay; mottles increase in size as depth increases; moderate fine and medium angular blocky and subangular blocky structure; firm, sticky and plastic; thin discontinuous clay films; less than 1 percent by volume angular quartz pebbles as much as 2 millimeters in diameter; few fine flakes of mica; very strongly acid.

The solum is 40 to more than 60 inches thick. Depth to the IIBt horizon ranges from 20 to 40 inches. Depth to bedrock is more than 5 feet. The solum above the IIBt horizon is about 1 percent to about 25 percent, by volume, rounded and subrounded quartz pebbles as much as 50 millimeters in diameter. The IIBt horizon is about 1 percent to about 15 percent, by volume, angular feldspar pebbles or angular quartz pebbles, as much as 25 millimeters in diameter. A gravel line is at the contact between the Bt horizon and IIBt horizon in places.

The A1 horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. The A2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8. The Ap horizon, where present, has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 or 4. The B1 horizon and B2t horizon have hue of 7.5YR, 10YR, or 2.5Y; value of 5 or 6; and chroma of 4 to 8. The B1 horizon is loam, clay loam, or sandy clay loam, and the B2t horizon is clay loam or clay. The IIBt horizon commonly has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. Its mottles have hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 6 to 8. The IIBt horizon is clay or clay loam. It has few to many flakes of mica. The C horizon is multicolored red, brown, yellow, and white. It is strongly weathered gneiss or granite that crushes to loamy analogs.

Spotsylvania soils are similar to Appling, Cecil, Mayodan, Vance, and Wedowee soils. Spotsylvania soils have a IIBt horizon, which those soils do not have.

Spotsylvania soils are near Appling, Bourne, Cecil, Colfax, Durham, Faceville, Louisburg, Norfolk, Vance, Varina, and Wedowee soils. Spotsylvania soils have a IIBt horizon, which those soils do not have.

24B—Spotsylvania fine sandy loam, 2 to 6 percent slopes. This soil is on somewhat broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Colfax, Faceville, Kempsville, Vance, and Wedowee soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 4o1.

24C—Spotsylvania fine sandy loam, 6 to 12 percent slopes. This soil is on moderately long, slightly convex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Colfax, Faceville, Louisburg, Vance, and Wedowee soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 4o1.

Starr Series

The Starr series consists of deep, well drained, gently sloping soils in upland depressions, at the heads of drainageways, and along small drainageways in the Piedmont.

These soils have a dominantly clayey subsoil. They formed in alluvium washed from surrounding upland soils.

In a representative profile the surface layer is dark reddish brown clay loam about 6 inches thick. The subsoil is about 47 inches thick. The upper 26 inches is dark reddish brown and dusky red, friable clay; the next 12 inches is yellowish red, friable to firm gravelly clay and clay that is mottled with reddish yellow, yellowish brown, and red in the lower part; and the lower 9 inches is yellowish brown, strong brown, and pale yellow, friable clay. The substratum extends to a depth of 80 inches or more. It is yellowish brown, strong brown, yellowish red, and pale yellow clay and silty clay loam.

Unless limed, Starr soils are slightly acid to strongly acid. These soils are medium in organic-matter content and medium in natural fertility. Permeability is moderately rapid in the subsoil, and available water capacity is medium. A seasonal high water table is at a depth of 2 to 2½ feet for very brief periods during wet seasons and after heavy rain.

Representative profile of Starr clay loam, in an area of Starr soils, clayey substratum, 2 to 6 percent slopes, ¼ mile south of the junction of Routes 602 and 621:

Ap—0 to 6 inches; dark reddish brown (2.5YR 3/4) clay loam; moderate medium and fine subangular blocky structure parting to moderate fine granular; friable, sticky and plastic; common very fine roots; few worm ducts; common fine and very fine pores; few black very fine mineral concretions; about 1 percent by volume rounded pebbles as much as 12 millimeters across; slightly acid; abrupt smooth boundary.

B1—6 to 14 inches; dark reddish brown (2.5YR 3/4) clay; weak coarse subangular blocky structure; friable, sticky and plastic; few very fine roots; few worm ducts; few black very fine concretions; about 1 percent by volume rounded pebbles as much as 12 millimeters in diameter; medium acid; abrupt smooth boundary.

B21—14 to 25 inches; dusky red (10R 3/4) clay; weak coarse subangular blocky and weak fine granular structure; friable, slightly sticky and slightly plastic; few very fine roots; few very fine black concretions; few worm ducts; common fine and very fine pores; slightly more development and dark reddish brown (2.5YR 3/4) color in lower half; about 1 percent by volume rounded pebbles as much as 12 millimeters in diameter; medium acid; clear smooth boundary.

B22—25 to 32 inches; dark reddish brown (5YR 3/4) clay; moderate medium and fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common very fine and fine pores; few fine concretions; about 10 to 15 percent gravel as much as 12 millimeters in diameter; many discontinuous clay films; about 15 percent by volume rounded pebbles as much as 12 millimeters in diameter; few fine black stains and concretions; medium acid; clear smooth boundary.

IIB23—32 to 37 inches; yellowish red (5YR 4/8) gravelly clay; strong fine and very fine subangular blocky structure; friable, sticky and plastic; few fine roots; few very fine pores; common fine concretions; thin continuous clay films; about 30 percent by volume rounded pebbles as much as 5 millimeters in diameter; medium acid; abrupt smooth boundary.

IIIB24t—37 to 44 inches; yellowish red (5YR 4/8) clay; common medium distinct reddish yellow (7.5YR 6/8), yellowish brown (10YR 5/8), red (2.5YR 4/8), and black mottles; moderate medium and fine subangular blocky structure; firm, sticky and plastic; common fine pores; thick continuous clay films; few highly weathered rock fragments; few fine concretions; few pebbles 2 to 5 millimeters in diameter; about 1 percent by volume pebbles as much as 5 millimeters in diameter; medium acid; clear wavy boundary.

IIIB25t—44 to 53 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), and pale yellow (5Y 7/3) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; few fine pores; 20 to 30 percent highly weathered rock fragments; medium acid; gradual wavy boundary.

IIIC1—53 to 67 inches; mottled yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), yellowish red (5YR 4/6), and pale yellow (5Y 7/3) clay; rock controlled structure; friable, sticky and plastic; few fine roots; few fine black concretions; few coarse fragments as much as 12 millimeters in diameter; 60 to 70 percent strongly weathered saprolite; medium acid; gradual wavy boundary.

IIIC2—67 to 80 inches; strongly weathered silty clay loam saprolite.

The solum is 30 to 60 inches thick. Depth to bedrock is more than 5 feet. Buried soils are in many profiles, generally at a depth of 40 inches or more. Rounded and angular quartz pebbles, as much as 50 millimeters in diameter, make up from less than 1 percent to about 15 percent, by volume, of the solum and often range to 30 percent in one or more layers of the subsoil.

The A horizon has hue of 2.5YR, 5YR, and 7.5YR; value of 3 or 4; and chroma of 4 to 8. It ranges from clay loam to fine sandy loam. The B horizon has hue of 10R, 2.5YR, and 5YR; value of 3 to 5; and chroma of 4 to 8. High chroma mottles that have hue of 5YR to 10YR are in the lower part of the B horizon, and the B horizon is mottled in hue of 5YR to 5Y, value of 4 to 7, and chroma of 3 to 8 in many places. The B horizon ranges from clay to loam. The C horizon is commonly strongly weathered granite, gneiss, and schist, but it ranges from loam to silty clay loam.

Starr soils are similar to Abell and Cullen soils. Starr soils are redder throughout than Abell soils, and they do not have the Bt horizon that is characteristic of Cullen soils.

Starr soils are near Abell, Cecil, Colfax, Cullen, and Louisa soils. Starr soils do not have the Bt horizon that is characteristic of Cecil soils, and they do not have the fragipan that is characteristic of Colfax soils. They have a redder solum and more clay throughout than Louisa soils.

101B—Starr soils, clayey substratum, 2 to 6 percent slopes. This soil is in small, concave upland depressions; in small slightly concave areas at the heads of drainageways; and on narrow, slightly concave toe slopes along small drainageways. The surface layer ranges from clay loam to fine sandy loam. It is 4 to 10 inches thick.

Included with this soil in mapping were scattered small areas of Abell, Cecil, Cullen, and Colfax soils.

Runoff is slow to medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. The soil receives seepage and runoff from surrounding, higher lying areas.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 1o1.

Tetotum Series

The Tetotum series consists of deep, moderately well drained, nearly level and gently sloping soils on Coastal Plain uplands. These soils have a dominantly loamy subsoil. They formed in Coastal Plain sediment.

In a representative profile about 1 inch of partly decomposed forest litter overlies a surface layer of grayish brown and light olive brown loam about 11 inches thick. The subsoil is about 43 inches thick. The upper 11 inches is yellowish brown, friable clay loam; the next 13 inches is yellowish brown, light gray, light brownish gray, strong brown, and red, friable clay loam and sandy clay loam; and the lower 19 inches is gray, friable clay loam that is mottled with red, brownish yellow, and strong brown.

The substratum extends to a depth of 80 inches or more. It is gray clay and sandy clay loam.

Unless limed, Tetotum soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and availability water capacity is medium. A seasonal high water table is at a depth of 1½ to 2½ feet during winter and spring. Some areas of this soil are ponded during wet periods.

Representative profile of Tetotum loam, clayey substratum, 2 to 6 percent slopes, west of Route 722, 100 yards south of the junction of Routes 722 and 628:

O1—1 inch to 0; partly decomposed pine needles and twigs.
A1—0 to 4 inches; grayish brown (2.5Y 5/2) loam; weak fine granular structure; friable; many coarse medium and fine tree roots; very strongly acid; clear smooth boundary.
A2—4 to 11 inches; light olive brown (2.5Y 5/4) loam; few fine distinct brownish yellow (10YR 6/6) mottles; weak fine and medium granular structure; friable; slightly compact in place; few fine and medium roots; few fine pores; very strongly acid; clear smooth boundary.
B1t—11 to 14 inches; yellowish brown (10YR 5/6) light clay loam, few fine faint brownish yellow (10YR 6/6) mottles; weak medium and fine subangular blocky structure; friable, sticky and plastic; few fine roots; thin patchy clay films; very strongly acid; clear smooth boundary.
B21t—14 to 22 inches; yellowish brown (10YR 5/6) light clay loam; few medium faint brownish yellow (10YR 6/6) mottles and few medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable, sticky and plastic; few fine roots; thin discontinuous clay films; very strongly acid; gradual smooth boundary.
B22t—22 to 31 inches; mottled yellowish brown (10YR 5/6), light gray (10YR 7/2), and strong brown (7.5YR 5/6) clay loam; weak to moderate medium and fine subangular blocky structure; friable, sticky and slightly plastic; tendency toward platiness in place; few fine roots; thin continuous clay films; very strongly acid; gradual smooth boundary.
B23t—31 to 35 inches; mottled yellowish brown (10YR 5/8), light brownish gray (2.5Y 6/2), and red (2.5YR 4/8) sandy clay loam; weak medium and fine subangular blocky structure; friable, sticky and slightly plastic; thin discontinuous clay films; clear sand grains on ped faces; very strongly acid; gradual smooth boundary.
B3tg—35 to 54 inches; gray (10YR 6/1) heavy clay loam; many distinct red (2.5YR 4/8), brownish yellow (10YR 6/6), and strong brown (7.5YR 5/6) mottles; moderate fine and medium subangular blocky structure; friable, sticky and plastic; thin discontinuous clay films on horizontal ped faces; clear sand grains on vertical ped faces; very strongly acid; gradual smooth boundary.
IIC1g—54 to 70 inches; gray (10YR 6/1) clay; many coarse prominent red and brownish yellow mottles; massive; firm, sticky and plastic; very strongly acid; clear smooth boundary.
IIC2g—70 to 80 inches; gray (10YR 6/1) sandy clay loam; many coarse prominent brownish yellow mottles; massive; firm, sticky and slightly plastic; very strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 2 to 4. It is loam or fine sandy loam. The upper part of the Bt horizon has hue of 10YR, 7.5YR, and 2.5Y; value of 4 to 6, and chroma of 6 to 8. High-chroma mottles are common. Mottles of chroma 2 or less are within the upper 24 inches of the Bt horizon. The lower part of the Bt horizon is commonly gray and has high chroma mottles. The Bt horizon ranges from sandy clay loam to heavy clay loam. The C horizon is commonly gray, has high chroma mottles, and ranges from clay to sandy loam and fine sandy loam.

Tetotum soils are similar to Craven, Dogue, and Lenoir soils. Tetotum soils have less clay than those soils. They are better drained than Lenoir soils.

Tetotum soils are near Coxville, Craven, Dunbar, Lenoir, Norfolk, and Orangeburg soils. Tetotum soils are better drained and have less clay than Coxville and Dunbar soils. They are not so well drained as Norfolk and Orangeburg soils.

8B—Tetotum fine sandy loam, ponded. This soil is in small, slightly concave upland depressions and along small drainageways. Slopes are dominantly 0 to 2 percent.

Included with this soil in mapping were scattered small areas of Coxville and Dunbar soils.

Runoff is slow. This soil receives seepage and runoff from surrounding, high lying areas. A seasonal high water table is at a depth of 1½ to 2½ feet during winter and spring, and the soil is ponded during wet seasons and after heavy rain.

This soil is used for corn, small grain, mixed hay, and pasture. If adequately drained, limed, and fertilized, it is moderately well suited to most locally grown crops except those that are sensitive to excess moisture. Capability unit IIIw–1; woodland group 2w2.

158B—Tetotum loam, clayey substratum, 2 to 6 percent slopes. This soil is on broad, slightly convex ridgetops and along small drainageways where slopes are slightly concave. It has the profile described as representative of the series.

Included with this soil in mapping were scattered small areas of Bourne, Dunbar, Faceville, Gritney, Kempsville, and Norfolk soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is at a depth of 1½ to 2½ feet, and drainage is desirable if the soil is used for farming.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is usually short lived because of excess moisture. Capability unit IIe–3; woodland group 3o1.

Toccoa Series

The Toccoa series consists of deep, well drained, nearly level and very gently sloping soils that have a dominantly loamy substratum. These soils formed in alluvium on flood plains along streams of the county.

In a representative profile the surface layer is reddish brown fine sandy loam about 15 inches thick. The substratum extends to a depth of 60 inches or more. The upper 16 inches is brown, very friable fine sandy loam; and the lower 29 inches is dark yellowish brown, brown, and pale brown, very friable fine sandy loam that is mottled with gray in the lower part.

Unless limed, Toccoa soils are medium acid. These soils are low in organic-matter content and medium in natural fertility. Permeability is moderately rapid in the substratum, and available water capacity is medium. A seasonal high water table is at a depth of 3 feet or more during wet periods. The soils are frequently flooded.

Representative profile of Toccoa fine sandy loam, 0 to 4 percent slopes, in idle field between River Road and James River, 300 feet south of river and ½ mile east of Bosher dam:

Ap—0 to 15 inches; reddish brown (5YR 4/4) fine sandy loam; weak fine granular structure; very friable; common fine pores; many fine roots in upper 4 inches, few fine roots in lower 11 inches; less than 1 percent rounded quartz pebbles as much as 75 millimeters in diameter; few cobbles as much as 6 inches in diameter; medium acid; clear smooth boundary.

C1—15 to 31 inches; brown (7.5YR 4/4) heavy fine sandy loam; massive; very friable; few fine roots; many fine and medium pores; few fine soft oxide concretions; less than 1 percent rounded quartz pebbles as much as 50 millimeters in diameter; few cobbles as much as 6 inches in diameter; medium acid; gradual smooth boundary.

C2—31 to 60 inches; mottled dark yellowish brown (10YR 4/4), brown (7.5YR 4/4), and pale brown (10YR 6/3) light fine sandy loam; pale brown mottles increase as depth increases; few fine gray mottles below a depth of 48 inches; massive; very friable; few fine roots; common fine pores; few fine soft oxide concretions; medium acid.

Depth to bedrock is more than 5 feet. The A horizon and substratum are less than 1 percent to about 10 percent, by volume, rounded quartz pebbles as much as 75 millimeters in diameter. The A horizon has hue of 5YR, 7.5YR, and 10YR; value of 4 and 5; and chroma of 2 to 4. The C horizon has hue of 7.5YR, 10YR, and 5YR; value of 4 to 6; and chroma of 4 to 8. Mottles of chroma 2 or less are commonly below a depth of 48 inches. The C horizon ranges from fine sandy loam and sandy loam to loam.

Toccoa soils are similar to Buncombe and Chewacla soils. Toccoa soils have less sand than Buncombe soils, and they are better drained than Chewacla soils.

Toccoa soils are near Buncombe, Chastain, Chewacla, and Forestdale soils. Toccoa soils are not so poorly drained as Chastain and Forestdale soils, and they have less clay than those soils.

26B—Toccoa fine sandy loam, 0 to 4 percent slopes. This soil is on nearly level and slightly convex bottoms on flood plains of the larger streams of the county.

Included with this soil in mapping were scattered small areas of Buncombe and Chewacla soils.

Runoff is slow. This soil is frequently flooded by nearby streams.

This soil is used for corn, small grain, mixed hay, and pasture. If protected from flooding and adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIw–1; woodland group 1o1.

Turbeville Series

The Turbeville series consists of deep, well drained, gently sloping and sloping soils on high terraces. These soils have a dominantly clayey subsoil. They formed in older alluvium that is often higher than and some distance from present flood plains.

In a representative profile the surface layer is brown fine sandy loam about 11 inches thick. The subsoil is about 51 inches thick. The upper 6 inches is strong brown, friable sandy clay loam; and the lower 5 inches is red, friable to firm clay. The substratum is gravel that extends to a depth of 70 inches or more.

Unless limed, Turbeville soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and the available water capacity is medium.

Representative profile of Turbeville fine sandy loam, 2 to 6 percent slopes, 200 yards north of U.S. Highway 60, ¾ mile east of the junction of U.S. Highway 60 and Route 607:

Ap—0 to 11 inches; brown (10YR 5/3) fine sandy loam; weak very fine and fine granular structure; very friable; many fine and medium roots; many fine pores; strongly acid; abrupt smooth boundary.

B1t—11 to 17 inches; strong brown (7.5YR 5/6) sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; many coarse and fine roots; strongly acid; clear smooth boundary.

B21t—17 to 26 inches; red (2.5YR 4/6) clay; moderate fine subangular blocky structure; friable to firm, sticky and plastic; thin patchy clay films; few highly weathered quartz pebbles; strongly acid; gradual smooth boundary.

B22t—26 to 62 inches; red (10R 4/6) clay; few fine distinct strong brown (7.5YR 5/6) mottles; moderate fine subangular and angular blocky structure; firm to friable, sticky and plastic; very strongly acid; clear smooth boundary.

IIC—62 to 70 inches; gravel.

The solum is more than 60 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 30 percent, by volume, rounded quartz pebbles as much as 75 millimeters in diameter. The substratum is about 5 percent to about 60 percent, by volume, rounded quartz pebbles and cobbles.

The A horizon has hue of 10YR and 7.5YR, value of 4 and 5, and chroma of 2 to 4. It is fine sandy loam and gravelly fine sandy loam. The B2t horizon has hue of 2.5YR and 10R, value of 3 and 4, and chroma of 4 to 8. It ranges from clay and heavy clay loam to gravelly clay and gravelly heavy clay loam. The C horizon ranges from gravelly or very gravelly clay to sand and gravel.

Turbeville soils are similar to Faceville and Masada soils. Turbeville soils have mixed mineralogy, whereas Faceville soils have kaolinitic mineralogy. They have a redder Bt horizon than Masada soils.

Turbeville soils are near Augusta, Masada, and Varina soils. Turbeville soils are not so poorly drained as Augusta soils. They are redder throughout than Augusta and Varina soils.

107B—Turbeville fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Edgehill, Masada, and Varina soils. Also included were small areas where the surface layer is gravelly fine sandy loam.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

107C—Turbeville fine sandy loam, 6 to 12 percent slopes. This soil is on moderately long, slightly convex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Edgehill, Masada, and Varina soils. Also included were small areas of soils where the surface layer is gravelly fine sandy loam.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 3o1.

108B—Turbeville gravelly fine sandy loam, 2 to 6 percent slopes. This soil is on broad, convex ridgetops. The surface layer is 20 to 30 percent, by volume, rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Edgehill, Masada, and Varina soils.

Runoff is medium. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled.

The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–1; woodland group 3o1.

108C—Turbeville gravelly fine sandy loam, 6 to 12 percent slopes. This soil is on short to moderately long, slightly convex side slopes. The surface layer is 20 to 30 percent, by volume, rounded quartz pebbles. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Creedmoor, Edgehill, and Mayodan soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled. The surface layer contains enough pebbles to dull and damage plowshares.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops. Capability unit IIIe–1; woodland group 3o1.

Udifluvents

2—Udifluvents. These soils are deep, moderately well drained, and nearly level. They are on long, narrow, flood plains along streams and drainageways in the county. The soils are intermingled in such an intricate pattern that it was not practical to map them separately.

The surface layer ranges from grayish brown to light yellowish brown sand to sandy loam. The subsoil and substratum range from light yellowish brown and pale brown and gray sand to sandy loam, sandy clay loam, clay loam, and clay. In some areas Udifluvents are gravelly or very gravelly.

The soils are extremely acid to strongly acid. They are low to high in organic-matter content and low in natural fertility. Permeability is moderately rapid to moderately slow in the subsoil and substratum, and available water capacity is low to medium. Depth to bedrock is commonly more than 5 feet.

Runoff is slow, and these soils receive seepage and runoff from surrounding, higher lying areas. A seasonal high water table is at a depth of 1½ to 2½ feet during wet periods, and the soils are frequently flooded.

Most areas of Udifluvents are wooded. Not assigned to a capability unit or woodland group.

Vance Series

The Vance series consists of deep, well drained, gently sloping to moderately steep soils on Piedmont Uplands. These soils have a dominantly clayey subsoil. They formed in material weathered from granite and granite gneiss.

In a representative profile about ½ inch of forest litter overlies a surface layer of light olive brown and light yellowish brown fine sandy loam about 13 inches thick. The subsoil is about 43 inches thick. It is strong brown, very firm clay that is mottled with yellowish brown, pale brown, and red in the lower part. The substratum extends to a depth of 60 inches or more. It is strongly weathered granite that crushes to silty clay loam.

Unless limed, Vance soils are very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and available water capacity is medium.

Representative profile of Vance fine sandy loam, 2 to 6 percent slopes, in cutover hardwoods, 200 feet north of Route 665, 1¼ mile west of junction of Routes 603 and 665:

O1—½ inch to 0; hardwood leaf litter and decomposed organic residue.

A1—0 to 6 inches; light olive brown (2.5Y 5/4) fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and medium roots; about 5 percent by volume angular quartz pebbles as much as 5 millimeters in diameter; very strongly acid; clear smooth boundary.

A2—6 to 13 inches; light yellowish brown (10YR 6/4) fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; common fine and medium roots; very strongly acid; clear smooth boundary.

B21t—13 to 22 inches; strong brown (7.5YR 5/6) clay; few fine distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; very firm, sticky and plastic; few fine roots; thin continuous clay films; very strongly acid; gradual smooth boundary.

B22t—22 to 34 inches; strong brown (7.5YR 5/6) clay; common medium and fine distinct yellowish brown (10YR 5/6) and pale brown (10YR 6/3) mottles and few fine prominent red (2.5YR 4/6) mottles; moderate medium and fine subangular blocky structure; very firm, sticky and plastic; few medium roots; thin continuous clay films; very strongly acid; gradual smooth boundary.

B3t—34 to 56 inches; mottled strong brown (7.5YR 5/6), red (2.5YR 4/8), yellowish brown (10YR 5/6), and pale brown (10YR 6/3) clay; very pale brown mottles increase as depth increases; weak coarse subangular blocky structure; firm, sticky and plastic; thin continuous clay films; silt content increases as depth increases; very strongly acid; gradual smooth boundary.

C—56 to 60 inches; yellowish brown, white, gray, and black strongly weathered granite that crushes easily to silty clay loam; massive; firm, sticky and plastic; very strongly acid.

The solum is 24 to 56 inches thick. Depth to bedrock is more than 5 feet. The solum is less than 1 percent to about 15 percent, by volume, angular quartz pebbles as much as 50 millimeters in diameter.

The A horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 2 to 4. The Bt horizon has hue of 7.5YR, 10YR, and 5YR; value of 4 to 6; and chroma of 6 to 8. High chroma mottles are common. The C horizon is strongly weathered granite and granite gneiss that crushes to silty clay loam and clay loam to loam.

Vance soils in this county have a thicker solum than is typical of the Vance series. This difference, however, does not alter their use or management.

Vance soils are similar to Appling, Gritney, Masada, Mayodan, and Wedowee soils. Vance soils have a very firm, sticky and plastic Bt horizon, which those soils do not have.

Vance soils are near Appling, Grover, Louisa, Louisburg, Orange, and Wedowee soils. Vance soils have more clay than Grover, Louisa, and Louisburg soils. They are better drained than Orange soils.

210B—Vance fine sandy loam, 2 to 6 percent slopes. This soil is on somewhat broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Enon, and Orange soils.

Runoff is medium. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it

is moderately well suited to most locally grown crops. Capability unit IIIe–4; woodland group 3o1.

210C—Vance fine sandy loam, 6 to 12 percent slopes. This soil is on narrow, convex ridgetops and on short, slightly convex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Enon, Grover, Louisburg, and Orange soils.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or clean tilled. The soil is somewhat droughty during the growing season.

This soil is suited to small grain, mixed hay, and pasture. Capability unit IVe–4; woodland group 3o1.

210D—Vance fine sandy loam, 12 to 20 percent slopes. This soil is on short, complex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were scattered small areas of Appling, Enon, Grover, and Louisburg soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is suited to pasture and woodland. Capability unit VIe–1; woodland group 3r1.

Varina Series

The Varina series consists of deep, well drained, nearly level and very gently sloping soils on Coastal Plain uplands. These soils have a dominantly clayey subsoil. They formed in Coastal Plain sediment.

In a representative profile the surface layer is olive brown and light olive brown fine sandy loam about 10 inches thick. The subsoil extends to a depth of 70 inches or more. The upper 5 inches is yellowish brown, friable clay loam; the next 20 inches is yellowish brown, friable sandy clay that is mottled with strong brown and light yellowish brown; the next 15 inches is grayish brown, yellowish red, and strong brown, friable clay; and the lower 20 inches is dark red, yellowish red, strong brown, and gray, brittle sandy clay.

Unless limed, Varina soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and the available water capacity is medium.

Representative profile of Varina fine sandy loam, 0 to 4 percent slopes, in an idle field 300 feet north of Route 147 near Robious, 1,000 feet northeast of junction of Route 147 and Southern Railroad:

Ap—0 to 5 inches; olive brown (2.5YR 4/4) fine sandy loam; weak fine and very fine granular structure; friable, slightly sticky and slightly plastic; strongly acid; abrupt smooth boundary.

A2—5 to 10 inches; light olive brown (2.5Y 5/4) fine sandy loam; moderate fine and very fine granular structure; friable, slightly sticky and slightly plastic; common fine roots; many fine pores; strongly acid; clear smooth boundary.

B1t—10 to 15 inches; yellowish brown (10YR 5/4) clay loam; moderate medium subangular blocky structure; friable, sticky and slightly plastic; few fine roots; many fine pores; thin discontinuous clay films; about 1 percent by volume rounded quartz pebbles as much as 5 millimeters in diameter; strongly acid; clear smooth boundary.

B21t—15 to 35 inches; yellowish brown (10YR 5/4) sandy clay; common fine distinct strong brown (7.5YR 5/6) and light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable, sticky and slightly plastic; few fine roots; common fine pores; about 1 percent by volume rounded quartz pebbles as much as 5 millimeters in diameter; very strongly acid; clear wavy boundary.

B22t—35 to 50 inches; reticulately mottled grayish brown (2.5YR 5/2), yellowish red (5YR 4/8), and strong brown (7.5YR 5/6) clay; massive; compact in place; friable, slightly sticky and slightly plastic; 10 to 20 percent nonindurated plinthite; few fine roots; few fine pores; few thin clay films on plinthite nodules; about 1 percent by volume rounded quartz pebbles as much as 20 millimeters in diameter; very strongly acid; gradual smooth boundary.

B23t—50 to 70 inches; reticulately mottled dark red (2.5YR 3/6), yellowish red (5YR 5/6), strong brown (7.5YR 5/6), and gray (10YR 6/1) sandy clay; weak very thick platy structure; brittle, compact, nonsticky and nonplastic; 5 to 10 percent nonindurated plinthite; few thin clay films on horizontal ped faces; about 10 percent by volume rounded quartz pebbles as much as 50 millimeters in diameter; very strongly acid.

The solum is commonly more than 60 inches thick. Depth to bedrock is more than 5 feet. Rounded quartz pebbles, as much as 50 millimeters in diameter, make up less than 1 percent to about 5 percent, by volume, of the A horizon and upper part of the Bt horizon. Such pebbles make up less than 1 percent to about 15 percent of the lower part of the Bt horizon.

The A horizon has hue of 2.5Y and 10YR, value of 4 to 6, and chroma of 1 to 6. The upper part of the Bt horizon has hue of 10YR, 2.5Y, and 7.5YR; value of 4 to 8; and chroma of 3 or more. The lower part of the Bt horizon is commonly reticulately mottled in grayish brown, yellowish red, red, dark red, strong brown, and gray. It is 5 to 20 percent plinthite nodules. and it ranges from clay to sandy clay.

Varina soils are similar to Faceville, Gritney, Masada, and Turbeville soils. Varina soils are 5 to 20 percent plinthite in the lower part of the Bt horizon, and the similar soils are not.

Varina soils are near Augusta, Bourne, Masada, and Turbeville soils. Varina soils are better drained than Augusta and Bourne soils, have more clay than those soils, and do not have the fragipan that is characteristic of Bourne soils.

66B—Varina fine sandy loam, 0 to 4 percent slopes. This soil is in slight depressions on broad, convex ridgetops.

Included with this soil in mapping were scattered small areas of Augusta, Bourne, and Masada soils.

Runoff is slow. The hazard of erosion is moderate where the soil is disturbed and exposed or is clean tilled. A seasonal high water table is in the lower part of the subsoil for brief periods during wet seasons.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is suited to most locally grown crops. Alfalfa is often short lived because of excess wetness. Capability unit IIe–2; woodland group 3o1.

Vaucluse Series

The Vaucluse series consists of well drained, gently sloping and sloping soils on Coastal Plain uplands. These soils have a fragipan at a depth of 15 to 36 inches. They formed in Coastal Plain sediment.

In a representative profile the surface layer is dark grayish brown and pale brown sandy loam about 20 inches thick. The subsoil is about 44 inches thick. The upper 14 inches is yellowish red, friable gravelly clay loam and clay loam; and the lower 30 inches is red sandy clay loam that is brittle and compact in place. The substratum extends to a depth of 99 inches or more. It is red sandy loam.

Unless limed, Vaucluse soils are very strongly acid.

These soils are low in organic-matter content and low in natural fertility. Permeability is slow in the subsoil, and the available water capacity is low.

Representative profile of Vaucluse sandy loam, 2 to 6 percent slopes, 200 yards west of Route 625, 1½ miles north of Swift Creek:

A1—0 to 3 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 5 percent by volume rounded quartz pebbles as much as 15 millimeters in diameter; very strongly acid; gradual smooth boundary.

A21—3 to 15 inches; pale brown (10YR 6/3) sandy loam; few fine faint light yellowish brown (10YR 6/4) mottles; weak fine granular structure; very friable; many fine medium and coarse roots; about 5 percent by volume rounded quartz pebbles as much as 15 millimeters across; very strongly acid; clear smooth boundary.

A22—15 to 20 inches; pale brown (10YR 6/3) gravelly sandy loam; few fine faint light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/4) mottles; weak thick platy structure parting to weak fine granular; very friable, slightly compact and brittle; many vesicular pores; about 25 percent by volume rounded quartz pebbles as much as 15 millimeters in diameter; very strongly acid; clear smooth boundary.

B21t—20 to 27 inches; yellowish red (5YR 5/6) gravelly clay loam; few fine distinct red (2.5YR 4/6) and yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; few thin clay films; about 20 percent by volume rounded quartz pebbles as much as 5 millimeters in diameter; very strongly acid; clear smooth boundary.

B22t—27 to 34 inches; yellowish red (5YR 5/8) clay loam; mottled and streaked with red (2.5YR 4/6) and yellowish brown (10YR 5/6); weak fine and medium subangular blocky structure; friable, sticky and plastic; thin patchy clay films; about 10 percent by volume rounded quartz pebbles as much as 5 millimeters in diameter; very strongly acid; clear smooth boundary.

Bx1—34 to 40 inches; red (2.5YR 4/6) sandy clay loam; mottled and streaked with yellowish red (5YR 5/8) and strong brown (7.5YR 5/6); weak medium and thick platy structure; friable, brittle and compact in place; about 10 to 15 percent by volume rounded quartz pebbles as much as 5 millimeters in diameter; very strongly acid; gradual smooth boundary.

Bx2—40 to 64 inches; red (2.5YR 4/6) sandy clay loam; common medium distinct reddish yellow (7.5YR 6/8) and yellowish brown (10YR 5/6) mottles; weak coarse polygonal structure parting to weak coarse subangular blocky; compact and brittle in place; about 5 percent rounded quartz pebbles as much as 25 millimeters in diameter; very strongly acid; gradual smooth boundary.

C—64 to 99 inches; red (2.5YR 5/8) heavy sandy loam; massive; compact in place; slightly sticky; about 1 percent by volume rounded quartz pebbles as much as 25 millimeters in diameter; strongly acid.

The solum is more than 60 inches thick. Depth to bedrock is more than 5 feet. Rounded quartz pebbles, as much as 50 millimeters in diameter, make up about 5 percent to 25 percent, by volume, of the surface layer and 5 percent to about 30 percent of the subsoil.

The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 2 to 4. High chroma mottles are in the lower part. The Bt horizon has hue of 5YR and 7.5YR, value of 4 and 5, and chroma of 6 to 8. High chroma mottles that have hue of 2.5YR to 10YR are in this horizon. The Bt horizon is commonly clay loam, sandy loam, gravelly clay loam, and gravelly sandy clay loam. The fragipan has hue of 2.5YR and 10YR, value of 4 and 5, and chroma of 6 to 8. High chroma mottles that have hue of 2.5YR to 10YR are in the fragipan. The C horizon is commonly red to yellowish brown sandy loam.

Vaucluse soils are similar to Bourne and Orangeburg soils. Vaucluse soils are better drained and have a redder solum than Bourne soils. They have a fragipan, which Orangeburg soils do not have.

Vaucluse soils are near Bourne, Edgehill, Faceville, Kempsville, and Orangeburg soils. Vaucluse soils have a fragipan, which Edgehill, Faceville, and Kempsville soils do not have.

163B—Vaucluse sandy loam, 2 to 6 percent slopes. This soil is on somewhat broad, convex ridgetops. It has the profile described as representative of the series. In some areas where the soil is moderately eroded, however, the surface layer is only 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Faceville, and Orangeburg soils. Also included were small areas of soils that have a gravelly sandy loam surface layer.

Runoff is medium. The hazard of erosion is severe where the soil is disturbed and exposed or is clean tilled. The soil is droughty during the growing season.

This soil is used for corn, small grain, mixed hay, pasture, and tobacco. If adequately limed and fertilized, it is moderately well suited to most locally grown crops that are not deep rooted. Capability unit IIIe–4; woodland group 3o1.

163C—Vaucluse sandy loam, 6 to 12 percent slopes. This soil is on short, slightly convex side slopes. In some areas where the soil is moderately eroded, the surface layer is 4 to 8 inches thick.

Included with this soil in mapping were scattered small areas of Bourne, Faceville, and Orangeburg soils. Also included were small areas of soils that have a gravelly sandy loam surface layer.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is disturbed and exposed or clean tilled. The soil is droughty during the growing season.

This soil is poorly suited to cultivated crops because of the erosion hazard and droughtiness. It is better suited to small grain, mixed hay, and pasture. Capability unit IVe–4; woodland group 3o1.

Wedowee Series

The Wedowee series consists of deep, well drained, sloping to steep soils on Piedmont Uplands. These soils have a dominantly clayey subsoil. They formed in material weathered from granite and granite gneiss.

In a representative profile about 1 inch of decomposed forest litter overlies a surface layer of gray, olive brown, and light yellowish brown gravelly fine sandy loam about 10 inches thick. The subsoil is yellowish red, friable gravelly clay loam and clay loam about 23 inches thick. The substratum extends to a depth of 60 inches or more. It is strongly weathered granite that crushes easily to loam.

Wedowee soils are strongly acid to very strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderate in the subsoil, and available water capacity is medium.

Representative profile of Wedowee gravelly fine sandy loam, 20 to 40 percent slopes, ½ mile north of junction of Routes 711 and 673, 500 yards east of Route 673:

O1—1 inch to 0; decomposed hardwood leaves and twigs.

A11—0 to 2 inches; gray (5Y 5/1) gravelly fine sandy loam; weak fine granular structure; very friable; many fine medium and coarse roots; about 30 percent by volume angular pebbles as much as 50 millimeters in diameter; very strongly acid; abrupt smooth boundary.

A12—2 to 4 inches; olive brown (2.5Y 4/4) gravelly fine sandy loam; weak fine granular structure; very friable;

many fine and medium and coarse roots; about 30 percent by volume angular pebbles as much as 50 millimeters in diameter; very strongly acid; abrupt smooth boundary.

A2—4 to 10 inches; light yellowish brown (2.5Y 6/4) gravelly fine sandy loam; weak fine granular and subangular blocky structure; friable; common fine and medium roots; about 25 percent by volume angular pebbles as much as 75 millimeters in diameter; very strongly acid; gradual smooth boundary.

B21t—10 to 17 inches; yellowish red (5Y 5/8) gravelly clay loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; about 25 percent by volume angular pebbles as much as 75 millimeters in diameter; very strongly acid; gradual smooth boundary.

B22t—17 to 25 inches; yellowish red (5YR 5/8) heavy clay loam; moderate fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; thin patchy clay films; about 10 percent by volume angular pebbles as much as 75 millimeters in diameter; very strongly acid; gradual smooth boundary.

B3t—25 to 33 inches; yellowish red (5YR 5/8) clay loam; moderate fine subangular blocky structure; friable; slightly sticky and slightly plastic; few thin clay films; about 1 percent by volume angular pebbles as much as 50 millimeters in diameter; very strongly acid; gradual smooth boundary.

C—33 to 60 inches; yellowish red (5YR 4/6) loam; strongly weathered granite that crushes easily to loam; friable, slightly sticky and slightly plastic; very strongly acid.

The solum is 20 to 40 inches thick. Depth to bedrock is more than 5 feet. Angular and rounded quartz pebbles, as much as 75 millimeters in diameter, make up about 5 percent to about 30 percent, by volume, of the surface layer and about 1 percent to about 30 percent of the subsoil.

The A horizon has hue of 10YR to 5Y, value of 4 to 6, and chroma of 1 to 4. The Bt horizon has hue of 5YR, 7.5YR, and 10YR; value of 4 and 5; and chroma of 6 to 8. It ranges from clay loam, gravelly clay loam, and heavy clay loam to sandy clay loam, gravelly sandy clay loam, and clay. The C horizon ranges from yellowish red to yellowish brown. It is weathered granite or granite gneiss that crushes to loam or light clay loam.

Wedowee soils are similar to Appling, Durham, and Grover soils. Wedowee soils have a thinner solum than Appling soils, and they have more clay than Durham and Grover soils.

Wedowee soils are near Appling, Cecil, Durham, Grover, Louisburg, and Worsham soils. Wedowee soils have a thinner solum and are less red than Cecil soils. They have more clay than Louisburg soils. They are not so poorly drained as Worsham soils.

142E—Wedowee gravelly fine sandy loam, 20 to 40 percent slopes. This soil is on short, complex side slopes, generally along drainageways and small streams. In some moderately eroded areas, the surface layer is 4 to 6 inches thick.

Included with these soils in mapping were scattered small areas of Appling, Edgehill, Grover, Louisburg, and Masada soils.

Runoff is rapid. The hazard of erosion is very severe where the soil is disturbed and exposed. The soil is droughty during the growing season.

This soil is used mainly for woodland. Capability unit VIIe–1; woodland group 3r1.

Worsham Series

The Worsham series consists of deep, poorly drained, nearly level to sloping soils on upland flats, at the heads of drainageways, and along small drainageways. These soils have a dominantly clayey subsoil. They formed in material weathered from granite, gneiss, and schist.

In a representative profile about 1 inch of decomposed forest litter overlies a surface layer of dark gray and grayish brown fine sandy loam about 14 inches thick. The subsoil is about 46 inches thick. The upper 30 inches is gray, firm clay; and the lower 16 inches is light gray, friable sandy clay loam. The substratum extends to a depth of 70 inches or more. It is light gray sandy loam.

Worsham soils are very strongly acid to strongly acid. These soils are low in organic-matter content and low in natural fertility. Permeability is moderately slow to very slow in the subsoil, and the available water capacity is medium. A seasonal high water table is within 1 foot of the surface during winter and spring.

Representative profile of Worsham fine sandy loam, 0 to 4 percent slopes, 400 yards north of Route 654, ¾ mile northeast of the junction of Routes 654 and 655:

O1—1 inch to 0; black decomposed leaves and twigs.

A1—0 to 5 inches; dark gray (10YR 4/1) fine sandy loam; weak fine granular structure; very friable; many fine medium and coarse roots; very strongly acid; clear smooth boundary.

A2—5 to 14 inches; grayish brown (2.5Y 5/2) fine sandy loam; common medium and fine distinct yellowish brown (10YR 5/8) mottles; weak fine granular structure; very friable; slightly sticky and nonplastic; few fine and medium roots; few fine pores; very strongly acid; gradual smooth boundary.

B21t—14 to 29 inches; gray (5Y 6/1) clay; common medium distinct light olive brown (2.5Y 5/4) mottles and few fine distinct brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; thin continuous clay films; very strongly acid; gradual wavy boundary.

B22tg—29 to 44 inches; gray (N 6/0) clay; common medium distinct yellowish brown (10YR 5/8) mottles and few fine distinct strong brown (7.5YR 5/8) mottles; moderate medium angular blocky structure; firm, sticky and plastic; thin continuous clay films; very strongly acid; gradual wavy boundary.

B3tg—44 to 60 inches; light gray (5Y 6/1) sandy clay loam; few medium distinct yellowish brown (10YR 5/8) mottles; gray (N 6/0) ped coatings; weak coarse subangular blocky structure; friable, slightly sticky and slightly plastic; thin patchy clay films; very strongly acid; abrupt irregular boundary.

Cg—60 to 70 inches; light gray (5Y 6/1) sandy loam; massive; friable, slightly sticky and slightly plastic; very strongly acid.

The solum is 40 to 60 inches thick. Depth to bedrock is more than 5 feet. The A horizon has hue of 10YR and 2.5Y, value of 4 to 6, and chroma of 1 and 2. The Bt horizon has hue of 5Y, 2.5Y, 10YR, and N; value of 4 to 6; and chroma of 0 to 2. High chroma mottles are throughout the Bt horizon. The Bt horizon is commonly clay but ranges to sandy clay, heavy clay loam, sandy clay loam, and clay loam. The C horizon is commonly gray or light gray sandy loam to clay.

Worsham soils are similar to Forestdale and Roanoke soils. Worsham soils have less base saturation than Forestdale soils, and they have less silt and more sand than Roanoke soils.

Worsham soils are near Appling, Cecil, Colfax, Creedmoor, and Pouncey soils. Worsham soils are more poorly drained than Appling, Cecil, Colfax, and Creedmoor soils. They do not have the fragipan that is characteristic of Colfax soils. They have a thicker solum than Pouncey soils.

6B—Worsham fine sandy loam, 0 to 4 percent slopes. This soil is on upland flats and in slightly concave areas at the heads of drainageways and along small drainageways.

Included with this soil in mapping were scattered small areas of Colfax, Creedmoor, and Pouncey soils and small areas of very poorly drained soils.

Runoff is slow. This soil receives seepage and runoff from surrounding, higher lying areas. A seasonal high water table is within 1 foot of the surface during winter and spring.

This soil is used mainly for woodland. Capability unit Vw–1; woodland group 2w3.

Use and Management of the Soils

In this section, management of the soils for crops and pasture are discussed, and facts about woodland and wildlife habitat in the county are given. Use of soils for engineering and for town and country planning is described. The information is based on studies made in different parts of the county by the Virginia Polytechnic Institute and State University and the Soil Conservation Service.

Crops and Pasture

In this part of the survey, some basic practices of soil management are discussed, the system of capability classification used by the Soil Conservation Service is explained, use and management of the soils in capability units are discussed, and estimated productivity to be expected under high level management is given in the section "Estimated Yields."

Soils differ in such properties as slope, texture, depth to rock, fertility, and wetness. On most soils, however, the management practices are general enough that basic practices can be applied. Basic practices for all soils of Chesterfield County suitable for farming are discussed. Technical assistance in planning and applying practices suitable for the soils on a particular farm can be obtained from a local representative of the Soil Conservation Service or from the Extension County Agricultural agent.

Maintaining fertility.—Most soils of Chesterfield County are strongly acid to very strongly acid and have a pH range of 4.5 to 5.4. The intensity or degree of acidity or alkalinity in soils is measured and expressed in terms of pH values. A value between pH 6.0 and 6.5 is generally considered optimum for most plant growth. Liming is needed in most soils to raise the pH value to the desired range.

Most soils in Chesterfield County are low in natural fertility, and fertilization is required for consistent yields. Fertilization gives the best results when the amount of fertilizer required and the time of application are determined by the crop or vegetation grown and the soils on which the crop or vegetation is grown. Crops on sandy soils often do better if fertilizer is applied in small amounts several times during the growing season. Crops on loamy soils do well if fertilizer is applied only once or twice.

All crops do best if suited species are used in seeding. Better growth of these crops can be expected on the nearly level and gently sloping, loamy, well drained soils. Plant growth decreases on excessively drained soils and on soils that are wet. Plant growth also decreases as slope and erosion increase.

Maintaining organic matter content.—The soils of Chesterfield County were never very high in organic-matter content. Building up large amounts of organic matter in the soils is not economical because of the climate, nature of the soils, and other factors. It is important, however, to maintain economically a constant supply. Returning animal manure and crop residue to the soil, using cover and green-manure crops, and using sod crops in the cropping system are some of the most economical practices. Keeping erosion losses at a minimum by using proper cropping systems and conservation practices also helps maintain organic-matter content.

Tillage.—The main purpose of tillage is to prepare a seedbed and to control weeds. Planting, cultivating, and harvesting generally help to destroy the structure of the soil; therefore, overcultivation of the soils should be avoided. Maintenance of organic-matter content and minimum tillage aid in maintaining soil structure.

Conserving soil and water.—If gently sloping or steeper soils are cultivated, they are subject to erosion. Sheet erosion causes a loss of surface soil that generally contains a large part of organic matter and plant nutrients. Gullies form on areas receiving concentrated water flow unless proper erosion-control measures are used.

On soils where erosion is a hazard, excessive soil and water losses generally occur when a cultivated crop is growing. Use of a cropping system in combination with other erosion-control practices helps to reduce soil and water losses. Some practices used to control erosion are contour farming, terracing, stripcropping, diversion terraces, grassed waterways, and minimum tillage. Other practices that help to control erosion are leaving crop residue on the surface, growing cover crops, and applying fertilizer and lime to improve plant growth. Factors to consider in determining what practice or combination of practices is effective on a particular soil are: relative total effectiveness in reducing erosion; relative erodibility of the soil; eroding characteristics in connection with distribution of rain during the year; length of slope; steepness of slope, and average annual soil loss than can be tolerated.

Drainage.—Yields of most crops, particularly cultivated crops, can be increased on wet soils by removing excess water. Open ditches are used in most places to remove excess water. Tile drainage generally provides satisfactory drainage, but it is more expensive to install.

Soils that have a fragipan or a clay subsoil are difficult to drain, and tile drains are often only slightly effective. Open ditches are effective if they intercept water that moves laterally on top of the fragipan or clay layer. If drained and fertilized, wet soils that have a deep, permeable root zone generally are productive. A drainage system of ditches or tile cannot be installed and function, however, unless a suitable outlet is available.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are organized according to the limitations of the soils when used for field crops, the risk of damage when the soils are used, and the way the soils respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horicultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering uses.

In the capability system, all kinds of soils are grouped

at three levels: capability class, subclass, and unit. These are discussed in the following paragraphs.

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

Class I soils have few limitations that restrict their use. (None in Chesterfield County.)

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 largely to pasture, range, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuited to cultivation and that limit their use largely to pasture, range, woodland, or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture, range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and that restrict their use to recreation, wildlife, water supply, or to esthetic purposes. (None in Chesterfield County.)

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

In class I there are no subclasses because the soils of this class have few limitations. Class V can contain only the subclasses indicated by *w*, *s*, and *c* because the soils are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding on Arabic numeral to the subclass symbol, for example, IIe–2 or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

The capability units used in Chesterfield County are described in this section. The "Guide to Mapping Units" at the back of the survey gives the capability unit in which each soil is placed.

Each capability unit description indicates the general characteristics or qualities of the soils in the unit, their suitability for crops, and the major limitations for crops and pasture. It does not describe detailed management recommendations. There are, for example, many different combinations of cropping systems and erosion-control practices. The selection of management practices can vary from farm to farm. Assistance in planning appropriate cropping systems, erosion control, selection of proper plant varieties, artificial drainage, and other aspects of management can be obtained from the District Conservationist at the local Soil Conservation Service office or the local County Agricultural Extension Agent.

CAPABILITY UNIT IIe-1

This unit consists of deep, well drained to somewhat excessively drained, nearly level and gently sloping soils. These soils are on uplands or on stream terraces that normally are above flooding. They are slightly eroded to moderately eroded.

The plow layer is friable and erodible. The subsoil is dominantly clayey, but in places it is sandy clay loam, clay loam, loam, and fine sandy loam. Permeability is mainly moderate, but it is moderately rapid or slow in the soils in a few places. The available water capacity is mainly medium. The root zone is deep. It is very strongly acid to medium acid unless the soils are limed. Depth to bedrock is commonly more than 5 feet. The capacity to store and release plant nutrients is medium.

Runoff is medium. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is moderate. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate.

These soils are suited to commonly grown field crops, hay, and pasture. They are suited to row crops if the cropping system limits erosion to a tolerable soil loss. Sprinkler irrigation can be used if erosion is controlled.

CAPABILITY UNIT IIe-2

This unit consists of deep, well drained and moderately well drained, gently sloping soils on uplands. These soils are slightly eroded to moderately eroded.

The plow layer is friable and erodible. The subsoil is dominantly clayey, but a fragipan is in some places. Permeability is moderate to very slow, and available water capacity is medium to low. The root zone is moderately deep to deep. It is extremely acid to strongly acid unless the soils are limed. Depth to bedrock is more than 5 feet. The capacity to store and release plant nutrients is medium to low.

Runoff is mainly medium. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is moderate. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate. The moderately well drained soils commonly have a seasonal high water table, and artificial drainage helps alleviate seasonal wetness.

These soils are suited to commonly grown field crops,

hay, and pasture. Alfalfa is shorter lived because of seasonal wetness on the moderately well drained soils and soils that have a fragipan. These soils are suited to row crops if the cropping system limits erosion to a tolerable soil loss. Sprinkler irrigation is moderately well suited if erosion is controlled.

CAPABILITY UNIT IIe-3

Tetotum loam, clayey substratum, 2 to 6 percent slopes, the only soil in this unit, is a deep, moderately well drained, low lying soil on uplands. It is slightly eroded.

The plow layer is friable and erodible. The subsoil is dominantly loamy. Permeability is moderate, and available water capacity is medium. The root zone is deep. It is strongly acid to very strongly acid unless the soils are limed. Depth to bedrock is more than 5 feet. The capacity to store and release plant nutrients is medium.

Runoff is medium. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is moderate. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soil is likely to deteriorate.

This soil is suited to commonly grown field crops, hay, and pasture. It is suited to row crops if the cropping system limits erosion to a tolerable soil loss. Sprinkler irrigation can be used if erosion is controlled.

CAPABILITY UNIT IIe-5

This unit consists of deep, well drained, gently sloping soils on uplands. The soils in this unit are generally slightly eroded, but in a few places they are moderately eroded.

The plow layer is friable and erodible. In some areas it contains enough pebbles to damage and dull plowshares. The subsoil is dominantly clayey. Permeability is mainly moderate but is moderate to moderately slow in a small acreage. The available water capacity is medium. The root zone is deep. It is strongly acid to very strongly acid unless the soils are limed. Depth to bedrock is commonly more than 5 feet. The capacity to store and release plant nutrients is medium.

Runoff is medium. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is moderate. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate.

These soils are suited to commonly grown field crops, hay, and pasture. They are especially suited to bright tobacco and dark tobacco. They are suited to row crops if the cropping system limits erosion to a tolerable soil loss. Sprinkler irrigation can be used if erosion is controlled.

CAPABILITY UNIT IIw-2

This unit consists of deep, moderately well drained to somewhat poorly drained, nearly level to very gently sloping soils. These soils are in broad, low-lying upland areas or on low terraces.

The plow layer is friable. The subsoil is clay loam or clay. Permeability is moderately slow to slow, and available water capacity is medium. The root zone is deep. It is slightly acid to very strongly acid unless the soils are limed. Depth to bedrock is more than 5 feet. The capacity to store and release plant nutrients is medium.

A few areas of these soils receive seepage and runoff from higher lying areas. A few areas are subject to occasional flooding. Local silting is a concern in a few areas. Artificial drainage helps alleviate seasonal wetness.

These soils are suited to commonly grown field crops, hay, and pasture. Alfalfa is shorter lived because of seasonal wetness. There is little or no hazard of erosion, and row crops can be grown year after year if improved management is used. Pasture and hay that can withstand some seasonal wetness are suited. The soils are suited to sprinkler irrigation.

CAPABILITY UNIT IIs-1

This unit consists of deep, well drained, gently sloping soils on broad upland ridges. These soils are slightly eroded.

The plow layer is thick, very friable loamy sand. The subsoil is dominantly loamy. Permeability is moderate, and available water capacity is low to medium. The root zone is deep. It is strongly acid to very strongly acid unless the soils are limed. Depth to bedrock is more than 5 feet. The capacity to store and release plant nutrients is low to medium.

Runoff is medium. The hazard of erosion is moderate. These soils are somewhat droughty during the growing season. Crop response to lime and fertilizer is somewhat limited by the low to medium capacity to store and release plant nutrients and the low to medium available water capacity.

These soils are suited to the commonly grown field crops, hay, and pasture. They are suited to row crops if improved management is used. Sprinkler irrigation can be used.

CAPABILITY UNIT IIIe-1

This unit consists of deep, well drained and somewhat excessively drained, sloping soils on uplands. These soils are commonly slightly eroded, but some are moderately eroded.

The plow layer is friable and erodible. The subsoil is dominantly clayey, but in places in some soils it is dominantly loamy. Permeability is moderately rapid to slow, and available water capacity is mainly medium. The root zone is deep. It is very strongly acid to medium acid unless the soils are limed. Depth to bedrock is commonly more than 5 feet. The capacity to store and release plant nutrients is medium.

Runoff is medium to rapid. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is severe. Limiting erosion to a tolerable level increases in difficulty as slope increases. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate.

These soils are moderately well suited to commonly grown field crops, hay, and pasture. They are moderately well suited to row crops, if the cropping system limits erosion to a tolerable soil loss. Sprinkler irrigation can be used if erosion is controlled.

CAPABILITY UNIT IIIe-4

This unit consists of deep, well drained to somewhat poorly drained, gently sloping or sloping soils on uplands. These soils are slightly eroded to moderately eroded.

The plow layer is friable and erodible. The soils have a subsoil of dominantly firm to very firm, sticky and plastic clay, or they have a fragipan. Permeability is slow to very slow, and available water capacity is low to medium.

The root zone is moderately deep to deep. It is extremely acid to neutral unless the soils are limed. Many of the soils have a seasonal high water table at a depth of 1 foot to 3 feet. The capacity to store and release plant nutrients is low.

Runoff is medium to rapid. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is severe. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate. Artificial drainage helps alleviate seasonal wetness in the moderately well drained and somewhat poorly drained soils.

These soils are moderately well suited to commonly grown field crops, hay, and pasture. Planting is often delayed in spring because the soils dry out slowly. Alfalfa is commonly short lived, and pasture plants are limited because of seasonal wetness in many of the soils. These soils are moderately well suited to row crops if the cropping system limits erosion to a tolerable soil loss. The soils are poorly suited to sprinkler irrigation.

CAPABILITY UNIT IIIe-6

This unit consists of deep, well drained, sloping soils on uplands. These soils are slightly eroded to moderately eroded.

The plow layer is friable and erodible. In some areas it contains enough pebbles to damage and dull plowshares. The subsoil is dominantly clayey. Permeability is moderate, and available water capacity is medium. The root zone is deep. It is strongly acid to very strongly acid unless the soils are limed. Depth to bedrock is commonly more than 5 feet. The capacity to store and release plant nutrients is medium.

Runoff is medium to rapid. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is severe. Limiting erosion to a tolerable level increases in difficulty as slope increases. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate.

These soils are moderately well suited to the commonly grown field crops, hay, and pasture. They are suited to bright tobacco and dark tobacco. They are moderately well suited to row crops if the cropping system limits erosion to a tolerable soil loss. Sprinkler irrigation can be used if erosion is controlled.

CAPABILITY UNIT IIIw-1

This unit consists of deep, well drained to somewhat poorly drained, nearly level soils. These soils are mainly on flood plains and low terraces along streams and larger drainageways. A small acreage is in depressions on uplands or in low lying areas. The soils are frequently flooded.

The plow layer is thick and friable. The subsoil or substratum ranges from fine sandy loam, loam, and clay loam to clay. Permeability is slow to moderately rapid, and available water capacity is medium to high. The root zone is deep. It is medium acid to very strongly acid unless the soils are limed. A seasonal high water table is at a depth of 1 foot to 3 feet. Depth to bedrock is commonly more than 5 feet. The capacity to store and release plant nutrients is medium to high.

Flooding and seasonal wetness are the principal limitations. Because flooding generally occurs in spring and early in summer, high value crops commonly are not grown. Local silting is a concern in some areas after flooding. Artificial drainage helps alleviate seasonal wetness.

These soils are suited to summer crops, including truck crops, that can be planted after the normal flooding season. They have little or no erosion hazard, and row crops can be grown year after year where improved management is used. Pasture and hay plants that can withstand flooding and seasonal wetness are suited. The soils are suited to sprinkler irrigation.

CAPABILITY UNIT IIIw-2

This unit consists of deep to moderately deep, moderately well drained to somewhat poorly drained, nearly level to gently sloping soils. These soils are on uplands or on low stream terraces or in depressions that are frequently flooded.

The plow layer is friable. Many of the soils have a fragipan. Some soils have a dominantly loamy or clayey subsoil. Permeability is very slow to moderate, and available water capacity is low to medium. The root zone is moderately deep to deep. It is strongly acid to very strongly acid unless the soils are limed. A seasonal high water table is at a depth of 1 foot to 2½ feet. Depth to bedrock is more than 5 feet. The capacity to store and release plant nutrients is low to medium.

Flooding and seasonal wetness are the principal limitations. These soils often receive seepage and runoff from higher lying areas. Some of the soils pond after heavy rain. Artificial drainage helps alleviate seasonal wetness.

These soils are moderately well suited to some of the commonly grown field crops, hay, and pasture. Alfalfa is short lived because of flooding and seasonal wetness. Pasture and hay plants than can withstand flooding and seasonal wetness are moderately well suited. These soils are poorly suited to sprinkler irrigation.

CAPABILITY UNIT IIIs-1

This unit consists of deep, somewhat excessively drained to excessively drained, nearly level to very gently sloping soils. These soils are on flood plains and terraces along the larger streams of the county.

The plow layer is thick, very friable, and sandy. The subsoil and substratum are dominantly loamy fine sand and loamy sand. Permeability is rapid, and available water capacity is low. The root zone is deep. It is slightly acid to strongly acid unless the soils are limed. Depth to bedrock is commonly more than 5 feet. The capacity to store and release plant nutrients is low.

These soils are droughty during the growing season because the available water capacity is low. Crop response to lime and fertilizer is limited by the low capacity to store and release plant nutrients and the low available water capacity. Flooding is also a concern in some areas.

These soils are moderately well suited to commonly grown field crops, hay, and pasture. Pasture and hay plants that can withstand droughty conditions and flooding are better suited than other crops. The soils are moderately well suited to sprinkler irrigation.

CAPABILITY UNIT IIIs-2

This unit consists of deep, well drained, gently sloping and sloping soils on uplands. The soils in this unit are generally only slightly eroded, but in a few places they are moderately eroded.

The surface layer is either very friable loamy sand or fine sandy loam that is more than 50 percent, by volume, rounded pebbles. The subsoil ranges from sandy loam and sandy clay loam to very gravelly clay. Permeability is moderate, and available water capacity is low to medium. The root zone is deep. It is strongly acid to very strongly acid unless the soils are limed. Depth to bedrock is more than 5 feet. The capacity to store and release plant nutrients is low.

These soils are droughty during the growing season because the available water capacity is low to medium. Crop response to lime and fertilizer is limited by the low capacity to store and release plant nutrients and the low available water capacity. Establishing a seedbed is difficult, and the soils that have a very gravelly surface layer are difficult to till.

These soils are moderately well suited to the commonly grown field crops, hay, and pasture. Pasture and hay plants that can withstand droughty conditions are better suited than other crops. The soils are moderately well suited to sprinkler irrigation.

CAPABILITY UNIT IVe-1

This unit consists of deep, well drained, sloping and moderately steep soils. These soils are on uplands or on stream terraces that are normally above flood level. They are slightly eroded to moderately eroded.

The plow layer is friable and erodible. In some areas it contains enough pebbles to damage and dull plowshares. The subsoil is dominantly clayey, but in some areas it is loamy. Permeability is mainly moderate but ranges to moderately slow in a small acreage. Available water capacity is medium to low. The root zone is deep. It is very strongly acid to slightly acid unless the soils are limed. Depth to bedrock is more than 5 feet. The capacity to store and release plant nutrients is medium to low.

Runoff is rapid. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is very severe. Limiting erosion to a tolerable level increases in difficulty as the slope increases. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate. The soils are commonly somewhat droughty during the growing season.

These soils are poorly suited to commonly grown field crops and row crops because of the droughtiness, slope, and erosion hazard. They are better suited to the commonly grown hay and pasture plants than to other crops. They are poorly suited to sprinkler irrigation.

CAPABILITY UNIT IVe-2

This unit consists of moderately deep to deep, well drained to excessively drained, sloping soils on uplands. Most of these soils are slightly eroded.

The plow layer is friable and erodible. It will not tolerate as much annual loss of soil material as the plow layers of most other soils on uplands in the county. The subsoil ranges from sandy loam, gravelly sandy loam, and loam to clay loam. Permeability is rapid to moderate, and the available water capacity is low. The root zone is moderately deep. It is very strongly acid to strongly acid unless the soils are limed. Depth to bedrock ranges from about 2 feet to more than 5 feet. The capacity to store and release plant nutrients is low.

Runoff is medium to rapid. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is very severe. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate. The soils are droughty during the growing season.

These soils are poorly suited to the commonly grown field crops, hay, and pasture. Crop response to lime and fertilizer is limited by the low available water capacity, the moderately deep root zone, and the low capacity to store and release plant nutrients. The soils are better suited to close-growing crops than to row crops and to drought resistant pasture and hay plants.

CAPABILITY UNIT IVe-3

Cullen clay loam, 6 to 12 percent slopes, eroded, the only soil in this unit, is a deep, well drained, sloping soil on uplands.

The plow layer is dominantly sticky clay loam. It is difficult to work and maintain in good tilth. It is low in organic-matter content. It forms a crust after hard rain and tends to clod if tilled when wet. The subsoil is dominantly clayey. Permeability is moderate, and available water capacity is medium. The root zone is deep. It is strongly acid to very strongly acid unless the soil is limed. Depth to bedrock is more than 5 feet. The capacity to store and release plant nutrients is medium.

Runoff is medium to rapid. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is very severe. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soil is likely to deteriorate. The potential for crops is considerably less than in similar, less eroded Cullen soils that have the same range in slope.

This soil is poorly suited to commonly grown field crops, hay, and pasture. A high level of management is generally needed to ensure good stands of alfalfa and other legumes and grasses. The soil is poorly suited to row crops. It will not tolerate as much animal loss of soil material (tons per acre) as the less eroded Cullen soils. The adverse physical condition of the plow layer makes the soil poorly suited to sprinkler irrigation.

CAPABILITY UNIT IVe-4

This unit consists of deep, well drained to somewhat poorly drained, sloping to moderately steep soils on uplands. These soils are slightly eroded to moderately eroded.

The plow layer is friable and erodible. Most of the soils have a subsoil of firm, sticky and plastic clay, but some have a fragipan. Permeability is moderate to very slow, and available water capacity is low to medium. The root zone is moderately deep. It is extremely acid to neutral unless the soils are limed. Many of the soils have a seasonal high water table at a depth of 1 foot to 2½ feet. Depth to bedrock ranges from 3½ to more than 5 feet. The capacity to store and release plant nutrients is low.

Runoff is medium to rapid. In cultivated areas or areas where the pasture vegetation is thin, the hazard of erosion is very severe. If excessive soil losses continue, crop yields are likely to decline and the physical condition of the soils is likely to deteriorate. The soils are somewhat droughty during the growing season.

These soils are poorly suited to the commonly grown field crops, hay, and pasture. Planting is often delayed in

spring because the soils dry out slowly. Alfalfa is short lived and pasture is limited because of seasonal wetness. The soils are better suited to close-growing crops than to row crops and to drought-resistant pasture and hay plants than to other crops.

CAPABILITY UNIT IVw-3

This unit consists of deep, poorly drained and moderately well drained, nearly level to gently sloping soils. These soils are on flood plains, in upland depressions, at the heads of drainageways, and along small drainageways.

The plow layer is friable. The subsoil is dominantly clayey. Permeability is moderately slow to very slow, and available water capacity is low to medium. The root zone is deep. It is very strongly acid to strongly acid unless the soils are limed. A seasonal high water table is within 2 feet of the surface. Depth to bedrock ranges from 2 feet to more than 5 feet. The capacity to store and release plant nutrients is medium.

Flooding and seasonal wetness are the principal limitations. The soils receive seepage and runoff from higher lying areas. Artificial drainage helps alleviate seasonal wetness.

These soils are poorly suited to the commonly grown field crops, hay, and pasture. They are better suited to water tolerant crops, hay, and pasture plants than to other crops.

CAPABILITY UNIT Vw-1

This unit consists of deep, poorly drained, nearly level to very gently sloping soils. These soils are on low terraces and flood plains along drainageways and streams, in depressions, and at the heads of drainageways.

The surface layer is friable. The subsoil is dominantly clayey. Permeability is moderately slow to very slow, and available water capacity is medium. The root zone is deep. It is very strongly acid to medium acid. A seasonal high water table is within 1½ feet of the surface. Depth to bedrock is more than 5 feet. The capacity to store and release nutrients is low to medium.

Flooding and wetness are the principal limitations. The soils receive seepage and runoff from higher lying areas. Artificial drainage is commonly difficult because suitable outlets are lacking.

These soils are suited to water tolerant grasses and legumes or to woodland.

CAPABILITY UNIT VIe-1

This unit consists of deep, well drained, moderately steep soils on uplands. These soils are slightly eroded to moderately eroded.

The surface layer ranges from clay loam to very gravelly fine sandy loam. The subsoil is dominantly clayey. Permeability is moderate to slow, and available water capacity is low to medium. The root zone is deep. It is medium acid to very strongly acid. Depth to bedrock is commonly more than 5 feet. The capacity to store and release nutrients is low to medium.

Runoff is rapid. In exposed areas or areas where the pasture vegetation is thin, the hazard of erosion is very severe. If excessive soil losses continue, the physical condition of the soils deteriorates. Limiting erosion to a tolerable soil loss increases in difficulty as the slope increases. The soils are droughty during the growing season.

These soils are suited to commonly grown hay and pasture plants and to woodland.

CAPABILITY UNIT VIe-2

This unit consists of moderately deep to deep, well drained to excessively drained, moderately steep soils on uplands. These soils are commonly only slightly eroded.

The surface layer is friable and erodible. It will not tolerate as much annual loss of soil material as surface layers of other soils on uplands in the county. The subsoil ranges from sandy loam and gravelly sandy loam to loam. Permeability is rapid to moderately rapid, and available water capacity is low. The root zone is moderately deep. It is very strongly acid to strongly acid. Depth to bedrock ranges from about 2 feet to more than 5 feet. The capacity to store and release nutrients is low to medium.

Runoff is medium to rapid. In exposed areas or in areas where the pasture vegetation is thin, the hazard of erosion is very severe. If excessive soil losses continue, the physical condition of the soils deteriorates. The soils are droughty during the growing season.

These soils are suited to drought resistant hay and pasture plants and to woodland.

CAPABILITY UNIT VIIe-1

This unit consists of moderately deep to deep, well drained to excessively drained, steep soils on uplands. Most soils are only slightly eroded.

The surface layer is friable and erodible. It will not tolerate as much loss of soil material as the surface of most other soils on uplands in the county. The subsoil ranges from sandy loam and loam to clay loam and clay. Permeability is rapid to slow, and available water capacity is low to medium. The root zone is moderately deep. It is very strongly acid to strongly acid. Depth to bedrock ranges from about 2 feet to more than 5 feet. The capacity to store and release nutrients is low.

Runoff is rapid. In exposed areas, the hazard of erosion is very severe. The soils are droughty during the growing season.

These soils are suited to drought-resistant pasture or to woodland.

Estimated yields

Some of the soils of Chesterfield County consistently produce fairly high yields of most cultivated crops. Other soils, although suitable for crops, produce lower yields, and some are suited to less intensive use.

Estimates of yields of specified crops on most soils in the county are shown in table 2. These are the estimated average yield, per acre, using improved management.

To obtain the estimated yields shown in table 2, the following improved management practices should be used:

1. Contour tillage, stripcropping, terracing, minimum tillage, or similar measures are used where needed to help control erosion; the soils that need drainage are drained; excess water is disposed of safely.
2. Cropping systems are adequately planned to permit their use within the capabilities of the soil and to meet the needs of the farm operator.
3. Manure and crop residue are turned under to supply nitrogen, other nutrients, and organic matter

TABLE 2.—*Estimated average yields per acre of principal crops under improved management*

[Absence of data indicates that the crop is not commonly grown or that the soil is not suited to it. Not included in this table because their properties are too variable to estimate are Aquults (191), Fluvaquents (1A, 3A), Hydraquents (100), Made land (15), Orthents-Udults-Mine pits complex (16), and Udifluvents (2)]

Soil	Corn	Soybeans	Bright tobacco	Wheat	Hay		Grass-legume pasture
					Alfalfa	Mixed	
	Bushels	*Bushels*	*Pounds*	*Bushels*	*Tons*	*Tons*	*Cow-acre-days*[1]
Abell sandy loam, 2 to 8 percent slopes	120	35	[2] 2,000	[3] 55	[4] 4.0	3.5	240
Appling sandy loam, 2 to 6 percent slopes	100	35	2,200	65	4.0	4.0	240
Appling sandy loam, 6 to 12 percent slopes	85	30	2,000	60	3.5	3.5	225
Appling sandy loam, 12 to 20 percent slopes	70	25	1,800	45	3.0	3.0	210
Appling gravelly sandy loam, 2 to 6 percent slopes	90	35	2,000	65	3.8	3.5	230
Appling loam, 2 to 6 percent slopes	100	35	2,200	65	4.0	4.0	240
Appling loam, 6 to 12 percent slopes	85	30	2,100	60	3.5	3.5	230
Appling-Spotsylvania sandy loams, 2 to 6 percent slopes	100	35	2,100	65	4.0	3.8	240
Appling-Wedowee fine sandy loams, 6 to 12 percent slopes	80	30	2,000	60	3.2	3.2	220
Appling-Wedowee fine sandy loams, 12 to 20 percent slopes	65	25	1,200	45	2.8	2.8	190
Atlee silt loam, 0 to 4 percent slopes	90	30	[2] 2,000	[3] 50	[4] 3.0	3.5	235
Augusta fine sandy loam, high terrace, 0 to 4 percent slopes	90	30	[2] 1,000	[3] 45	----	2.5	195
Bourne sandy loam, 2 to 6 percent slopes	80	30	2,000	50	[4] 2.0	2.5	160
Bourne sandy loam, 6 to 12 percent slopes	75	25	2,000	40	[4] 1.5	2.0	150
Bourne fine sandy loam, 2 to 6 percent slopes	80	30	1,500	50	[4] 2.0	2.5	160
Bourne fine sandy loam, 6 to 12 percent slopes	75	25	1,300	40	[4] 1.5	2.0	150
Bourne-Colfax complex, 2 to 6 percent slopes	70	25	[2] 1,800	40	----	2.4	180
Buncombe loamy fine sand, 0 to 4 percent slopes	60	15	----	35	2.0	2.0	100
Cecil fine sandy loam, 2 to 6 percent slopes	110	40	[2] 1,800	65	4.0	4.0	240
Cecil fine sandy loam, 6 to 12 percent slopes	95	35	[2] 1,500	60	3.5	3.5	225
Cecil fine sandy loam, 12 to 20 percent slopes	80	25	[2] 1,200	45	3.0	3.0	210
Chastain loam	50	25	----	----	----	3.0	200
Chewacla loam	95	40	----	[3] 50	----	3.0	225
Colfax sandy loam, 6 to 12 percent slopes	60	20	[2] 1,500	40	----	2.0	160
Colfax fine sandy loam, 2 to 6 percent slopes	70	25	[2] 1,200	45	----	2.4	180
Colfax fine sandy loam, variant, 0 to 4 percent slopes	70	25	[2] 1,000	40	----	2.4	180
Coxville loam, 2 to 6 percent slopes	50	25	----	----	----	2.0	180
Craven fine sandy loam, 2 to 6 percent slopes	105	40	[2] 1,200	55	[4] 2.5	3.0	250
Creedmoor fine sandy loam, 2 to 6 percent slopes	75	25	[2] 1,200	55	[4] 2.4	2.8	180
Creedmoor fine sandy loam, 6 to 12 percent slopes	60	20	[2] 1,200	50	[4] 2.0	2.5	170
Creedmoor fine sandy loam, 6 to 12 percent slopes, eroded	50	15	[2] 1,000	45	[4] 1.4	1.8	140
Creedmoor gravelly fine sandy loam, 2 to 6 percent slopes	70	25	[2] 1,200	55	[4] 2.4	2.5	170
Creedmoor gravelly fine sandy loam, 6 to 12 percent slopes	55	20	[2] 1,200	50	[4] 2.0	2.0	150
Creedmoor-Worsham sandy loams, 2 to 6 percent slopes	50	15	----	35	----	2.0	150
Creedmoor-Worsham sandy loams, 6 to 12 percent slopes	50	15	----	35	----	2.0	150
Cullen loam, 2 to 6 percent slopes	120	45	[2] 1,200	75	4.5	3.5	240
Cullen clay loam, 6 to 12 percent slopes, eroded	80	30	[2] 1,100	50	3.5	3.0	180
Cullen clay loam, 12 to 20 percent slopes, eroded	----	----	----	----	----	2.0	140
Dogue loam, variant, 0 to 4 percent slopes	115	40	[2] 1,800	[3] 55	[4] 3.5	3.5	230
Dunbar fine sandy loam, 0 to 4 percent slopes	100	45	[2] 1,000	[3] 55	----	3.5	235
Durham-Bourne fine sandy loams, 2 to 6 percent slopes	80	30	2,400	50	[4] 3.0	2.5	180
Edgehill very gravelly fine sandy loam, 2 to 6 percent slopes	80	20	----	35	3.5	3.0	228
Edgehill very gravelly fine sandy loam, 6 to 12 percent slopes	70	15	----	30	3.0	2.5	210
Edgehill very gravelly fine sandy loam, 12 to 20 percent slopes	----	----	----	----	----	1.5	160
Edgehill very gravelly fine sandy loam, 20 to 40 percent slopes	----	----	----	----	----	----	----
Enon-Louisburg complex, 12 to 40 percent slopes	----	----	----	----	----	----	----
Enon-Vance complex, 2 to 12 percent slopes	70	30	1,400	50	4.0	4.0	210
Faceville fine sandy loam, 2 to 6 percent slopes	120	40	2,000	65	5.0	4.0	210
Faceville fine sandy loam, 6 to 12 percent slopes	90	30	1,900	60	4.5	3.5	180
Faceville-Gritney fine sandy loams, 2 to 6 percent slopes	110	35	2,000	60	4.0	3.5	200
Faceville-Gritney gravelly fine sandy loams, 2 to 6 percent slopes	100	30	1,800	60	4.0	3.5	200
Faceville-Gritney gravelly fine sandy loams, 6 to 12 percent slopes	80	25	1,800	55	3.5	3.0	180
Forestdale silt loam	----	----	----	----	----	----	180
Gritney fine sandy loam, 2 to 6 percent slopes	100	35	1,800	60	4.0	3.5	200
Gritney fine sandy loam, 6 to 12 percent slopes	90	30	1,500	55	3.5	3.0	180
Grover fine sandy loam, 2 to 6 percent slopes, eroded	90	30	2,200	70	3.0	3.0	190
Grover fine sandy loam, 6 to 12 percent slopes	80	30	2,200	60	2.8	2.8	180
Grover fine sandy loam, 12 to 20 percent slopes	70	20	1,200	50	2.5	2.5	160
Grover fine sandy loam, 20 to 35 percent slopes	----	----	----	----	----	1.5	120
Grover-Louisburg complex, 6 to 12 percent slopes, eroded	60	20	1,000	40	2.0	1.5	140
Kempsville-Bourne complex, 2 to 6 percent slopes	100	35	2,200	65	3.5	3.0	220
Kempsville-Bourne complex, 6 to 12 percent slopes	90	30	2,000	55	3.0	2.8	210
Lenoir loam, flooded, 0 to 4 percent slopes	90	45	[2] 1,200	[3] 60	----	3.0	170
Lenoir silt loam, 0 to 4 percent slopes	90	45	[2] 1,200	[3] 60	----	2.5	210

TABLE 2.—*Estimated average yields per acre of principal crops under improved management*—Continued

Soil	Corn	Soybeans	Bright tobacco	Wheat	Hay		Grass-legume pasture
					Alfalfa	Mixed	
	Bushels	*Bushels*	*Pounds*	*Bushels*	*Tons*	*Tons*	*Cow-acre-days*[1]
Louisa loam, variant, 12 to 20 percent slopes						1.5	100
Louisa loam, variant, 20 to 45 percent slopes							60
Louisburg sandy loam, 4 to 12 percent slopes	45	15	1,200	40	2.5	2.0	100
Louisburg sandy loam, 12 to 20 percent slopes						1.5	80
Louisburg sandy loam, 20 to 45 percent slopes							60
Lucy-Orangeburg loamy sands, 2 to 6 percent slopes	80	35	2,000	50	3.0	3.0	180
Lucy-Orangeburg loamy sands, 6 to 12 percent slopes	65	30	1,800	40	2.5	2.5	160
Masada fine sandy loam, 2 to 6 percent slopes	120	40	2,000	50	4.5	4.0	255
Masada fine sandy loam, 6 to 12 percent slopes	110	35	2,000	40	4.5	3.5	240
Masada gravelly fine sandy loam, 2 to 6 percent slopes	100	40	1,800	50	4.0	3.0	220
Masada gravelly fine sandy loam, 6 to 12 percent slopes	80	30	1,800	40	4.0	2.0	200
Masada loam, 2 to 6 percent slopes	120	45	2,000	50	4.5	4.0	255
Masada loam, 6 to 12 percent slopes	110	40	1,900	40	4.5	3.5	240
Mayodan sandy loam, clayey substratum, 2 to 6 percent slopes	90	35	2,200	65	4.0	3.5	240
Mayodan sandy loam, clayey substratum, 6 to 12 percent slopes	80	30	2,000	60	3.5	3.4	225
Mayodan sandy loam, clayey substratum, 12 to 20 percent slopes	70	20	1,500	45	3.0	3.0	210
Mayodan gravelly sandy loam, clayey substratum, 2 to 6 percent slopes	90	30	2,000	60	4.0	3.5	230
Mayodan gravelly sandy loam, clayey substratum, 6 to 12 percent slopes	80	25	1,800	55	3.5	3.4	215
Mayodan gravelly sandy loam, clayey substratum, 12 to 20 percent slopes	70	20	1,200	40	3.0	3.0	200
Mayodan, clayey substratum-Creedmoor sandy loams, 2 to 6 percent slopes	80	30		60	[4] 3.0	3.5	200
Mayodan, clayey substratum-Creedmoor sandy loams, 6 to 12 percent slopes	70	25		50	[4] 2.5	3.0	190
Mayodan, clayey substratum-Creedmoor sandy loams, 12 to 20 percent slopes	60	15		45	[4] 1.5	2.0	160
Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 2 to 12 percent slopes	60	15	[2] 1,200	45	[4] 2.5	2.5	140
Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 12 to 20 percent slopes						1.5	140
Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 20 to 40 percent slopes							120
Mayodan, clayey substratum-Pinkston sandy loams, 20 to 45 percent slopes							120
Molena loamy sand, 2 to 6 percent slopes	60	25	1,800	50	2.0	2.5	120
Norfolk fine sandy loam, 0 to 6 percent slopes	110	35	2,000	60	4.0	4.0	240
Ochrepts and Udults, sloping	60	15		45	2.5	3.0	170
Ochrepts and Udults, strongly sloping						2.5	160
Ochrepts and Udults, steep							140
Orange sandy loam, 2 to 6 percent slopes	80	25	[2] 1,200	40	[4] 3.0	3.0	195
Orange sandy loam, 6 to 12 percent slopes	60	20	[2] 1,000	35	[4] 2.5	2.0	140
Orangeburg-Faceville sandy loams, 2 to 6 percent slopes	95	45	2,200	65	5.0	4.0	210
Orangeburg-Faceville sandy loams, 6 to 12 percent slopes	85	35	2,000	60	4.5	3.5	180
Pamunkey loam, 0 to 6 percent slopes	120	45	[2] 1,800	75	5.0	3.5	255
Pamunkey loam, 6 to 12 percent slopes	100	35	[2] 1,800	65	4.5	3.0	230
Pamunkey loam, 12 to 20 percent slopes	80	25	[2] 1,200	50	3.5	2.5	200
Pinkston gravelly sandy loam, 6 to 12 percent slopes	65	30		50	2.5	2.5	120
Pinkston gravelly sandy loam, 12 to 20 percent slopes						1.5	100
Pinkston gravelly sandy loam, 20 to 45 percent slopes							90
Pouncey fine sandy loam, 0 to 6 percent slopes	70	30				3.5	225
Roanoke loam							150
Rumford loamy fine sand, 2 to 6 percent slopes	100	30	2,000	50	5.0	3.5	285
Rumford loamy fine sand, 6 to 12 percent slopes	90	25	1,800	45	4.5	3.0	255
Spotsylvania fine sandy loam, 2 to 6 percent slopes	120	35	[2] 2,000	55	4.2	3.8	270
Spotsylvania fine sandy loam, 6 to 12 percent slopes	105	30	[2] 1,800	50	4.0	3.6	260
Starr soils, clayey substratum, 2 to 6 percent slopes	110	40	[2] 1,200	[3] 70	4.5	4.5	210
Tetotum fine sandy loam, ponded	115	40	[2] 1,800	65		2.8	240
Tetotum loam, clayey substratum, 2 to 6 percent slopes	115	40	[2] 1,800	[3] 65	[4] 4.0	2.8	240
Toccoa fine sandy loam, 0 to 4 percent slopes	120	45	[2] 1,200	[3] 75	[4] 4.0	4.0	270
Turbeville fine sandy loam, 2 to 6 percent slopes	120	45	[2] 2,000	75	4.5	4.0	255
Turbeville fine sandy loam, 6 to 12 percent slopes	110	40	[2] 2,000	65	4.4	3.5	240

TABLE 2.—*Estimated average yields per acre of principal crops under improved management*—Continued

Soil	Corn	Soybeans	Bright tobacco	Wheat	Hay		Grass-legume pasture
					Alfalfa	Mixed	
	Bushels	*Bushels*	*Pounds*	*Bushels*	*Tons*	*Tons*	*Cow-acre-days*[1]
Turbeville gravelly fine sandy loam, 2 to 6 percent slopes	100	40	[2] 2,000	70	3.5	3.5	230
Turbeville gravelly fine sandy loam, 6 to 12 percent slopes	80	35	[2] 1,800	60	3.5	3.0	200
Vance fine sandy loam, 2 to 6 percent slopes	80	35	1,800	60	3.0	4.8	240
Vance fine sandy loam, 6 to 12 percent slopes	75	30	1,500	55	2.8	4.8	240
Vance fine sandy loam, 12 to 20 percent slopes						4.2	210
Varina fine sandy loam, 0 to 4 percent slopes	100	40	[2] 1,800	70	[4] 3.5	3.0	240
Vaucluse sandy loam, 2 to 6 percent slopes	60	25	2,200	45	4.0	3.0	240
Vaucluse sandy loam, 6 to 12 percent slopes	50	25	2,000	40	3.5	3.0	210
Wedowee gravelly fine sandy loam, 20 to 40 percent slopes							75
Worsham fine sandy loam, 0 to 4 percent slopes							150

[1] A term used to express the carrying capacity of pasture. It is the number of animal units carried per acre, multiplied by the number of days the pasture is grazed during a single grazing season without injury to the sod. An acre of pasture that provides 30 days of grazing for 2 cows, for example, has a carrying capacity of 60 cow-acre-days.

[2] Lower quality.
[3] Small grains lodge on this soil.
[4] Alfalfa is short lived on this soil.

so that the physical condition of the soil is improved and erosion is reduced.
4. Fertilizer and lime are applied according to the needs indicated by soil tests.
5. Tillage is kept to a minmum, but suitable methods of plowing, preparing the seedbed, and cultivating are used.
6. Planting, cultivating, and harvesting are done at the proper time and in the proper manner.
7. Weeds, disease, and insects are controlled.

The yields shown are not presumed to be the highest yields obtainable, but they are a practical goal if improved management is used. Yields on the same soil can be expected to vary because of differences in the kind of management, in the weather, in the crop varieties used, and in the number and kinds of insects and diseases. Other information about management practices is in the section "Capability Grouping."

Woodland [3]

About 232,130 acres, or 78 percent, of Chesterfield County is wooded. Most is in second growth hardwood, loblolly pine, Virginia pine, and shortleaf pine.

The original woodland was mixed stands of chestnut oak, white oak, post oak, scarlet oak, black oak, northern red oak, southern red oak, and hickory. Yellow-poplar was in the more moist areas. Shortleaf pine and Virginia pine were scattered throughout the hardwood stands. Poorly drained areas were covered by mixed stands of green ash, sweetgum, blackgum, boxelder, and red maple.

Much of the original woodland was cleared and cultivated. The present stands of mixed hardwood, Virginia pine, loblolly pine, and shortleaf pine are mainly on abandoned farms.

[3] By LUITPOLD W. KEMPF, woodland conservationist, Soil Conservation Service.

Woodland groups

The soils of Chesterfield County have been placed in woodland groups to assist in planning the use of soils for wood crops. Each group consists of soils that are suited to the same kinds of tree; that need approximately the same kind of management when the vegetation is similar; and that have about the same potential productivity.

Each woodland group is identified by three-part symbol, such as 1o1, 2w1, or 4c1. The potential productivity of the soil for the most important species is indicated by the first number in the symbol; 1, very high; 2, high; 3, moderately high; 4, moderate; and 5, low. These ratings are based on field determinations of average site index. Site index is the height, in feet, that the dominant and codominant trees of a given species, on a specified kind of soil, reach in a natural, essentially unmanaged stand at age 50 years.

The second part of the symbol is a lower case letter. This letter indicates an important soil property that is associated with a moderate or severe hazard or limitation in managing the soil for tree growth. The letter *w* indicates that water in or on the soil, either seasonally or year round, is the chief limitation; *d* indicates that rooting depth is restricted because the soil is shallow to hardpan, to hard rock, or to some other restrictive material; *c* indicates that the main limitation is the kind or amount of clay in the upper part of the soils in the group; *s* indicates that the soils are sandy and dry, have little or no difference in texture between surface layer and subsoil, have low available water capacity, and generally have a low supply of plant nutrients; *r* indicates that the main limitation is steep slopes; and *o* indicates that the soil has few limitations that restrict its use for trees. Some kinds of soil may have more than one set of subclass characteristics. Priority in placing each kind of soil into a subclass is in the order that the subclass characteristics are listed above.

The last part of the symbol, another number, differentiates woodland groups that have identical first and second

parts in their identifying symbol. For example, soils in group 1w1 require somewhat different management than soils in 1w2.

Table 3 gives the woodland group of each soil. A rating is given for erosion hazard, equipment limitations, seedling mortality, windthrow hazard, and plant competition. These ratings are *slight*, *moderate*, or *severe*.

Table 3 also presents the species to favor in existing stand and species to favor for planting. Tree species listed are those that experience and testing have shown to give the best production.

Erosion hazard indicates the potential degree of soil losses in common woodland management operations. The hazard is *slight* if expected soil losses are small; *moderate* if some soil losses are expected and care is needed during logging and construction to reduce the risk of erosion; *severe* if special methods of operation are necessary for preventing excessive soil losses. In this county, only the steep soils are subject to severe erosion.

Equipment limitations depends on soil characteristics that restrict or prohibit the use of tending and harvesting equipment. Soil characteristics considered the most limiting are drainage, depth to the water table, slope, and texture of the surface layer. *Slight* means no restriction in the kind of equipment or in the time of year it is used, *moderate* means that the use of equipment is restricted for less than 3 months of the year, and *severe* means that special equipment is needed and its use is restricted for more than 3 months of the year.

Seedling mortality refers to the expected degree of mortality of planted seedlings when plant competition is not a limiting factor. Considered in the ratings are depth to the water table, hazard of flooding, drainage, soil depth and structure, and degree of erosion. Normal rainfall, good planting stock, and proper planting are assumed. *Slight* indicates an expected loss of less than 25 percent of the planted seedlings; *moderate*, a loss of 25 to 50 percent; and *severe*, a loss of more than 50 percent of the seedlings. Special preparation is needed before planting for soils rated severe and for most soils rated moderate.

Plant competition is the degree to which undesirable plants invade areas under an opening in the tree canopy. *Slight* means that competition from other plants is not a concern; *moderate* means that plant competition generally is not expected to prevent development of fully stocked stands of desirable trees; and *severe* means that plant competition may prevent establishment of a desirable stand unless intensive site preparation and such practices as weeding are used to control undesirable plants.

Windthrow hazard ratings result from an evaluation of the development of tree roots and the ability of the soil to hold trees firmly. The hazard is *slight* if most trees withstand wind, *moderate* if some trees are blown down during periods of excessive soil wetness and strong wind, and *severe* if many trees are blown down during periods of excessive soil wetness and moderate or strong wind.

Wildlife Habitat [4]

The wildlife population in any area depends largely on the amount and distribution of food, cover, and water. The lack of any of these requirements, an unfavorable balance between them, or an inadequate distribution can seriously limit or make impossible the use of a tract as a habitat for desired species of wildlife.

Most wildlife habitats are created, improved, or maintained by establishing and manipulating vegetation and by providing food and water in suitable places. Information about the soils is essential. Such information is also useful in broad scale planning for parks, nature areas, or other recreational or educational developments in which wildlife populations are important. It is an important aid in planning for the acquisition of land for development of wildlife habitat or protection of wildlife.

Interpretations of the suitability of soils for wildlife are helpful in selecting sites that are adaptable to wildlife management and in determining the level of management needed to achieve satisfactory results. Interpretations can also reveal specific factors that make a particular area unsuited for a specified kind of wildlife. In table 4 the soils of Chesterfield County are rated according to their suitability for seven elements of wildlife habitat and three kinds of wildlife habitat.

Habitat suitability ratings

A rating of *good* means that habitat is generally easily created, improved, or maintained; that the soils have few or no limitations that affect habitat management; and that satisfactory results can be expected. *Fair* means that habitats can be created, improved, or maintained, but the soils have moderate limitations that affect management and that moderate intensity of management and fairly frequent attention are commonly required for satisfactory results. *Poor* means that habitats can be created, improved, or maintained, but the soils have rather severe limitations; habitat management is difficult, is expensive, and requires intensive effort; and that results are not always satisfactory. *Very poor* means that creating, improving, or maintaining habitats under the prevailing soil conditions is impractical and that unsatisfactory results are probable.

Habitat elements

The seven elements of wildlife habitat listed in table 4 are described in the following paragraphs.

Grain and seed crops are domestic grains or other seed producing annuals planted to produce wildlife food. Examples are corn, sorghum, wheat, oats, barley, millet, buckwheat, soybeans, cowpeas, and sunflowers.

Domestic grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food or cover. Some examples are fescue, orchardgrass, bluegrass, timothy, reed canarygrass, clover, alfalfa, lespedeza, trefoil, and crownvetch.

Wild herbaceous plants are native or naturally established dryland herbaceous grasses and forbs (including weeds) that provide food and cover for wildlife. Examples include partridge pea, bluestem, wild millet, goldenrod, wild strawberry, broomsedge, beggarweed, pokeweed, ragweed, dandelion, wheat grasses, and gramas.

Hardwood trees are nonconiferous trees and associated woody understory plants that provide wildlife cover or that produce nuts, buds, catkins, twigs, bark, or foliage used as food by wildlife. Many of these plants have secondary values as nesting or escape cover. These are often established naturally, but can be planted or trans-

[4] By R. F. DUGAN, biologist, Soil Conservation Service.

TABLE 3.—*Suitability*

[Not included in this table because their properties are too variable to estimate are: Fluvaquents (1A, 3A),

Woodland suitability group and soil symbol	Potential productivity	
	Species	Site index
Group 1w1: Deep, somewhat poorly drained soil on flood plains; high available water capacity; slopes of 0 to 2 percent. 28.	Northern red oak White oak Loblolly pine Yellow-poplar	85+ 85+ 95+ 95+
Group 1w2: Deep, poorly drained soil on low terraces; medium available water capacity; slopes of 0 to 2 percent. 37.	Loblolly pine Willow oak Virginia pine	95+ 85+ 65–75
Group 1o1: Deep, well drained soil on flood plains, in depressions, and at the head of drainageways; medium available water capacity; slopes of 0 to 6 percent. 26B, 101B.	Loblolly pine Yellow-poplar Sweetgum Virginia pine	95+ 95+ 85–95 65–75
Group 2w1: Deep, somewhat poorly drained soil on high terraces and upland flats; medium available water capacity; slopes of 0 to 4 percent. 167, 188.	Northern red oak White oak Loblolly pine Virginia pine	75–85 75–85 85–95 65–75
Group 2w2: Deep, moderately well drained to somewhat poorly drained soil on terraces and upland flats; medium available water capacity; slopes of 0 to 4 percent. 8B, 30B, 67B, 68B.	Loblolly pine White oak Sweetgum Northern red oak	85–95 65–75 85–95 75–85
Group 2w3: Moderately deep to deep, poorly drained soil on flood plains, terraces, and upland flats; low to medium available water capacity; slopes of 0 to 6 percent. 6B, 31, 33B, 137, 159B, 191.	Northern red oak Virginia pine Loblolly pine Pin oak Sweetgum	75–85 65–75 85–95 80–90 85–95
Group 2s1: Deep, excessively drained soil on flood plains; low available water capacity; slopes of 0 to 4 percent. 71B.	Loblolly pine Northern red oak White oak Yellow-poplar	85–95 75–85 75–85 95+
Group 2r1: Deep, moderately well drained to excessively drained soil on terraces and uplands; low to medium available water capacity; slopes of 12 to 40 percent. 51D, 172E, 172F.	Northern red oak White oak Loblolly pine Virginia pine	75–85 75–85 85–95 75–85
Group 2o1: Deep, moderately well drained to excessively drained soil on terraces, in depressions, at the head of drainageways, and on uplands; low to medium available water capacity; slopes of 0 to 12 percent. 51B, 51C, 65B, 70B, 112B, 112C, 172D.	Northern red oak Yellow-poplar Loblolly pine Virginia pine	75–85 85–95 85–95 65–75
Group 3w1: Deep, moderately well drained to poorly drained soil on uplands; low to medium available water capacity; slopes of 0 to 12 percent. 7B, 41B, 61B, 61C, 61C2, 80B, 123B, 123C, 202B, 202C, 207C.	Loblolly pine Northern red oak Sweetgum Red maple	75–85 65–75 75–85 60–70
Group 3s1: Deep, well drained to somewhat excessively drained soil on terraces and uplands; low to medium available water capacity; slopes of 2 to 12 percent. 53B, 212B, 212C.	Loblolly pine Northern red oak White oak Yellow-poplar	75–85 65–75 65–75 85–95
Group 3r1: Deep, well drained soil on uplands; low to medium available water capacity; slopes of 12 to 45 percent. 38D, 42D, 59D, 142D, 142E, 151D, 201D, 201F, 210D, 244D, 244E, 251D, 251F, 305D, 305E.	Loblolly pine Northern red oak White oak Virginia pine	75–85 65–75 65–75 65–75
Group 3r2: Moderately deep, well drained to excessively drained soil on uplands; low available water capacity; slopes of 12 to 45 percent. 105D, 105E.	Northern red oak White oak Virginia pine Shortleaf pine	65–75 65–75 60–70 50–60
Group 3o1: Deep, well drained and moderately well drained soil on uplands; low to medium available water capacity; slopes of 0 to 12 percent. 17B, 17C, 21B, 38B, 38C, 42B, 42C, 59B, 59C, 66B, 92B, 92C, 103B, 103C, 106B, 107B, 107B, 107C, 108B, 108C, 110B, 110C, 117B, 117C, 142B, 142C, 151B, 151C, 157B, 158B, 162B, 162C, 163B, 163C, 201B, 201C, 210B, 210C, 244B, 244C, 245B, 251C, 305B, 305C, 340B, 542B, 542C.	Loblolly pine Northern red oak White oak Virginia pine	75–85 65–75 65–75 70–80

of the soils for trees

Hydraquents (100), Made land (15), Orthents-Udults-Mine pits complex (16), and Udifluvents (2)]

Species to favor—		Erosion hazard	Equipment limitations	Seedling mortality	Windthrow hazard	Plant competition	
In existing stands	For planting					Conifers	Hardwoods
Northern red oak, white oak, loblolly pine, red maple.	Loblolly pine	Slight	Moderate	Slight	Slight	Severe	Severe.
Loblolly pine, willow oak, Virginia pine, green ash.	Loblolly pine	Slight	Severe	Severe	Slight	Severe	Severe.
Loblolly pine, yellow-poplar, sweetgum, black walnut, green ash.	Loblolly pine, yellow-poplar, sweetgum, black walnut.	Slight	Slight	Slight	Slight	Severe	Moderate.
Northern red oak, white oak, loblolly pine, Virginia pine.	Loblolly pine	Slight	Moderate	Moderate	Moderate	Severe	Severe.
Loblolly pine, white oak, sweetgum, northern red oak.	Loblolly pine	Slight	Moderate	Slight	Slight	Severe	Moderate.
Northern red oak, shortleaf pine, Virginia pine, loblolly pine, pin oak, green ash.	Loblolly pine, Virginia pine.	Slight	Severe	Severe	Slight	Severe	Severe.
Loblolly pine, northern red oak, white oak, yellow-poplar, Virginia pine, shortleaf pine.	Loblolly pine	Slight	Moderate	Moderate	Slight	Moderate	Slight.
Northern red oak, white oak, yellow-poplar, loblolly pine, Virginia pine.	Loblolly pine	Moderate	Moderate	Slight	Slight	Severe	Slight.
Northern red oak, white oak, yellow-poplar, black walnut, shortleaf pine, Virginia pine, loblolly pine.	Loblolly pine, yellow-poplar, black walnut.	Slight	Slight	Slight	Slight	Severe	Moderate.
Northern red oak, white oak, loblolly pine, sweetgum, red maple.	Loblolly pine, Virginia pine, sweetgum.	Slight	Moderate	Slight	Slight	Severe	Moderate.
Loblolly pine, northern red oak, white oak, yellow-poplar, Virginia pine, shortleaf pine.	Loblolly pine	Slight	Moderate	Moderate	Slight	Slight	Slight.
Loblolly pine, Virginia pine, northern red oak, white oak, yellow-poplar.	Loblolly pine	Moderate	Moderate	Slight	Slight	Moderate	Slight.
Northern red oak, white oak, Virginia pine.	Loblolly pine, Virginia pine, shortleaf pine.	Moderate. Severe where slope is more than 35 percent.	Moderate. Severe where slope is more than 35 percent.	Slight	Slight	Moderate	Slight.
Loblolly pine, northern red oak, sweetgum, Virginia pine.	Loblolly pine	Slight	Slight	Slight	Slight	Moderate	Slight.

TABLE 3.—*Suitability*

Woodland suitability group and soil symbol	Potential productivity	
	Species	Site index
Group 3o2: Moderately deep, well drained to excessively drained soil on uplands; low available water capacity; slopes of 4 to 12 percent. 105C, 241C.	Northern red oak	65–75
	White oak	65–75
	Virginia pine	60–70
	Shortleaf pine	50–60
Group 4w1: Deep, somewhat poorly drained to moderately well drained soil on uplands; medium available water capacity; slopes of 2 to 12 percent. 48B, 48C.	Northern red oak	55–65
	Virginia pine	55–65
	Shortleaf pine	55–65
	Loblolly pine	65–75
Group 4d1: Moderately well drained soil on uplands; low available water capacity; slopes of 2 to 12 percent. 45B, 49B, 49C, 82B, 82C, 169B, 169C, 261B.	Loblolly pine	65–75
	Virginia pine	55–65
	Northern red oak	55–65
	White oak	55–65
Group 4d2: Moderately deep, well drained to excessively drained soil on uplands; low available water capacity; slopes of 6 to 12 percent. 165C.	Shortleaf pine	55–65
	Virginia pine	55–65
	Northern red oak	55–65
	White oak	55–65
	Loblolly pine	65–75
Group 4c1: Deep, well drained soil on uplands; medium available water capacity; slopes of 6 to 12 percent. 340C, 340D.	Loblolly pine	65–75
	Northern red oak	55–65
	White oak	55–65
	Virginia pine	55–65
Group 4r1: Deep, well drained to excessively drained soil on uplands; medium available water capacity; slopes of 12 to 45 percent. 50F, 505D, 505F.	Northern red oak	55–65
	White oak	55–65
	Virginia pine	55–65
	Shortleaf pine	55–65
Group 4r2: Moderately deep, well drained to excessively drained soil on uplands; low available water capacity; slope is 12 to 45 percent. 165D, 165F.	Northern red oak	55–65
	White oak	55–65
	Virginia pine	55–65
Group 4o1: Deep, well drained soil on uplands; medium available water capacity; slopes of 2 to 12 percent. 24B, 24C, 50C.	Northern red oak	55–65
	White oak	55–65
	Shortleaf pine	55–65
	Virginia pine	55–65
	Loblolly pine	65–75

planted. These include oak, beech, hickory, maple, birch, locust, dogwood, viburnum, honeysuckle, grape, sumac, blackberries, autumn-olive, multiflora rose, and shrub lespedeza.

Coniferous plants are cone bearing trees, shrubs, or ground cover that furnish wildlife cover or supply food in the form of browse, seeds, or fruitlike cones. These are commonly established through natural process, but can be planted. Examples include pine, spruce, hemlock, fir, cedar, juniper, larch, yew, and cowpeas.

Wetland plants are annual or perennial wild herbaceous plants that grow on moist to wet sites. They do not include submerged or floating aquatics. They produce food or cover used extensively by wetland wildlife. Examples are smartweed, wildrice, rushes, sedges, reeds, cutgrass, arrowhead, and wild millet.

Shallow water areas are areas of surface water having an average depth of less than 5 feet. They are natural areas, or they have been formed by dams or levees (sometimes in combination with some excavation) or by water control devices in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering areas, wildlife ponds, and beaver ponds.

Kinds of wildlife

The three kinds of wildlife habitat listed in table 4, for which the soils are rated, are defined in the following paragraphs.

Open land wildlife refer to birds and mammals that normally live in areas of crops, pasture, meadow, lawns, and areas overgrown with grasses, herbs, shrubs, and vines. Examples are rabbit, quail, pheasant, mourning dove, field sparrow, meadowlark, killdeer, red fox, and woodchuck.

Ratings in this column are obtained by weighing and averaging the ratings for habitat elements of grain and seed crops, domestic grasses and legumes, wild herbaceous plants, and hardwood trees or coniferous plants.

Woodland wildlife are birds and mammals that obtain food and cover in stands or hardwoods, coniferous trees, and shrubs, or a mixture of these. Examples are wild turkey, white-tailed deer, ruffed grouse, gray squirrel,

of the soil for trees—Continued

Species to favor—		Erosion hazard	Equipment limitations	Seedling mortality	Windthrow hazard	Plant competition	
In existing stands	For planting					Conifers	Hardwoods
Virginia pine, northern red oak, white oak, shortleaf pine.	Loblolly pine, Virginia pine, shortleaf pine.	Slight	Slight	Slight	Slight	Moderate	Slight.
Northern red oak, Virginia pine, shortleaf pine, loblolly pine.	Loblolly pine, Virginia pine.	Slight	Moderate	Moderate	Moderate	Severe	Moderate.
Loblolly pine, Virginia pine.	Loblolly pine	Slight	Moderate	Moderate	Moderate	Moderate	Slight.
Shortleaf pine, Virginia pine, northern red oak, white oak, loblolly pine.	Loblolly pine	Slight	Slight	Severe	Moderate	Slight	Slight.
Loblolly pine, Virginia pine, northern red oak, white oak.	Loblolly pine, Virginia pine.	Moderate. Severe where slope is more than 15 percent.	Moderate. Severe where slope is more than 15 percent.	Moderate	Moderate	Slight	Slight.
Northern red oak, white oak, Virginia pine, loblolly pine.	Virginia pine, loblolly pine.	Moderate	Moderate	Slight	Slight	Slight	Slight.
Northern red oak, white oak, Virginia pine, loblolly pine.	Virginia pine, loblolly pine.	Moderate. Severe where slope is more than 15 percent.	Moderate. Severe where slope is more than 15 percent.	Severe	Moderate	Slight	Slight.
Northern red oak, white oak, loblolly pine, Virginia pine.	Loblolly pine, Virginia pine.	Slight	Slight	Slight	Slight	Slight	Slight.

gray fox, raccoon, wood thrush, vireos, warblers, and woodpeckers.

Ratings in this column are obtained by weighing and averaging the ratings for habitat elements of domestic grasses, and legumes, wild herbaceous plants, and hardwood trees or coniferous plants.

Wetland wildlife are birds and mammals of swamps, marshes, or areas of open water. Examples are ducks, coots, herons, geese, snipe, rails, kingfishers, mink, muskrat, and beaver.

Ratings in this column are obtained by averaging the rating for wetland plants with the ratings for shallow water areas.

Engineering [5]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, drainage, shrink swell potential, grain size, plasticity, and reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems of disposal of sewage and refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems,

[5] RICHARD A. GALLO, engineer, Soil Conservation Service, helped prepare this section.

TABLE 4.—*Suitability of the soils for*

[Not included in this table because their properties are too variable to

Soil	Elements of wildlife habitat		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants
Abell sandy loam, 2 to 8 percent slopes	Good	Good	Good
Appling sandy loam, 2 to 6 percent slopes	Good	Good	Good
Appling sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Appling sandy loam, 12 to 20 percent slopes	Fair	Good	Good
Appling gravelly sandy loam, 2 to 6 percent slopes	Good	Good	Good
Appling loam, 2 to 6 percent slopes	Good	Good	Good
Appling loam, 6 to 12 percent slopes	Fair	Good	Good
Appling-Spotsylvania sandy loams, 2 to 6 percent slopes	Good	Good	Good
Appling-Wedowee fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Appling-Wedowee fine sandy loams, 12 to 20 percent slopes	Fair	Good	Good
Aquults	Poor	Poor	Fair
Atlee silt loam, 0 to 4 percent slopes	Good	Good	Good
Augusta fine sandy loam, high terrace, 0 to 4 percent slopes	Fair	Good	Good
Bourne sandy loam, 2 to 6 percent slopes	Fair	Good	Good
Bourne sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Bourne fine sandy loam, 2 to 6 percent slopes	Fair	Good	Good
Bourne fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Bourne-Colfax complex, 2 to 6 percent slopes	Fair	Good	Good
Buncombe loamy fine sand, 0 to 4 percent slopes	Poor	Poor	Good
Cecil fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Cecil fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Cecil fine sandy loam, 12 to 20 percent slopes	Fair	Good	Good
Chastain loam	Very poor	Poor	Poor
Chewacla loam	Very poor	Poor	Poor
Colfax sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Colfax fine sandy loam, 2 to 6 percent slopes	Fair	Good	Good
Colfax fine sandy loam, variant, 0 to 4 percent slopes	Fair	Good	Good
Coxville loam, 2 to 6 percent slopes	Poor	Fair	Fair
Craven fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Creedmoor fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Creedmoor fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Creedmoor fine sandy loam, 6 to 12 percent slopes, eroded	Fair	Good	Good
Creedmoor gravelly fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Creedmoor gravelly fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Creedmoor-Worsham sandy loams, 2 to 6 percent slopes	Fair	Good	Good
Creedmoor-Worsham sandy loams, 6 to 12 percent slopes	Fair	Good	Good
Cullen loam, 2 to 6 percent slopes	Good	Good	Good
Cullen clay loam, 6 to 12 percent slopes, eroded	Fair	Good	Good
Cullen clay loam, 12 to 20 percent slopes, eroded	Poor	Fair	Good
Dogue loam variant, 0 to 4 percent slopes	Good	Good	Good
Dunbar fine sandy loam, 0 to 4 percent slopes	Good	Good	Good
Durham-Bourne fine sandy loams, 2 to 6 percent slopes	Fair	Good	Good
Edgehill very gravelly fine sandy loam, 2 to 6 percent slopes	Fair	Good	Good
Edgehill very gravelly fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Edgehill very gravelly fine sandy loam, 12 to 20 percent slopes	Poor	Fair	Good
Edgehill very gravelly fine sandy loam, 20 to 40 percent slopes	Very poor	Fair	Good
Enon-Louisburg complex, 12 to 40 percent slopes	Very poor	Fair	Good
Enon-Vance complex, 2 to 12 percent slopes	Fair	Good	Good
Faceville fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Faceville fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Faceville-Gritney fine sandy loams, 2 to 6 percent slopes	Good	Good	Good
Faceville-Gritney gravelly fine sandy loams, 2 to 6 percent slopes	Good	Good	Good
Faceville-Gritney gravelly fine sandy loams, 6 to 12 percent slopes	Fair	Good	Good
Fluvaquents	Very poor	Very poor	Fair
Fluvaquents, ponded	Very poor	Very poor	Fair
Forestdale silt loam	Poor	Poor	Fair
Gritney fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Gritney fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Grover fine sandy loam, 2 to 6 percent slopes, eroded	Good	Good	Good
Grover fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Grover fine sandy loam, 12 to 20 percent slopes	Poor	Fair	Fair
Grover fine sandy loam, 20 to 35 percent slopes	Very poor	Fair	Fair
Grover-Louisburg complex, 6 to 12 percent slopes, eroded	Fair	Fair	Good
Hydraquents	Very poor	Very poor	Poor
Kempsville-Bourne complex, 2 to 6 percent slopes	Good	Good	Good
Kempsville-Bourne complex, 6 to 12 percent slopes	Good	Good	Good
Lenoir loam, flooded, 0 to 4 percent slopes	Poor	Fair	Good
Lenoir silt loam, 0 to 4 percent slopes	Fair	Good	Good
Louisa loam, variant, 12 to 20 percent slopes	Poor	Fair	Good

wildlife habitat and for kinds of wildlife

estimate are: Made land (15) and Orthents-Udults-Mine pits complex (16)]

Elements of wildlife habitat—Continued				Kinds of wildlife		
Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Open land	Woodland	Wetland
Good	Good	Poor	Poor	Good	Good	Poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Fair	Good	Good	Fair	Fair	Good.
Good	Good	Poor	Poor	Good	Good	Very poor.
Good	Good	Fair	Fair	Good	Good	Fair.
Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
Poor	Poor	Very poor	Very poor	Fair	Poor	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Poor	Good	Good	Poor	Fair	Good.
Good	Good	Fair	Fair	Poor	Good	Fair.
Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Fair	Poor	Good	Fair	Poor.
Fair	Fair	Good	Fair	Fair	Fair	Fair.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Good	Poor	Poor	Good	Good	Poor.
Good	Good	Poor	Fair	Good	Good	Poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Poor	Very poor	Good	Good	Poor	Poor	Good.
Poor	Very poor	Good	Good	Poor	Poor	Good.
Fair	Fair	Good	Good	Fair	Fair	Good.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Fair	Very poor	Very poor	Fair	Good	Very poor.
Good	Fair	Very poor	Very poor	Fair	Good	Very poor.
Very poor	Very poor	Good	Good	Very poor	Very poor	Good.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Fair	Good	Fair	Good	Fair.
Good	Good	Fair	Fair	Good	Good	Fair.
Good	Good	Very poor	Very poor	Fair	Good	Very poor.

TABLE 4.—*Suitability of the soils for wildlife*

Soil	Elements of wildlife habitat		
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants
Louisa loam, variant, 20 to 45 percent slopes	Very poor	Poor	Good
Louisburg sandy loam, 4 to 12 percent slopes	Poor	Fair	Fair
Louisburg sandy loam, 12 to 20 percent slopes	Poor	Fair	Fair
Louisburg sandy loam, 20 to 45 percent slopes	Very poor	Poor	Fair
Lucy-Orangeburg loamy sands, 2 to 6 percent slopes	Poor	Fair	Good
Lucy-Orangeburg loamy sands, 6 to 12 percent slopes	Poor	Fair	Good
Masada fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Masada fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Masada gravelly fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Masada gravelly fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Masada loam, 2 to 6 percent slopes	Good	Good	Good
Masada loam, 6 to 12 percent slopes	Fair	Good	Good
Mayodan sandy loam, clayey substratum, 2 to 6 percent slopes	Good	Good	Good
Mayodan sandy loam, clayey substratum, 6 to 12 percent slopes	Fair	Good	Good
Mayodan sandy loam, clayey substratum, 12 to 20 percent slopes	Fair	Good	Good
Mayodan gravelly sandy loam, clayey substratum, 2 to 6 percent slopes	Good	Good	Good
Mayodan gravelly sandy loam, clayey substratum, 6 to 12 percent slopes	Fair	Good	Good
Mayodan gravelly sandy loam, clayey substratum, 12 to 20 percent slopes	Fair	Good	Good
Mayodan, clayey substratum-Creedmoor sandy loams, 2 to 6 percent slopes	Good	Good	Good
Mayodan, clayey substratum-Creedmoor sandy loams, 6 to 12 percent slopes	Fair	Good	Good
Mayodan, clayey substratum-Creedmoor sandy loams, 12 to 20 percent slopes	Fair	Fair	Good
Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 2 to 12 percent slopes	Fair	Good	Good
Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 12 to 20 percent slopes	Poor	Fair	Good
Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 20 to 40 percent slopes	Very poor	Fair	Good
Mayodan, clayey substratum-Pinkston sandy loams, 20 to 45 percent slopes	Very poor	Fair	Good
Molena loamy sand, 2 to 6 percent slopes	Poor	Fair	Fair
Norfolk fine sandy loam, 0 to 6 percent slopes	Good	Good	Good
Ochrepts and Udults, sloping	Fair	Good	Good
Ochrepts and Udults, strongly sloping	Poor	Fair	Good
Ochrepts and Udults, steep	Very poor	Poor	Good
Orange sandy loam, 2 to 6 percent slopes	Fair	Good	Good
Orange sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Orangeburg-Faceville sandy loams, 2 to 6 percent slopes	Good	Good	Good
Orangeburg-Faceville sandy loams, 6 to 12 percent slopes	Fair	Good	Good
Pamunkey loam, 0 to 6 percent slopes	Good	Good	Good
Pamunkey loam, 6 to 12 percent slopes	Fair	Good	Good
Pamunkey loam, 12 to 20 percent slopes	Fair	Good	Good
Pinkston gravelly sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Pinkston gravelly sandy loam, 12 to 20 percent slopes	Poor	Fair	Good
Pinkston gravelly sandy loam, 20 to 45 percent slopes	Very poor	Fair	Good
Pouncey fine sandy loam, 0 to 6 percent slopes	Poor	Fair	Fair
Roanoke loam	Poor	Poor	Fair
Rumford loamy fine sand, 2 to 6 percent slopes	Fair	Fair	Fair
Rumford loamy fine sand, 6 to 12 percent slopes	Fair	Fair	Fair
Spotsylvania fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Spotsylvania fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Starr soils, clayey substratum, 2 to 6 percent slopes	Good	Good	Good
Tetotum fine sandy loam, ponded	Fair	Good	Good
Tetotum loam, clayey substratum, 2 to 6 percent slopes	Good	Good	Good
Toccoa fine sandy loam, 0 to 4 percent slopes	Poor	Fair	Fair
Turbeville fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Turbeville fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Turbeville gravelly fine sandy loam, 2 to 6 percent slopes	Good	Good	Good
Turbeville gravelly fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Udifluvents	Poor	Fair	Fair
Vance fine sandy loam, 2 to 6 percent slopes	Fair	Good	Good
Vance fine sandy loam, 6 to 12 percent slopes	Fair	Good	Good
Vance fine sandy loam, 12 to 20 percent slopes	Fair	Good	Good
Varina fine sandy loam, 0 to 4 percent slopes	Good	Good	Good
Vaucluse sandy loam, 2 to 6 percent slopes	Fair	Fair	Fair
Vaucluse sandy loam, 6 to 12 percent slopes	Fair	Fair	Fair
Wedowee gravelly fine sandy loam, 20 to 40 percent slopes	Very poor	Poor	Good
Worsham fine sandy loam, 0 to 4 percent slopes	Poor	Fair	Fair

habitat and for kinds of wildlife—Continued

Elements of wildlife habitat—Continued				Kinds of wildlife		
Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Open land	Woodland	Wetland
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Good	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Poor	Poor	Very poor	Very poor	Poor	Poor	Very poor.
Good	Good	Poor	Very poor	Fair	Good	Very poor.
Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Fair	Fair	Poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Fair	Very poor	Very poor	Poor	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Fair	Very poor	Very poor	Good	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Good	Good	Fair	Fair	Good.
Fair	Fair	Good	Good	Fair	Fair	Good.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Fair	Fair	Fair	Good	Good	Fair.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Fair	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Fair	Poor	Fair	Good	Poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Very poor	Very poor	Good	Good	Very poor.
Good	Good	Poor	Very poor	Good	Good	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Fair	Fair	Very poor	Very poor	Fair	Fair	Very poor.
Good	Good	Very poor	Very poor	Poor	Good	Very poor.
Fair	Fair	Good	Good	Fair	Fair	Good.

ponds, terraces and other structures for controlling water and conserving soil.

5. Correlate performance of structures already built with properties of the kinds of soil on which they are built to predict performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5 and 6, which show, respectively, several estimated soil properties significant in engineering and interpretations for various engineering uses.

This information, along with the soil map and other parts of this publication, can be used in making interpretations in addition to those given in tables 5 and 6, and it also can be used to make other useful maps.

This information, however, does not eliminate the need for further investigations at sites selected for engineering works, especially works that involve heavy loads, or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Inspection of sites, especially small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have special meaning to soil scientists but are not known to all engineers. Many of these terms commonly used in soil science are defined in the Glossary.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system used by the SCS engineers, Department of Defense, and others, and the AASHTO system adopted by the American Association of State Highways and Transportation Officials.

In the Unified system soils are classified according to particle size distribution, plasticity, liquid limit, and organic limit, and organic matter (*2*). Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes for fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, CL–ML.

The AASHTO system is used to classify soils according to those properties that affect use in highway construction and maintenance (*1*). In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest.

The estimated AASHTO classification, without group index numbers, is given in table 5 for all soils mapped in the survey area. Laboratory test data for samples of several soil series in Chesterfield County have been published (*5*).

USDA texture is determined by the relative proportions of sand, silt, and clay in soil material that is less than 2.0 millimeters in diameter. "Sand," "silt," "clay," and some of the other terms used in the USDA textural classification are defined in the Glossary.

Estimated engineering properties

Several estimated soil properties significant in engineering are given in table 5. These estimates are made for typical soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 5.

Depth to seasonal high water table is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer.

Soil texture is described in table 5 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand." "Sand," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this soil survey.

The Unified and AASHTO classification have been explained under the heading "Engineering Soil Classification Systems."

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 5 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material as moisture content changes; that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

Corrosion potential, as used in table 5, pertains to soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Rate of corrosion of uncoated steel is related to soil properties such as drainage, texture, total acidity, and electrical conductivity of the soil material. Ratings of soils for corrosivity for concrete are based mainly on soil texture and acidity. Installations that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* means there is a low probability of soil-induced corrosion damage. A rating of *high* means there is a high probability of damage, so protective measures for steel and more resistant concrete should be used to avoid or minimize damage.

Engineering interpretations

The estimated interpretations in table 6 are based on the engineering properties of soils shown in table 5, test data for soils in this survey area and others nearby or adjoining, and the experience of engineers and soil scientists with the soils of Chesterfield County. Following are explanations of the columns in table 6.

Suitability for winter grading depends on the ease with which soil can be moved and traversed by conventional construction equipment during cold weather. Slope, texture, depth to water table, susceptibility to formation of large frozen clods, and the kind and amount of clay are features and qualities affecting winter grading.

Road fill is soil material used in embankments for road. The suitability ratings reflect the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and the relative ease of excavating the material at borrow areas.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 6 provide guidance about where to look for probable sources. A soil rated as a *good* or *fair* source of sand or gravel generally has a layer at least 3 feet thick, the top of which is within a depth of 6 feet. The ratings do not take into account thickness of overburden, location of the water table, or other factors that affect mining of the materials, and neither do they indicate quality of the deposit.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as when preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but also considered in the ratings is damage that will result at the area from which topsoil is taken.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments and dikes require soil material resistant to seepage and piping and of favorable stability, shrink-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among factors that are unfavorable.

Drainage for crops and pasture is affected by such soil properties as permeability, texture, and structure; depth to heavy clay, rock, or other layers that influence rate of water movements; depth to the water table; slope, stability of ditchbanks; susceptibility to stream overflow; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion or soil blowing; texture; content of stones; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in fragipans or other layers that restrict movement of water; amount of water held available to plants; and need for drainage, or depth to water table or bedrock.

Terraces or diversions are embankments, or ridges, constructed across the slope to intercept runoff and seepage so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slippage, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

Grassed waterway layout and construction are affected by such soil properties as texture, depth, and erodibility of the soil material; presence of stones or rock outcrop and the steepness of slope. Other factors affecting waterways are seepage, natural soil drainage, available water capacity, susceptibility to siltation, and the ease of establishing and maintaining vegetation.

Town and Country Planning

This section was prepared chiefly for planners, developers, landscape architects, builders, zoning officials, realtors, private and potential landowners, and others interested in use of the soils in Chesterfield County for purposes other than farming (fig. 7).

Soil and water losses in areas undergoing urbanization are often excessive. Construction of streets and roads,

***Figure 7.*—Interchange areas on interstate highways are often developed, consuming many acres of wooded and farmed soils. Rumford soils have few limitations for such development.**

TABLE 5.—*Estimated soil*

[An asterisk in the first column indicates that at least one mapping unit in the series is made up of two or more kinds of soil, referring to another series in the first column of this table.

Soils	Depth to—		Depth from surface (typical profile)	USDA texture	Classification	
	Seasonal high water table	Bedrock			Unified	AASHTO
	Feet	*Feet*	*Inches*			
Abell: 65B	2–3½	>5	0–15	Sandy loam	SM, ML	A–4, A–2
			15–40	Sandy clay loam, clay loam	SC, CL	A–6
			40–60	Clay	CL, MH	A–7
*Appling: 42B, 42C, 42D, 142B, 142C, 142D, 245B, 542B, 542C. For Spotsylvania part of 245B, see Spotsylvania series. For Wedowee parts of 142C and 142D, see Wedowee series.	>5	>5	0–10	Loam, sandy loam, fine sandy loam.	SM, ML	A–2, A–4
			0–10	Gravelly sandy loam	GM, SM	A–1, A–2
			10–60	Clay loam, clay	CL, MH	A–6, A–7
			60–154	Sandy loam	SM, SC	A–2, A–4
Aquults: 191. Too variable for valid estimate.						
Atlee: 21B	1½–2½ (perched)	>5	0–14	Silt loam, loam	ML, CL–ML	A–4
			14–150	Clay loam	CL, ML	A–6, A–7
Augusta: 167	[2] 1–1½	>5	0–10	Fine sandy loam	SM, ML	A–2, A–4
			10–72	Sandy clay loam, clay loam	ML, CL	A–4, A–6
*Bourne: 49B, 49C, 169B, 169C, 261B For Colfax part of 261B, see Colfax series.	1½–2½ (perched)	>5	0–11	Fine sandy loam	ML, SM	A–2, A–4
			11–22	Sandy clay loam	SC, CL	A–2, A–6
			[3] 22–44	Fine sandy loam	SM, ML	A–2, A–4
			44–72	Clay	CL	A–7
Buncombe: 71B	[2] >5	>5	0–57	Loamy fine sand	SM	A–2
Cecil: 38B, 38C, 38D	>5	>5	0–14	Fine sandy loam	SM, SM–SC	A–2, A–4
			14–63	Clay	MH, ML	A–7
			63–83	Loam	ML, CL	A–4, A–6
Chastain: 31	[2] 0–1	>5	0–13	Loam	ML, CL	A–4, A–6
			13–80	Clay loam	CL, CH	A–7
Chewacla: 28	[2] 1–1½	>5	0–13	Loam, fine sandy loam	SM, ML	A–2, A–4
			13–60	Sandy clay loam, clay loam, silty clay loam.	SM, ML, CL	A–2, A–4, A–7
Colfax: 7B, 207C	1–1½ (perched)	>5	0–8	Fine sandy loam	SM, ML	A–4
			8–24	Sandy clay loam	SC, CL	A–6
			[3] 24–40	Sandy clay loam	SC, CL	A–6
			40–86	Clay	MH	A–7
Colfax, variant: 80B	1–1½ (perched)	>5	0–10	Fine sandy loam	SM, ML	A–4
			10–21	Sandy clay loam	SC, CL	A–6
			[3] 21–52	Sandy clay loam	SC, CL	A–6
			52–73	Clay	MH	A–7
Coxville: 33B	0–1	>5	0–10	Loam	ML	A–4
			10–75	Clay	MH	A–7
Craven: 41B	2–3	>5	0–15	Fine sandy loam	SM, ML	A–4
			15–59	Clay loam, clay	MH	A–7
			59–95	Sandy clay loam, sandy loam	SM, SC	A–2, A–4
*Creedmoor: 61B, 61C, 61C2, 123B, 123C, 202B, 202C. For Worsham part of 202B and 202C, see Worsham series.	1–2	>5	0–10	Fine sandy loam, sandy loam	SM, ML	A–2, A–4
			0–10	Gravelly fine sandy loam, gravelly sandy loam.	SM, GM, GC	A–1, A–2
			10–43	Clay, gravelly clay	CH	A–7
			43–60	Clay loam, gravelly clay loam	CL, CH	A–7
Cullen: 340B, 340C, 340D	>5	>5	0–7	Loam, clay loam	ML, CL	A–4, A–6
			7–35	Clay, clay loam	MH	A–7
			35–89	Loam	ML	A–4
Dogue, variant: 68B	[2] 2–3	>5	0–9	Loam	ML	A–4
			9–42	Clay	MH	A–7
			42–110	Clay loam, loam	ML, MH	A–4, A–7

properties significant in engineering

and these soils may have different properties and limitations. Thus, the reader should follow carefully the instructions for
Symbol > means more than; symbol < means less than]

Coarse fraction (fragments more than 3 inches in diameter)	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential	
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.047 mm)	No. 200 (0.074 mm)					Steel (uncoated)	Concrete
					Inches per hour	*Inches per inch of soil*	*pH*			
----------	90–100	85–100	60–95	30–75	2.0–6.0	0.10–0.16	4.5–5.5	Low	(1)	High.
----------	90–100	85–100	70–95	40–75	0.6–2.0	0.13–0.19	4.5–5.5	Low	High	High.
----------	90–100	85–100	70–95	65–90	0.2–0.6	0.10–0.14	4.5–5.5	Moderate	High	High.
----------	90–100	85–100	55–95	30–75	2.0–6.0	0.10–0.15	4.5–5.5	Low	(1)	High.
----------	60–80	55–70	35–50	15–25	2.0–6.0	0.08–0.13	4.5–5.5	Low	(1)	High.
----------	90–100	85–100	75–95	60–90	0.6–2.0	0.12–0.15	4.5–5.5	Moderate	High	High.
----------	90–100	85–100	50–70	25–40	0.6–2.0	0.10–0.14	4.5–5.5	Low	High	High.
----------	95–100	95–100	85–100	51–90	0.6–2.0	0.14–0.20	4.5–6.0	Low	(1)	High.
----------	95–100	95–100	85–100	60–90	0.2–0.6	0.07–0.12	4.5–5.5	Low	High	High.
----------	95–100	90–100	75–95	30–75	2.0–6.0	0.10–0.14	4.0–5.0	Low	(1)	High.
----------	95–100	95–100	75–95	50–80	0.6–2.0	0.10–0.14	4.0–5.0	Moderate	High	High.
----------	80–100	70–100	45–85	20–55	2.0–6.0	0.08–0.15	4.5–5.5	Low	(1)	High.
----------	80–100	70–100	60–95	30–80	0.6–2.0	0.14–0.18	4.5–5.5	Moderate	High	High.
----------	80–100	70–100	60–95	30–80	<0.2	0.08–0.12	4.5–5.5	Low	High	High.
----------	100	100	90–100	75–95	0.06–0.2	----------	4.5–5.5	Moderate	High	High.
----------	100	100	50–75	15–30	>6.0	0.06–0.08	5.6–5.5	Low	Low	Moderate.
----------	90–100	80–100	65–90	25–40	2.0–6.0	0.12–0.14	4.5–5.5	Low	(1)	Moderate.
----------	95–100	90–100	70–100	55–95	0.6–2.0	0.13–0.15	4.5–5.5	Moderate	Moderate	Moderate.
----------	95–100	90–100	70–95	50–75	0.6–2.0	0.12–0.14	4.5–5.5	Low	Moderate	Moderate.
----------	100	100	90–100	70–95	0.6–2.0	0.14–0.16	4.5–5.5	Low	(1)	High.
----------	100	100	95–100	85–95	0.06–0.2	0.14–0.16	4.5–5.5	Moderate	High	High.
----------	95–100	95–100	60–90	30–70	0.6–2.0	0.10–0.16	4.5–5.5	Low	(1)	Moderate.
----------	95–100	95–100	60–90	30–95	0.6–2.0	0.12–0.18	4.5–5.5	Low	High	Moderate.
----------	85–100	80–100	60–85	40–55	0.6–2.0	0.10–0.15	4.5–5.5	Low	(1)	High.
----------	90–100	80–100	65–85	40–60	0.6–2.0	0.13–0.18	4.5–5.5	Low	High	High.
----------	90–100	80–100	65–85	40–60	0.06–0.2	0.06–0.10	4.5–5.5	Low	High	High.
----------	100	100	90–100	75–95	0.06–0.2	----------	4.5–5.5	Moderate	High	High.
----------	95–100	90–100	65–85	35–55	0.6–2.0	0.10–0.14	4.5–5.5	Low	(1)	High.
----------	95–100	90–100	80–95	40–60	0.6–2.0	0.12–0.14	4.5–5.5	Low	High	High.
----------	95–100	90–100	80–95	40–60	0.06–0.2	0.06–0.10	4.5–5.5	Low	High	High.
----------	100	100	90–100	75–95	0.06–0.2	----------	4.5–5.5	Moderate	High	High.
----------	100	100	85–95	60–75	0.6–2.0	0.12–0.17	4.5–5.5	Low	(1)	Moderate.
----------	100	100	90–100	75–95	0.2–0.6	0.14–0.18	4.5–5.5	Moderate	High	Moderate.
----------	100	100	70–85	40–55	2.0–6.0	0.12–0.16	4.5–5.5	Low	High	High.
----------	100	100	90–100	75–95	0.06–0.2	0.12–0.15	4.5–5.5	Moderate	High	High.
----------	100	100	60–70	30–40	2.0–6.0	0.08–0.10	4.5–5.5	Low	High	High.
----------	95–100	90–100	50–85	25–55	2.0–6.0	0.12–0.16	4.5–5.5	Low	(1)	High.
0–10	65–80	50–70	35–45	15–30	2.0–6.0	0.06–0.10	4.5–5.5	Low	(1)	High.
0–5	80–100	70–100	60–100	50–95	<0.06	0.10–0.14	4.0–5.0	High	High	High.
0–5	80–100	70–100	60–100	50–80	0.2–0.6	0.12–0.17	4.0–5.0	Moderate	High	High.
----------	95–100	90–100	75–100	50–80	2.0–6.0	0.14–0.19	4.5–5.5	Low	(1)	High.
----------	95–100	90–100	80–100	60–95	0.6–2.0	0.12–0.15	4.5–5.5	Moderate	High	High.
----------	90–100	85–100	70–100	50–75	0.6–2.0	0.14–0.17	4.5–5.5	Low	High	High.
----------	90–100	85–100	75–95	50–75	0.6–2.0	0.12–0.17	5.6–6.5	Low	(1)	Moderate.
----------	90–100	85–100	80–100	65–95	0.2–0.6	0.10–0.14	5.6–6.5	Moderate	High	Moderate.
----------	90–100	85–100	75–100	55–80	0.6–2.0	0.14–0.19	5.6–6.5	Low	High	Moderate.

TABLE 5.—*Estimated soil properties*

Soils	Depth to—		Depth from surface (typical profile)	USDA texture	Classification	
	Seasonal high water table	Bedrock			Unified	AASHTO
	Feet	*Feet*	*Inches*			
Dunbar: 188	1–2½	>5	0–12	Fine sandy loam	SM, ML	A–4
			12–20	Sandy clay loam	SC, CL	A–6
			20–72	Clay, sandy clay	MH, CL, SC	A–7
*Durham: 45B	>5	>5	0–16	Fine sandy loam	SM, ML	A–4
			16–60	Sandy clay loam	SC, CL	A–2, A–6
For Bourne part, see Bourne series.			60–84	Clay	MH	A–7
Edgehill: 244B, 244C, 244D, 244E	>5	>5	0–17	Very gravelly fine sandy loam	GM, GP–GM	A–1, A–2
			17–41	Very gravelly clay loam, gravelly clay.	GC	A–1, A–2, A–6
			41–80	Very gravelly sandy loam	GM, GC, GP	A–1
*Enon: 50C, 50F	>5	3–4	0–5	Loam	ML	A–4
			5–22	Clay, silty clay loam	CH, MH	A–7
For Vance part of 50C, see Vance series. For Louisburg part of 50F, see Louisburg series.			22–40	Clay loam	CL	A–6
			40	Hornblende gneiss.		
*Faceville: 110B, 110C, 157B, 162B, 162C	>5	>5	0–12	Fine sandy loam, gravelly fine sandy loam.	SM, ML	A–2, A–4
For Gritney part of 110B, 110C, and 157B, see Gritney series.			12–100	Clay	MH	A–7
Fluvaquents: 1A, 3A. Too variable for valid estimates.						
Forestdale: 37	[2] 0–1	>5	0–9	Silt loam	ML, CL	A–4, A–6
			9–43	Silty clay, clay	MH, CH	A–7
			43–74	Sand and gravel to clay	----------	----------
Gritney: 17B, 17C	>5	>5	0–9	Fine sandy loam, gravelly fine sandy loam.	SM, ML	A–2, A–4
			9–39	Clay	MH	A–7
			39–59	Sandy clay loam, clay loam	SC, CL	A–2, A–6
			59–70	Clay	MH	A–7
*Grover: 241C, 305B, 305C, 305D, 305E	>5	>5	0–12	Fine sandy loam	SM, ML	A–4
			12–60	Clay loam, sandy clay loam	SC, CL	A–6
For Louisburg part of 241C, see Louisburg series.						
Hydraquents: 100. Too variable for valid estimates.						
*Kempsville: 82B, 82C	>5	>5	0–19	Sandy loam	SM	A–2, A–4
			19–150	Sandy clay loam, clay loam	SC, CL	A–6, A–7
For Bourne part, see Bourne series.						
Lenoir: 30B, 67B	1–2½	>5	0–16	Loam, silt loam	ML, CL	A–4
			16–60	Clay	MH, CH	A–7
Louisa,variant: 505D, 505F	>5	>5	0–35	Loam, silt loam	SM, ML	A–4
			35–60	Weathered micaceous schist (variable texture).	----------	----------
Louisburg: 105C, 105D, 105E	>5	2–5	0–22	Sandy loam	SM	A–2, A–4
			22–80	Weathered granite (variable texture).	----------	----------
*Lucy: 212B, 212C	>5	>5	0–26	Loamy sand	SM	A–2
			26–60	Sandy clay loam, sandy loam	SM, SC, CL	A–2, A–6
For Orangeburg part, see Orangeburg series.			60–90	Loamy sand	SM	A–2
Made land: 15. Too variable for valid estimates.						
Masada: 103B, 103C, 106B, 106C, 117B, 117C	>5	>5	0–10	Fine sandy loam, loam, gravelly fine sandy loam.	ML, SM, GM	A–2, A–4
			10–74	Clay, gravelly clay	MH, CH	A–2, A–7
			74–80	Very gravelly clay loam	GM, GC	A–1, A–2

significant in engineering—Continued

Coarse fraction (fragments more than 3 inches in diameter)	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential	
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.047 mm)	No. 200 (0.074 mm)					Steel (uncoated)	Concrete
					Inches per hour	*Inches per inch of soil*	*pH*			
	100	100	70–85	40–55	2.0–6.0	0.10–0.14	4.5–5.5	Low	(1)	High.
	100	100	80–90	35–55	0.6–2.0	0.12–0.16	4.5–5.5	Low	High	High.
	100	100	85–100	45–95	0.06–0.2	0.13–0.15	4.5–5.5	Moderate	High	High.
	90–100	85–100	60–85	35–55	2.0–6.0	0.10–0.15	4.5–5.5	Low	Moderate	Moderate.
	90–100	85–100	70–90	30–55	0.6–2.0	0.13–0.16	4.5–5.5	Low	Moderate	Moderate.
	90–100	85–100	80–100	65–95	0.2–0.6	0.10–0.14	4.5–5.5	Moderate	High	High.
0–10	30–65	20–55	15–45	8–30	0.6–6.0	0.07–0.12	4.5–5.5	Low	Moderate	High.
0–15	30–65	20–55	18–55	15–50	0.6–2.0	0.07–0.12	4.5–5.5	Moderate	Moderate	High.
0–15	30–65	20–55	15–40	5–20	0.6–6.0	0.06–0.10	4.5–5.5	Low	Moderate	High.
	100	100	85–95	60–75	2.0–6.0	0.14–0.17	5.6–6.5	Low	(1)	Low.
	100	100	90–100	75–95	0.06–0.2	0.12–0.15	5.6–6.5	High	Moderate	Low.
	100	100	90–100	70–80	0.06–0.2	0.16–0.19	5.6–6.5	Moderate	Moderate	Low.
	65–100	55–100	40–85	25–55	2.0–6.0	0.08–0.15	4.5–5.5	Low	(1)	Low.
	95–100	90–100	80–100	65–95	0.6–2.0	0.08–0.14	4.5–5.5	Moderate	Low	Moderate.
	100	100	90–100	70–90	0.6–2.0	0.14–0.18	5.1–6.0	Low	(1)	High.
	100	100	90–100	75–95	<0.06	0.10–0.14	5.1–6.0	High	High	Moderate.
0–10							5.1–6.0		High	Moderate.
	65–100	55–100	40–85	25–55	>6.0	0.08–0.15	4.5–5.0	Low	(1)	High.
	90–100	90–100	80–100	65–95	0.06–0.2	0.08–0.16	4.5–5.0	Moderate	High	High.
	95–100	90–100	70–100	30–80	0.2–0.6	0.10–0.16	4.5–5.0	Moderate	High	High.
	95–100	90–100	80–100	65–95	0.06–0.2	0.08–0.14	4.5–5.0	Moderate	High	High.
	95–100	90–100	60–85	35–55	2.0–6.0	0.08–0.15	4.5–5.5	Low	(1)	High.
	95–100	90–100	70–100	35–75	0.6–2.0	0.12–0.14	4.5–5.5	Moderate	Moderate	High.
	100	100	60–70	30–40	2.0–6.0	0.08–0.15	4.5–5.5	Low	Low	Moderate.
	100	100	80–95	35–60	0.6–2.0	0.08–0.16	4.5–5.5	Low	Low	Moderate.
	100	100	85–95	60–85	0.6–2.0	0.15–0.18	4.5–5.5	Low	High	High.
	100	100	90–100	75–95	0.06–0.2	0.13–0.15	4.5–5.5	Moderate	High	High.
	80–100	75–100	65–100	45–90	2.0–6.0	0.12–0.17	4.5–5.5	Low	Moderate	High.
					2.0–6.0	0.06–0.12	4.5–5.5	Low	Moderate	High.
0–10	75–100	65–100	30–70	15–40	>6.0	0.06–0.12	4.5–5.5	Low	Low	High.
					>6.0	0.04–0.10	4.5–5.5	Low	Low	High.
	100	100	50–75	15–30	>6.0	0.06–0.10	4.5–5.5	Low	Low	High.
	100	100	60–90	30–55	0.6–2.0	0.08–0.12	4.5–5.5	Low	Low	High.
	100	100	50–75	15–30	>6.0	0.06–0.10	4.5–5.5	Low	Low	High.
0–10	60–100	50–100	35–85	20–70	2.0–6.0	0.07–0.17	4.5–5.5	Low	(1)	High.
0–5	55–100	50–100	40–95	20–95	0.6–2.0	0.10–0.17	4.5–5.5	Moderate	High	Moderate.
5–20	30–40	25–35	20–35	15–30	0.6–2.0	0.06–0.10	4.5–5.5	Moderate	High	Moderate.

TABLE 5.—*Estimated soil properties*

Soils	Depth to—		Depth from surface (typical profile)	USDA texture	Classification	
	Seasonal high water table	Bedrock			Unified	AASHTO
	Feet	*Feet*	*Inches*			
*Mayodan: 59B, 59C, 59D, 151B, 151C, 151D, 201B, 201C, 201D, 201F, 251C, 251D, 251F. For Creedmoor part of 201B, 201C, 201D, 251C, 251D, and 251F, see Creedmoor series. For Pinkston part of 201F, see Pinkston series. For Edgehill part of 251C, 251D, and 251F, see Edgehill series.	>5	>5	0–12	Sandy loam	SM	A–2
			0–12	Gravelly sandy loam, very gravelly sandy loam.	GM, GC	A–1, A–2
			12–70	Clay, gravelly clay	ML, MH	A–7
Molena: 53B	>5	>5	0–72	Loamy sand	SM	A–2
Norfolk: 70B	>5	>5	0–11	Fine sandy loam	SM, ML	A–4
			11–31	Sandy clay loam	SC, CL	A–6
			31–90	Clay	MH	A–7
Ochrepts: 172D, 172E, 172F. Too variable for valid estimates.						
Orange: 48B, 48C	1–1½	3½–5	0–8	Sandy loam	SM	A–2, A–4
			8–29	Clay	CH	A–7
			29–41	Silty clay loam	CH	A–7
			41	Schist.		
*Orangeburg: 112B, 112C For Faceville part, see Faceville series.	>5	>5	0–16	Sandy loam, loamy sand	SM	A–2, A–4
			16–100	Sandy clay loam	SC, CL	A–6
Orthents: 16. Too variable for valid estimates.						
Pamunkey: 51B, 51C, 51D	>5	>5	0–14	Loam, fine sandy loam	SM, ML	A–4
			14–50	Clay loam, loam, sandy clay loam.	SC, ML, CL	A–2, A–4, A–6
			50–108	Loamy fine sand	SM	A–2
Pinkston: 165C, 165D, 165F	>5	2–3½	0–30	Gravelly sandy loam	SM, GM	A–1, A–2
			30	Sandstone conglomerate.		
Pouncey: 159B	0–1	2–3½	0–18	Fine sandy loam	SM	A–2, A–4
			18–25	Clay	CH, MH	A–7
			25	Weakly cemented sandstone.		
Roanoke: 137	0–1	>5	0–4	Loam	CL	A–4, A–6
			4–70	Clay, clay loam	MH, CH	A–7
Rumford: 92B, 92C	>5	>5	0–21	Loamy fine sand	SM	A–2
			21–40	Fine sandy loam	SM, ML	A–4
			40–132	Fine sand, sand	SM, SP–SM	A–2, A–3
Spotsylvania: 24B, 24C	>5	>5	0–10	Fine sandy loam	SM	A–2, A–4
			10–31	Clay loam	SC, CL	A–6
			31–48	Clay	MH, CH	A–7
Starr: 101B	2–2½	>5	0–6	Clay loam, fine sandy loam	SC, CL	A–2, A–6
			6–80	Clay, silty clay loam, clay loam.	MH	A–7
Tetotum: 8B, 158B	1½–2½	>5	0–11	Loam, fine sandy loam	SM, ML	A–4
			11–54	Clay loam	CL, ML	A–6
			54–70	Clay	MH	A–7
Toccoa: 26B	[2] >3	>5	0–60	Fine sandy loam	SM, ML	A–4
Turbeville: 107B, 107C, 108B, 108C	>5	>5	0–11	Fine sandy loam	SM	A–2, A–4
			11–62	Clay	SC, MH, CH	A–7

significant in engineering—Continued

Coarse fraction (fragments more than 3 inches in diameter)	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential	
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.047 mm)	No. 200 (0.074 mm)					Steel (uncoated)	Concrete
					Inches per hour	*Inches per inch of soil*	*pH*			
0–5	80–95	75–95	45–65	20–35	2.0–6.0	0.08–0.12	4.5–5.0	Low	(1)	High.
0–5	35–85	25–80	15–55	10–30	2.0–6.0	0.04–0.08	4.5–5.0	Low	(1)	High.
0–5	70–95	65–95	60–95	50–90	0.6–2.0	0.08–0.14	4.5–5.0	Moderate	High	High.
	100	100	50–75	15–30	>6.0	0.06–0.08	5.1–5.5	Low	Low	Moderate.
	100	100	70–85	40–55	2.0–6.0	0.10–0.16	4.5–5.0	Low	(1)	High.
	100	100	80–90	35–55	0.6–2.0	0.12–0.16	4.5–5.0	Low	Moderate	High.
	100	100	90–100	75–95	0.6–2.0	0.10–0.14	4.5–5.0	Moderate	High	High.
	95–100	90–100	55–70	25–40	2.0–6.0	0.14–0.20	5.1–6.0	Low	(1)	Moderate.
	95–100	90–100	80–100	65–95	0.06–0.2	0.10–0.19	5.1–6.0	High	High	Moderate.
	95–100	90–100	85–100	75–95	0.2–0.6	0.13–0.20	5.6–7.3	Moderate	High	Moderate.
	100	100	50–70	15–40	2.0–6.0	0.06–0.10	5.1–5.5	Low	Moderate	Moderate.
	100	100	80–90	35–55	0.6–2.0	0.12–0.16	5.1–5.5	Low	Moderate	High.
0–5	90–100	85–100	60–95	35–75	2.0–6.0	0.10–0.17	5.1–6.5	Low	Moderate	Moderate.
0–5	90–100	85–100	65–100	30–80	0.6–2.0	0.13–0.19	5.1–6.5	Low	Moderate	Moderate.
0–5	75–100	70–100	35–75	10–30	2.0–6.0	0.04–0.12	5.1–6.5	Low	Moderate	Moderate.
0–10	70–95	65–95	40–65	20–35	2.0–6.0	0.06–0.15	4.5–5.5	Low	Low	High.
	95–100	90–100	60–75	20–45	0.6–2.0	0.08–0.16	3.5–5.0	Low	High	High.
	95–100	90–100	80–90	45–80	0.06–0.2	0.10–0.17	3.5–5.0	High	High	High.
	90–100	85–100	80–100	50–90	0.6–2.0	0.14–0.20	4.5–5.5	Low	(1)	High.
	90–100	85–100	85–100	65–95	0.06–0.2	0.10–0.19	4.5–5.5	Moderate	High	High.
	100	100	50–75	15–30	>6.0	0.06–0.12	4.5–5.5	Low	Low	High.
	100	100	70–85	40–55	2.0–6.0	0.10–0.14	4.5–5.5	Low	Low	High.
	100	100	50–80	5–35	>6.0	0.04–0.08	4.5–5.5	Low	Low	High.
	70–95	60–95	40–80	25–50	0.6–6.0	0.08–0.16	4.5–5.5	Low	(1)	High.
0–5	70–95	60–95	55–95	40–75	0.6–2.0	0.13–0.19	4.5–5.5	Low	Moderate	High.
0–5	80–95	75–95	70–95	55–90	0.6–2.0	0.08–0.16	4.5–5.5	Low	High	High.
	80–100	75–100	50–100	30–80	2.0–6.0	0.14–0.19	5.1–6.5	Low	(1)	Moderate.
	80–100	75–100	70–100	50–95	2.0–6.0	0.12–0.16	5.1–6.5	Moderate	High	High.
	100	100	70–95	40–80	2.0–6.0	0.10–0.16	4.5–5.5	Low	(1)	High.
	100	100	90–100	70–80	0.6–2.0	0.14–0.19	4.5–5.5	Moderate	High	High.
	100	100	90–100	75–95	0.6–2.0	0.12–0.16	4.5–5.5	Moderate	High	High.
0–5	80–100	75–100	60–85	35–55	2.0–6.0	0.09–0.14	5.1–6.0	Low	Low	Moderate.
0–5	60–95	50–95	35–80	20–50	2.0–6.0	0.08–0.14	4.5–5.5	Low	(1)	High.
0–10	60–95	50–95	45–95	35–90	0.6–2.0	0.10–0.16	4.5–5.5	Moderate	High	High.

TABLE 5.—*Estimated soil properties*

Soils	Depth to—		Depth from surface (typical profile)	USDA texture	Classification	
	Seasonal high water table	Bedrock			Unified	AASHTO
	Feet	*Feet*	*Inches*			
Udifluvents: 2. Too variable for valid estimates.						
Vance: 210B, 210C, 210D	>5	>5	0–13	Fine sandy loam	SM, ML	A–2, A–4
			13–60	Clay	CH	A–7
Varina: 66B	>5	>5	0–10	Fine sandy loam	SM	A–4
			10–70	Sandy clay, clay	SC, CL	A–7
Vaucluse: 163B, 163C	>5	>5	0–20	Sandy loam, gravelly sandy loam.	SM	A–2
			20–34	Clay loam, gravelly clay loam	SC, CL	A–6
			[1] 34–64	Sandy clay loam	SC, CL	A–2, A–6
			64–99	Sandy loam	SM, SC	A–2, A–4
Wedowee: 142E	>5	>5	0–10	Gravelly fine sandy loam, fine sandy loam.	SM	A–2, A–4
			10–33	Clay loam, gravelly clay loam	SC, CL	A–6
			33–60	Loam	ML	A–4
Worsham: 6B	0–1	>5	0–14	Fine sandy loam	SM, ML	A–4
			14–44	Clay	MH	A–7
			44–70	Sandy clay loam, sandy loam	SC, CL	A–2, A–6

[1] Not rated.
[2] Subject to flooding.
[3] Fragipan.

significant in engineering—Continued

Coarse fraction (fragments more than 3 inches in diameter)	Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential	
	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.047 mm)	No. 200 (0.074 mm)					Steel (uncoated)	Concrete
					Inches per hour	*Inches per inch of soil*	*pH*			
	80–100	75–100	50–85	30–55	2.0–6.0	0.10–0.14	4.5–5.0	Low	(1)	High.
	80–100	75–100	70–100	55–95	0.06–0.2	0.12–0.15	4.5–5.0	Moderate	High	High.
	95–100	90–100	60–85	35–50	2.0–6.0	0.08–0.13	4.5–5.5	Low	(1)	High.
	90–100	85–100	75–100	40–85	0.06–0.2	0.10–0.14	4.5–5.5	Low	Moderate	High.
	70–90	60–900	35–60	20–35	2.0–6.0	0.08–0.12	4.5–5.0	Low	Low	High.
	70–90	60–90	55–90	40–70	0.6–2.0	0.10–0.15	4.5–5.0	Low	Low	High.
	95–100	90–100	70–90	30–55	0.06–0.2	0.05–0.08	4.5–5.0	Low	Low	High.
	95–100	90–100	55–70	25–40	2.0–6.0		4.5–5.0	Low	Low	High.
	60–90	50–90	35–75	20–50	2.0–6.0	0.08–0.12	4.5–5.5	Low	(1)	High.
	60–90	50–90	45–90	35–70	0.6–2.0	0.10–0.16	4.5–5.5	Moderate	Moderate	High.
	85–95	80–95	75–90	55–70	0.6–2.0	0.10–0.16	4.5–5.5	Low	Moderate	High.
	100	100	70–85	40–55	2.0–6.0	0.08–0.15	4.5–5.5	Low	High	Moderate.
	100	100	90–100	75–95	0.06–0.6	0.10–0.16	4.5–5.5	Moderate	High	Moderate.
	100	100	60–90	30–55	0.2–0.6	0.08–0.14	4.5–5.5	Low	High	Moderate.

TABLE 6.—*Interpretations of engineering*

[An asterisk in the first column indicates that at least one mapping unit in the series is made up of reader should follow carefully the instructions for referring

Soils	Suitability for winter grading	Suitability as source of—		
		Road fill	Sand and gravel	Topsoil
Abell: 65B	Fair: fair trafficability; seasonal high water table; high soil moisture.	Fair: too silty	Unsuited	Fair in upper 30 inches.
*Appling: 42B, 42C, 42D, 142B, 142C, 142D, 245B, 542B, 542C. For Spotsylvania part of 245B, see Spotsylvania series. For Wedowee part of 142C and 142D, see Wedowee series.	Fair: fair trafficability; clayey subsoil; moderate soil moisture.	Fair: clayey subsoil; moderate shrink-swell potential; slope.	Unsuited	Poor: too clayey; difficult to reclaim borrow area.
Aquults: 191. Too variable for valid interpretations.				
Atlee: 21B	Poor: poor trafficability; seasonal high water table; high soil moisture; flooding.	Fair: too silty	Unsuited	Fair in upper 20 inches.
Augusta: 167	Poor: poor trafficability; seasonal high water table; high soil moisture; flooding.	Fair: too silty; somewhat poorly drained.	Poor: too silty. Fair below a depth of 72 inches in some places.	Fair in upper 30 inches.
*Bourne: 49B, 49C, 169B, 169C, 261B For Colfax part of 261B, see Colfax series.	Poor: poor trafficability; seasonal high water table; high soil moisture; fragipan.	Fair: too silty	Unsuited	Poor: difficult to reclaim borrow area; fragipan.
Buncombe: 71B	Good: good trafficability; low plasticity; low soil moisture; flooding.	Fair: too silty	Poor: too silty	Poor: too silty.
Cecil: 38B, 38C, 38D	Fair: fair trafficability; clayey subsoil; moderate soil moisture.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Poor: too clayey; difficult to reclaim borrow area.
Chastain: 31	Poor: poor trafficability; seasonal high water table; clayey subsoil; high soil moisture; flooding.	Poor: clayey subsoil; poorly drained; flooding.	Unsuited	Poor: poorly drained; difficult to reclaim borrow area.
Chewacla: 28	Poor: poor trafficability; seasonal high water table; high soil moisture; flooding.	Fair: too silty; somewhat poorly drained.	Unsuited	Fair in upper 48 inches.
Colfax: 7B, 207C	Poor: poor trafficability; seasonal high water table; high soil moisture; fragipan.	Fair: too silty; somewhat poorly drained.	Unsuited	Poor: difficult to reclaim borrow area; fragipan.
Colfax, variant: 80B	Poor: poor trafficability; seasonal high water table; high soil moisture; fragipan.	Fair: too silty; somewhat poorly drained.	Unsuited	Poor: difficult to reclaim borrow area; fragipan.

properties of the soils

two or more kinds of soil, and these soils may have different properties and limitations. Thus, the
to another series in the first column of this table]

Soil features affecting—					
Impoundments		Drainage for crops and pasture	Irrigation	Terraces or diversions	Grassed waterways
Pond reservoir areas	Embankments and dikes				
Seasonal high water table; moderate permeability; seepage.	Medium strength, compressibility, permeability, and susceptibility to piping; fair compaction characteristics.	Moderately well drained; moderate permeability.	Medium available water capacity; seasonal high water table; moderate intake rate.	Short slopes; erodible; seepage.	Moderately well drained; seepage.
Moderate permeability; seepage.	Low to medium strength, permeability, and susceptibility to piping; fair compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate; erodible.	(1)	Erodible on slopes.
Seasonal high water table; moderately slow permeability.	Medium to low strength, compressibility, permeability and susceptibility to piping; fair compaction characteristics.	Moderately well drained; moderately slow permeability.	Medium available water capacity; seasonal high water table; slow intake rate.	(2)	Moderately well drained; seepage.
Seasonal high water table; moderate permeability; seepage.	Medium strength, compressibility, permeability, and susceptibility to piping; fair compaction characteristics.	Somewhat poorly drained; moderate permeability; flooding.	Medium available water capacity; seasonal high water table; flooding.	(2)	(2).
Seasonal high water table; slow to very slow permeability.	Medium to low strength, compressibility; permeability, and susceptibility to piping; fair compaction characteristics.	Moderately well drained; slow to very slow permeability; fragipan.	Low available water capacity; seasonal high water table; moderate intake rate; fragipan.	Slow to very slow permeability; erodible; siltation of channels; fragipan.	Moderately well drained; low available water capacity; erodible; fragipan.
Rapid permeability; seepage.	Medium to high strength; medium to low compressibility and permeability; medium to high susceptibility to piping; fair to good compaction characteristics.	Excessively drained; flooding.	Low available water capacity; rapid intake rate; flooding.	(2)	Low available water capacity; erodible; siltation of channels; flooding.
Moderate permeability.	Low to medium strength and susceptibility to piping; medium to high compressibility; low permeability; fair to poor compaction characteristics.	Well drained	Medium available water capacity; rapid intake rate; flooding.	(1)	Erodible on slopes.
Seasonal high water table; slow permeability.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Poorly drained; slow permeability; flooding.	Medium available water capacity; slow intake rate; flooding.	(2)	Poorly drained; seepage; siltation of channels; flooding.
Seasonal high water table; moderate permeability; seepage.	Low to medium strength, compressibility, and permeability; medium to high susceptibility to piping; fair compaction characteristics.	Somewhat poorly drained; moderate permeability; flooding.	High available water capacity; moderate intake rate; flooding.	(2)	Somewhat poorly drained; seepage; siltation of channels; flooding.
Seasonal high water table; slow permeability; fragipan.	Low to medium strength, compressibility, and permeability; medium susceptibility to piping; fair to good compaction characteristics.	Somewhat poorly drained; slow permeability; fragipan.	Low available water capacity; moderate intake rate; fragipan.	Slow permeability; erodible; siltation of channels; fragipan.	Somewhat poorly drained; low available water capacity; erodible; fragipan.
Seasonal high water table; slow permeability; fragipan.	Low to medium strength, compressibility, and permeability; medium susceptibility to piping; fair to good compaction characteristics.	Somewhat poorly drained; slow permeability; fragipan.	Low available water capacity; moderate intake rate; fragipan.	Slow permeability; erodible; siltation of channels; fragipan.	Somewhat poorly drained; low available water capacity; erodible; fragipan.

TABLE 6.—*Interpretations of engineering*

Soils	Suitability for winter grading	Suitability as source of—		
		Road fill	Sand and gravel	Topsoil
Coxville: 33B	Poor: poor trafficability; seasonal high water table; clayey subsoil; high soil moisture; ponding.	Poor: clayey subsoil; poorly drained.	Unsuited	Poor: poorly drained; difficult to reclaim borrow area.
Craven: 41B	Poor: poor trafficability; seasonal high water table; clayey subsoil; high soil moisture.	Poor: clayey subsoil.	Unsuited	Poor: thin layer; difficult to reclaim borrow area.
*Creedmoor: 61B, 61C, 61C2, 123B, 123C, 202B, 202C. For Worsham part of 202B and 202C, see Worsham series.	Poor: poor trafficability; seasonal high water table; plastic, clayey subsoil; high soil moisture.	Poor: plastic, clayey subsoil; high shrink-swell potential.	Unsuited	Poor: too clayey; difficult to reclaim borrow area.
Cullen: 340B, 340C, 340D	Fair: fair trafficability; clayey subsoil; moderate soil moisture.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Poor: too clayey; difficult to reclaim borrow area.
Dogue, variant: 68B	Poor: poor trafficability; clayey subsoil; seasonal high water table; high soil moisture; flooding.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Poor: too clayey; difficult to reclaim borrow area.
Dunbar: 188	Poor: poor trafficability; clayey subsoil; seasonal high water table; high soil moisture.	Fair: clayey subsoil; moderate shrink-swell potential; somewhat poorly drained.	Unsuited	Fair: too clayey; difficult to reclaim borrow area.
*Durham: 45B. For Bourne part, see Bourne series.	Fair: fair trafficability; moderate soil moisture.	Good	Unsuited	Fair in upper 30 inches.
Edgehill: 244B, 244C, 244D, 244E	Fair: fair trafficability; clayey subsoil; moderate soil moisture.	Fair: clayey subsoil; moderate shrink-swell potential.	Poor: too silty.	Poor: too clayey; excess pebbles.
*Enon: 50C, 50F. For Vance part of 50C, see Vance series. For Louisburg part of 50F, see Louisburg series.	Poor: poor trafficability; clayey subsoil; moderate soil moisture.	Poor: clayey subsoil; high shrink-swell potential.	Unsuited	Poor: too clayey; difficult to reclaim borrow area.
*Faceville: 110B, 110C, 157B, 162B, 162C. For Gritney part of 110B, 110C, and 157B, see Gritney series.	Fair: fair trafficability; clayey subsoil; moderate soil moisture.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Fair: too clayey; difficult to reclaim borrow area.
Fluvaquents: 1A, 3A. Too variable for valid interpretations.				
Forestdale: 37	Poor: poor trafficability; seasonal high water table; clayey subsoil; high soil moisture; flooding.	Poor: clayey subsoil; high shrink-swell potential; poorly drained.	Unsuited: fair below a depth of 4 feet in some places.	Poor: too clayey; poorly drained.

properties of the soils—Continued

Soil features affecting—					
Impoundments		Drainage for crops and pasture	Irrigation	Terraces or diversions	Grassed waterways
Pond reservoir areas	Embankments and dikes				
Seasonal high water table; moderately slow permeability.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Poorly drained; moderately slow permeability; ponding.	Medium available water capacity; slow intake rate; ponding.	(2)	Poorly drained; siltation of channels; ponding.
Seasonal high water table; slow permeability.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Moderately well drained; slow permeability.	Medium available water capacity; slow intake rate.	Slow permeability; erodible; siltation of channels.	Moderately well drained; siltation of channels; erodible.
Seasonal high water table; very slow permeability	Low strength, permeability, and susceptibility to piping; high compressibility; poor to fair compaction characteristics.	Moderately well drained; very slow permeability.	Medium available water capacity; slow intake rate.	Very slow permeability; plastic, clayey subsoil.	Moderately well drained; medium available water capacity; siltation of channels; erodible.
Moderate permeability; seepage.	Low to medium strength, permeability, and susceptibility to piping; medium to high compressibility; fair compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate; erodible.	(1)	Erodible.
Seasonal high water table; moderately slow permeability.	Low to medium strength, permeability, and susceptibility to piping; medium to high compressibility; fair compaction characteristics.	Moderately well drained; moderately slow permeability; flooding.	Medium available water capacity; slow intake rate; flooding.	Moderately slow permeability; erodible; siltation of channels.	Moderately well drained; medium available water capacity; siltation of channels; erodible.
Seasonal high water table; slow permeability.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; fair to good compaction characteristics.	Somewhat poorly drained; slow permeability.	Medium available water capacity; slow intake rate.	(2)	(2).
Moderate permeability; seepage.	Medium to low strength, permeability, susceptibility to piping, and compressibility; fair to good compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate.	(1)	Erodible.
Moderate permeability; seepage.	Medium to high strength and permeability; low to medium compressibility and susceptibility to piping; good compaction characteristics.	Well drained	Low available water capacity; moderate intake rate.	Erodible; siltation of channels; excess pebbles.	Low available water capacity; erodible; siltation of channels; excess pebbles.
Slow permeability.	Low to medium strength, permeability and susceptibility to piping; high compressibility; fair to poor compaction characteristics.	Well drained	Medium available water capacity; slow intake rate.	Slow permeability; clayey subsoil; erodible; siltation of channels.	Erodible; siltation of channels.
Moderate permeability; seepage.	Medium to low strength, compressibility, permeability, and susceptibility to piping; fair compaction characteristics.	Well drained	(1)	(1)	(1).
Seasonal high water table; very slow permeability.	Medium to low strength, high compressibility; low permeability and susceptibility to piping; fair to poor compaction characteristics.	Poorly drained; very slow permeability; flooding.	(2)	(2)	Poorly drained; siltation of channels; flooding.

TABLE 6.—*Interpretations of engineering*

Soils	Suitability for winter grading	Suitability as source of—		
		Road fill	Sand and gravel	Topsoil
Gritney: 17B, 17C	Fair: fair trafficability; clayey subsoil; moderate soil moisture.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Poor: too clayey; difficult to reclaim borrow area.
*Grover: 241C, 305B, 305C, 305D, 305E. For Louisburg part of 241C, see Louisburg series.	Fair: fair trafficability; moderate soil moisture.	Fair: moderate shrink-swell potential.	Unsuited	Fair in upper 2 feet.
Hydraquents: 100. Too variable for valid interpretations.				
*Kempsville: 82B, 82C. For Bourne part, see Bourne series.	Good: good trafficability; moderate soil moisture.	Fair: too silty	Unsuited	Good in upper 2 feet.
Lenoir: 30B, 67B	Poor: poor trafficability; seasonal high water table; high soil moisture; flooding.	Poor: clayey subsoil; somewhat poorly drained.	Unsuited	Poor: difficult to reclaim borrow area.
Louisa, variant: 505D, 505F	Fair: fair trafficability; moderate soil moisture; slope.	Fair: high mica content; slope.	Unsuited	Poor: difficult to reclaim borrow area.
Louisburg: 105C, 105D, 105E	Good: good trafficability; low plasticity; low soil moisture; slope.	Poor: bedrock at a depth of 2 to 5 feet.	Unsuited	Poor: difficult to reclaim borrow area.
*Lucy: 212B, 212C. For Orangeburg part, see Orangeburg series.	Good: good trafficability; low soil moisture.	Fair: too silty	Unsuited	Poor: too sandy.
Made land: 15. Too variable for valid interpretations.				
Masada: 103B, 103C, 106B, 106C, 117B, 117C	Fair: fair trafficability; clayey subsoil; moderate soil moisture.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited: thin beds of gravel below a depth of 6 feet in some areas.	Fair: too clayey; excess pebbles.
*Mayodan: 59B, 59C, 59D, 151B, 151C, 151D, 201B, 201C, 201D, 201F, 251C, 251D, 251F. For Creedmoor part of 201B, 201C, 201D, 251C, 251D, and 251F, see Creedmoor series. For Pinkston part of 201F, see Pinkston series. For Edgehill part of 251C, 251D, and 251F, see Edgehill series.	Fair: fair trafficability; clayey subsoil; moderate soil moisture; slope.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Poor: too clayey; excess pebbles; difficult to reclaim borrow area.
Molena: 53B	Good: good trafficability; low soil moisture.	Good	Poor: too silty	Poor: too sandy.

properties of the soils—Continued

Soil features affecting—					
Impoundments		Drainage for crops and pasture	Irrigation	Terraces or diversions	Grassed waterways
Pond reservoir areas	Embankment and dikes				
Moderately slow permeability.	Medium to low strength, permeability, and susceptibility to piping; medium to high compressibility; fair compaction characteristics.	Well drained	Medium available water capacity; slow intake rate.	(1)	Erodible.
Moderate permeability; seepage.	Medium to low strength, compressibility, and susceptibility to piping; low permeability; good to fair compaction characteristics.	Well drained	(1)	(1)	Erodible.
Moderate permeability; seepage.	Medium to low strength, compressibility, permeability, and susceptibility to piping; fair to good compaction characteristics.	Well drained	(1)	(1)	(1).
Seasonal high water table; slow permeability.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Somewhat poorly drained.	Medium available water capacity; slow intake rate; flooding.	(2)	Somewhat poorly drained; siltation of channels; flooding.
Moderately rapid permeability; seepage.	Medium to low strength, permeability, and compressibility; high susceptibility to piping; fair compaction characteristics.	Somewhat excessively drained.	(2)	(2)	Somewhat excessively drained; siltation of channels; erodible; slope.
Rapid permeability; seepage.	Medium to low strength, compressibility, and permeability; medium to high susceptibility to piping; fair to good compaction characteristics.	Well drained to excessively drained.	Low available water capacity; rapid intake rate; bedrock at a depth of 2 to 5 feet; erodible; slope.	(2)	(2).
Moderate permeability; seepage.	Medium to low strength, compressibility, and permeability; medium to high susceptibility to piping; fair compaction characteristics.	Well drained	Low to medium available water capacity; rapid intake rate; erodible.	(1)	Low to medium available water capacity; siltation of channels; erodible.
Moderate permeability; seepage.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; fair to poor compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate.	(1)	(1).
Moderate permeability.	Medium to low strength, permeability, and susceptibility to piping; medium to high compressibility; fair compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate; slope.	Erodible; siltation of channels; excess pebbles.	Erodible; siltation of channels; excess pebbles.
Rapid permeability; seepage.	Medium strength, permeability, compressibility, and susceptibility to piping; fair to good compaction characteristics.	Somewhat excessively drained.	Low available water capacity; rapid intake rate.	(2)	Low available water capacity; siltation of channels; erodible.

TABLE 6.—*Interpretations of engineering*

Soils	Suitability for winter grading	Suitability as source of—		
		Road fill	Sand and gravel	Topsoil
Norfolk: 70B	Good: good trafficability; moderate soil moisture.	Fair: too silty	Unsuited	Good in upper 2 feet.
Ochrepts: 172D, 172E, 172F. Too variable for valid interpretations.				
Orange: 48B, 48C	Poor: poor trafficability; seasonal high water table; plastic, clayey subsoil; high soil moisture.	Poor: plastic, clayey subsoil; high shrink-swell potential.	Unsuited	Poor: thin surface layer; difficult to reclaim borrow area.
*Orangeburg: 112B, 112C. For Faceville part, see Faceville series.	Good: good trafficability; moderate soil moisture.	Fair: too silty	Unsuited	Fair in upper 2½ feet.
Orthents: 16. Too variable for valid interpretations.				
Pamunkey: 51B, 51C, 51D	Fair: fair trafficability; moderate soil moisture.	Fair: too silty	Poor: too silty; fair below a depth of 4 feet in some areas.	Fair in upper 2½ feet.
Pinkston: 165C, 165D, 165F	Good: good trafficability; low plasticity; low soil moisture; slope.	Poor: bedrock at a depth of 2 to 3½ feet.	Unsuited	Poor: difficult to reclaim borrow area.
Pouncey: 159B	Poor: poor trafficability; seasonal high water table; clayey subsoil; high soil moisture.	Poor: clayey subsoil; poorly drained.	Unsuited	Poor: thin surface layer; poorly drained.
Roanoke: 137	Poor: poor trafficability; seasonal high water table; clayey subsoil; high soil moisture; flooding.	Poor: clayey subsoil; poorly drained.	Unsuited	Poor: too clayey; poorly drained.
Rumford: 92B, 92C	Good: good trafficability; low plasticity; low soil moisture.	Good	Poor: too silty	Poor: too sandy.
Spotsylvania: 24B, 24C	Poor: poor trafficability; clayey subsoil; high soil moisture.	Poor: clayey subsoil.	Unsuited	Fair in upper 1⅔ feet.
Starr: 101B	Poor: poor trafficability; clayery subsoil; high soil moisture.	Poor: clayey subsoil.	Unsuited	Poor: difficult to reclaim borrow area.

properties of the soils—Continued

Soil features affecting—					
Impoundments		Drainage for crops and pasture	Irrigation	Terraces or diversions	Grassed waterways
Pond reservoir areas	Embankments and dikes				
Moderate permeability.	Medium to low strength, compressibility, and susceptibility to piping; low permeability; fair to good compaction characteristics.	Well drained	(1)	(1)	(1).
Seasonal high water table; slow permeability.	Medium to low strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Somewhat poorly drained; slow permeability.	Medium available water capacity; slow intake rate.	Slow permeability; plastic, clayey subsoil; erodible; siltation of channels.	Somewhat poorly drained; erodible; siltation of channels.
Moderate permeability; seepage.	Medium to low strength, compressibility, and susceptibility to piping; low permeability; fair to good compaction characteristics.	Well drained	(1)	(1)	(1).
Moderate permeability; seepage.	Medium to low strength, compressibility, permeability, and susceptibility to piping; good compaction characteristics.	Well drained	(1)	(1)	(1).
Moderately rapid permeability; seepage; bedrock at a depth of 2 to 3½ feet.	Medium to low strength, compressibility, and permeability; medium to high susceptibility to piping; fair to good compaction characteristics.	Well drained to excessively drained.	Low available water capacity; rapid intake rate; bedrock at a depth of 2 to 3½ feet; erodible; slope.	(2)	(2).
Seasonal high water table; slow permeability; bedrock at a depth of 2 to 3½ feet.	Medium to low strength, permeability, and susceptibility to piping; high compressibility; poor to fair compaction characteristics.	Poorly drained; slow permeability; bedrock at a depth of 2 to 3½ feet.	Low available water capacity; slow intake rate; bedrock at a depth of 2 to 3½ feet.	(2)	Poorly drained; low available water capacity; siltation of channels; bedrock at a depth of 2 to 3½ feet.
Seasonal high water table; slow permeability.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Poorly drained; slow permeability; flooding.	(2)	(2)	Poorly drained; siltation of channels; flooding.
Moderately rapid permeability; seepage.	Low to medium strength, compressibility, and permeability; medium to high susceptibility to piping; fair to good compaction characteristics.	Somewhat excessively drained.	Low available water capacity; rapid intake rate.	Moderately rapid permeability; erodible; siltation of channels.	Low available water capacity; erodible; siltation of channels.
Moderate permeability; seepage.	Medium to low strength, permeability, and susceptibility to piping; medium to high compressibility; fair compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate.	(1)	(1).
Moderately rapid permeability; seepage.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate.	(2)	(1).

TABLE 6.—*Interpretations of engineering*

Soils	Suitability for winter grading	Suitability as source of—		
		Road fill	Sand and gravel	Topsoil
Tetotum: 8B, 158B	Poor: poor trafficability; seasonal high water table; high soil moisture.	Fair: too silty	Unsuited	Fair in upper 2½ feet.
Toccoa: 26B	Fair: fair trafficability; high soil moisture; flooding.	Fair: too silty	Poor: too silty.	Good in upper 3 feet.
Turbeville: 107B, 107C, 108B, 108C	Poor: poor trafficability; clayey subsoil; high soil moisture.	Poor: clayey subsoil.	Unsuited	Poor: difficult to reclaim borrow area.
Udifluvents: 2. Too variable for valid interpretations.				
Vance: 210B, 210C, 210D	Poor: poor trafficability; plastic, clayey subsoil; high soil moisture.	Poor: plastic, clayey subsoil.	Unsuited	Poor: too clayey; difficult to reclaim borrow area.
Varina: 66B	Fair: fair trafficability; clayey subsoil; moderate soil moisture.	Fair: too silty	Unsuited	Fair: clayey subsoil; difficult to reclaim borrow area.
Vaucluse: 163B, 163C	Fair: fair trafficability; moderate soil moisture; fragipan.	Fair: too silty	Unsuited	Fair: fair in upper 2 feet; difficult to reclaim borrow area; fragipan.
Wedowee: 142E	Fair: fair trafficability; moderate soil moisture.	Fair: too silty	Unsuited	Fair: fair in upper 1⅔ feet; difficult to reclaim borrow area.
Worsham: 6B	Poor: poor trafficability; seasonal high water table; clayey subsoil; high soil moisture.	Poor: clayey subsoil; poorly drained.	Unsuited	Poor: too clayey; poorly drained.

[1] Generally favorable features.
[2] Practice not applicable on this soil.

properties of the soils—Continued

Soil features affecting—					
Impoundments		Drainage for crops and pasture	Irrigation	Terraces or diversions	Grassed waterways
Pond reservoir areas	Embankment and dikes				
Seasonal high water table; moderate permeability; seepage.	Medium to low strength, compressibility, permeability, and susceptibility to piping; good to fair compaction characteristics.	Moderately well drained; moderate permeability.	Medium available water capacity; moderate intake rate.	(2)	Moderately well drained.
Moderately rapid permeability; seepage.	Medium to low strength, compressibility, and permeability; high susceptibility to piping; fair compaction characteristics.	Well drained; flooding.	Medium available water capacity; moderate intake rate; flooding.	(2)	Siltation of channels; flooding.
Moderate permeability.	Medium to low strength, permeability, and susceptibility to piping; high compressibility; poor to fair compaction characteristics.	Well drained	(1)	(1)	(1).
Slow permeability	Low strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Well drained	Medium available water capacity; slow intake rate.	Plastic, clayey subsoil; siltation of channels; erodible.	Plastic, clayey subsoil; siltation of channels; erodible; slope.
Slow permeability	Medium to low strength, permeability, susceptibility to piping, and compressibility; fair to good compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate.	(1)	(1).
Slow permeability	Medium to low strength, permeability, susceptibility to piping, and compressibility; good to fair compaction.	Well drained; fragipan.	Low available water capacity; moderate intake rate.	Slow permeability; erodible; siltation of channels; fragipan.	Low available water capacity; erodible; fragipan.
Moderate permeability; seepage.	Medium to low strength, permeability, susceptibility to piping, and compressibility; fair to good compaction characteristics.	Well drained	Medium available water capacity; moderate intake rate; slope.	Erodible; siltation of channels; slope.	Erodible; siltation of channels; slope.
Seasonal high water table; moderately slow to very slow permeability.	Low to medium strength, permeability, and susceptibility to piping; high compressibility; poor compaction characteristics.	Poorly drained; moderately slow to very slow permeability.	Medium available water capacity; slow intake rate.	(2)	Poorly drained; siltation of channels.

shopping centers, and large buildings, land shaping, and the installation of water and sewage lines remove the vegetation from the soils and leave them exposed to erosion for long periods of time. Increased runoff and downstream siltation extend the damage far beyond the construction area. Soil and water losses in these areas can be reduced by adequate management practices during construction.

Contractors and developers should expose the smallest area possible at any one time and keep the exposure to the shortest length of time that is practical. They should use temporary vegetation or mulching, or both where needed; use sediment basins to control siltation; install measures to control increased runoff; and retain and protect natural vegetation (fig. 8).

In table 7 the estimated degree and kinds of limitations of the soils of the county are given for septic tank absorption fields, sewage lagoons, and shallow excavations; dwellings with and without basements; sanitary landfills; local roads and streets; lawns, garden, and landscape projects; and playgrounds, camp areas, and picnic areas. The degree of limitation is indicated by the ratings *slight*, *moderate*, and *severe*. A limitation of *slight* means that soil properties are generally favorable and limitations are so minor that they easily can be overcome. A *moderate* limitation can be overcome or modified by planning, by design, or by special maintenance. A *severe* limitation means that costly soil reclamation, special design, intense maintenance, or a combination of these is required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. The soil material from a depth of 18 inches to 6 feet is evaluated. The soil properties considered are those that affect both absorption of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to water table or rock, and susceptibility to flooding. Slope is a soil property that affects difficulty of layout and construction and also the risk of soil erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

***Figure 8.*—The substratum of many soils erodes easily in steep excavations. Freezing and thawing of this northeast exposure along Chippenham Parkway have caused this bank to slough into the road ditch.**

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet, long enough for bacteria to decompose the solids. A lagoon has a nearly level floor and sides, or embankments, of compacted soil material. The assumption is made that the embankment is compacted to medium density and the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, organic-matter content, and slope, and if the floor needs to be leveled, depth to and condition of bedrock becomes important. The soil properties that affect the embankment are the engineering properties of the embankment material as interpreted from the Unified Soil Classification and the amounts of stones, if any, that influence the ease of excavation and compaction of the embankment material.

Shallow excavations are those that require digging or trenching to a depth of 6 feet, or less, as for example, excavations for pipelines, sewer lines, phone and power transmission lines, basements, open ditches, and cemeteries. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, absence of rock outcrops or big stones, and freedom from flooding or a high water table.

Dwellings, as rated in table 7, are not more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load, and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Sanitary landfill, as used in table 7, refers to the disposal of refuse in excavated areas. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated the ratings in table 7 apply only to a depth of about 6 feet; and, therefore, limitations ratings of *slight* or *moderate* may not be valid if trenches are to be much deeper than that. For some soils, reliable predictions can be made to a depth of 10 to 15 feet, but regardless, every site should be investigated before it is selected.

Local roads and streets, as rated in table 7, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material;

a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load-supporting capacity and stability of the subgrade, and the workability and quantity of cut and fill material available. The AASHTO and Unified classifications of the soil material, and also the shrink-swell potential, indicate traffic supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

The limitations for lawns, gardens, and landscaping are based on depth to seasonal high water table, slope, depth, texture, and the hazard of flooding. The soils in these areas are subject to moderate trafficability. Soil material at the site is used, and no fill dirt or topsoil is imported. Traps or roughs were not considered when estimating suitability of the soils for golf fairways.

Lawns, gardens, and landscaping in subdivisions or other built-up areas often present special concerns. Soil materials excavated for foundations and basements are generally spread over the surrounding area. The resulting surface layer ranges in texture, generally from loamy to clayey. In addition, the surface layer is often compacted by machinery and other traffic during construction. Lawns and recreation areas are subject to a variety of uses that compact the surface layer and wear away the grass cover. Preparation of a good seedbed, seeding of adapted grasses, the application of lime and fertilizer, watering as needed, and regulation of use all help to alleviate these concerns.

Playgrounds are areas used intensively for baseball, football, badminton, and other organized games. Soils suitable for this use need to be able to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrop, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rain but not dusty when dry. If grading and leveling are required, depth to rock is important.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have mild slopes, good drainage, a surface free of rocks and coarse fragments, freedom from flooding during periods of heavy use, and surface material that is firm after rain but not dusty when dry.

Picnic areas are attractive natural or landscaped tracts used primarily for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not dusty when dry; are free of flooding during the season of use; do not have slopes or stoniness that greatly increases cost of leveling sites or of building access roads.

Formation, Morphology, and Classification of the Soils

This section contains three main parts. The first part discusses the factors of soil formation as they relate to the soils of Chesterfield County. The second part describes the important processes in the development of soil horizons. The third part explains the current system of soil classification, and places the soil series in some of the categories of the current classification system.

Factors of Soil Formation

Soils are formed through the interaction of five major factors: climate, plant and animal life, parent material, topography, and time. The relative influence of each factor generally varies from place to place. Local variations in soils are caused by differences in kind of parent material, in topography, and in drainage. In one place one factor will be dominant in the formation of a soil and determine many of its properties; in another place, another factor will be dominant. Climate, however, is fairly constant throughout the county.

Climate

Chesterfield County has a warm continental climate. The average annual rainfall is about 44 inches, and the average air temperature is between 50° and 60° F. The climate is uniform throughout the county. Rainfall is well distributed throughout the year, but normally July and August are the months of highest rainfall. If rainfall is more than 40 inches and the average air temperature is 50° or more, leaching that removes plant nutrients from the soil occurs. This temperature range and rainfall also causes oxidation of the organic matter in the surface horizons of the soils. The soils are frozen only for short periods and to shallow depths each winter. Generally, this occurs in farmed areas. Where the soils are wooded and covered with forest litter, they are rarely frozen. Consequently, weathering and translocation of leachable materials are accelerated. Although calcium is present in some of the more basic parent rocks, leaching has prevented the accumulation of free carbonates of lime. Nearly all the soils in the county are acid. Generally they range from slightly acid to extremely acid. Geologic evidence indicates that the climate in Chesterfield County has not always been warm and continental. Evidences of other climate regimes are shown in such factors as beds of coal and plinthite formation in the subsoil of soils that formed under a climate quite different from the one today.

Plant and animal life

All living organisms are important to soil formation. These include vegetation, animals, both macroscopic and microscopic bacteria, and fungi. Plants supply organic debris, and burrowing animals, earthworms, and insects below the soil surface help to keep the soil open and porous. Soil bacteria and other micro-organisms act to decompose plant material into organic matter that is incorporated into the soil.

Organic matter does not accumulate in large quantities in the soils of Chesterfield County. The soils formed

TABLE 7.—*Limitations of the soils*

[An asterisk in the first column indicates that at least one mapping unit in the series is made
Thus, the reader should follow carefully the instructions for

Soils	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements [1]
Abell: 65B	Severe: [2] moderately well drained.	Severe: [2] moderate permeability; seasonal high water table; seepage.	Moderate: moderately well drained.	Severe: seasonal high water table.
*Appling:				
42B, 142B, 245B, 542B For Spotsylvania part of 245B, see Spotsylvania series.	Moderate: [2] moderate permeability.	Moderate: [2] moderate permeability; seepage; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.
42C, 142C, 542C For Wedowee part of 142C, see Wedowee series.	Moderate: [2] moderate permeability; slope.	Severe: [2] slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.
42D, 142D For Wedowee part of 142D, see Wedowee series.	Severe: [2] slope	Severe: [2] slope	Severe: slope	Severe: slope
Aquults: 191. Too variable for valid estimates.				
Atlee: 21B	Severe: [2] moderately well drained; moderately slow permeability.	Slight [2]	Moderate: moderately well drained.	Moderate: moderately well drained.
Augusta: 167	Severe: somewhat poorly drained; flooding.	Severe: seasonal high water table; flooding.	Severe: somewhat poorly drained; flooding.	Severe: somewhat poorly drained; seasonal high water table; flooding.
*Bourne:				
49B, 169C	Severe: moderately well drained; slow to very slow permeability; fragipan.	Severe: slope	Severe: seasonal high water table.	Severe: moderately well drained; fragipan.
49C, 169B, 261B For Colfax part of 261B, see Colfax series.	Severe: moderately well drained; slow to very slow permeability; fragipan.	Moderate: slope	Severe: seasonal high water table.	Severe: moderately well drained; fragipan.
Buncombe: 71B	Severe: [2] flooding	Severe: [2] rapid permeability; flooding.	Severe: too sandy; flooding.	Severe: flooding
Cecil:				
38B	Moderate: [2] moderate permeability.	Moderate: [2] moderate permeability; seepage; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.
38C	Moderate: [2] moderate permeability; slope.	Severe: [2] slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.
38D	Severe: [2] slope	Severe: [2] slope	Severe: slope	Severe: slope
Chastain: 31	Severe: [2] poorly drained; slow permeability; flooding.	Severe: [2] seasonal high water table; flooding.	Severe: poorly drained; clayey subsoil; flooding.	Severe: poorly drained; flooding.
Chewacla: 28	Severe: [2] somewhat poorly drained; flooding.	Severe: [2] seasonal high water table; flooding.	Severe: somewhat poorly drained; flooding.	Severe: somewhat poorly drained; seasonal high water table; flooding.

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up of two or more kinds of soil, and these soils may have different properties and limitations.
referring to another series in the first column of this table]

Dwellings without basements [1]	Sanitary landfill (trench type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Moderate: seasonal high water table; moderate shrink-swell potential.	Severe: [2] seasonal high water table.	Moderate: too silty; moderate shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Moderate: moderate shrink-swell potential.	Severe: [2] clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Moderate: moderate shrink-swell potential; slope.	Severe: [2] clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: [2] clayey subsoil.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: seasonal high water table.	Severe: [2] seasonal high water table.	Moderate: too silty.	Slight	Moderate: moderately well drained; moderately slow permeability.	Moderate: moderately well drained; moderately slow permeability.	Slight.
Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Severe: flooding	Moderate: some poorly drained; flooding.	Severe: seasonal high water table; flooding.	Severe: seasonal high water table; flooding.	Moderate: somewhat poorly drained; flooding.
Moderate: seasonal high water table; slope; fragipan.	Severe: [2] seasonal high water table; fragipan.	Moderate: too silty; slope; fragipan.	Moderate: slope	Severe: moderately well drained; slow to very slow permeability; slope.	Severe: moderately well drained; slow to very slow permeability.	Moderate: seasonal high water table; slope.
Moderate: seasonal high water table; fragipan.	Severe: [2] seasonal high water table; fragipan.	Moderate: too silty; fragipan.	Slight	Severe: moderately well drained; slow to very slow permeability.	Severe: moderately well drained; slow to very slow permeability.	Moderate: seasonal high water table.
Severe: flooding	Severe: rapid permeability; flooding.	Severe: flooding	Severe: too sandy; flooding.	Severe: too sandy; flooding.	Severe: flooding	Severe: too sandy; flooding.
Moderate: moderate shrink-swell potential.	Severe: [2] clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Moderate: moderate shrink-swell potential; slope.	Severe: [2] clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: [2] clayey subsoil.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: poorly drained; flooding.	Severe: [2] poorly drained; seasonal high water table; clayey subsoil; flooding.	Severe: poorly drained; clayey subsoil; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained: flooding.	Severe: poorly drained; flooding.
Severe: seasonal high water table; flooding.	Severe: [2] seasonal high water table; flooding.	Severe: too silty; flooding.	Severe: somewhat poorly drained; flooding.	Severe: flooding	Severe: somewhat poorly drained; flooding.	Severe: flooding.

TABLE 7.—*Limitations of the soils for use*

Soils	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements [1]
Colfax: 7B	Severe: somewhat poorly drained; slow permeability; fragipan.	Severe: seasonal high water table; seepage.	Severe: somewhat poorly drained; fragipan.	Severe: somewhat poorly drained; seasonal high water table; fragipan.
207C	Severe: somewhat poorly drained; slow permeability; fragipan.	Severe: seasonal high water table; seepage; slope.	Severe: somewhat poorly drained; fragipan.	Severe: somewhat poorly drained; seasonal high water table; fragipan.
Colfax, variant: 80B	Severe: somewhat poorly drained; slow permeability; fragipan.	Severe: seasonal high water table; seepage.	Severe: somewhat poorly drained; fragipan.	Severe: somewhat poorly drained; seasonal high water table; fragipan.
Coxville: 33B	Severe: [2] poorly drained; moderately slow permeability; ponding.	Severe: [2] seasonal high water table; ponding.	Severe: poorly drained; clayey subsoil; ponding.	Severe: poorly drained; ponding.
Craven: 41B	Severe: moderately well drained; slow permeability.	Severe: seasonal high water table.	Severe: clayey subsoil.	Severe: [3] seasonal high water table; clayey subsoil.
*Creedmoor: 61B, 123B, 202B For Worsham part of 202B, see Worsham series.	Severe: moderately well drained; very slow permeability.	Moderate: slope	Severe: seasonal high water table; plastic, clayey subsoil.	Severe: seasonal high water table; plastic, clayey subsoil; high shrink-swell potential.
61C, 61C2, 123C, 202C For Worsham part of 202C, see Worsham series.	Severe: moderately well drained; very slow permeability.	Severe: slope	Severe: seasonal high water table; plastic, clayey subsoil.	Severe: seasonal high water table; plastic, clayey subsoil; high shrink-swell potential.
Cullen: 340B	Moderate: [2] moderate permeability.	Moderate: [2] moderate permeability; seepage; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.
340C	Moderate: [2] moderate permeability; slope.	Severe: [2] slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.
340D	Severe: [2] slope	Severe: [2] slope	Severe: slope	Severe: slope
Dogue, variant: 68B	Severe: [2] moderately well drained; moderately slow permeability; flooding.	Severe: [2] seasonal high water table; flooding.	Severe: seasonal high water table; clayey subsoil; flooding.	Severe: seasonal high water table; clayey subsoil; flooding.
Dunbar: 188	Severe: somewhat poorly drained; slow permeability.	Severe: seasonal high water table.	Severe: somewhat poorly drained; clayey subsoil.	Severe: somewhat poorly drained; seasonal high water table; clayey subsoil.
*Durham: 45B For Bourne part, see Bourne series.	Slight [2]	Moderate: [2] moderate permeability; slope.	Slight	Slight
Edgehill: 244B	Moderate: moderate permeability.	Severe: excess pebbles	Severe: excess pebbles.	Moderate: moderate shrink-swell potential.

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Dwellings without basements [1]	Sanitary landfill (trench type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Severe: seasonal high water table; fragipan.	Severe: seasonal high water table; fragipan.	Moderate: too silty; fragipan.	Moderate: somewhat poorly drained; fragipan.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained.
Severe: seasonal high water table; fragipan.	Severe: seasonal high water table; fragipan.	Moderate: too silty; slope; fragipan.	Moderate: somewhat poorly drained; slope; fragipan.	Severe: slope	Moderate: somewhat poorly drained; slow permeability; slope.	Moderate: somewhat poorly drained; slope.
Severe: seasonal high water table; fragipan.	Severe: seasonal high water table; fragipan.	Moderate: too silty; fragipan.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained.
Severe: poorly drained; ponding.	Severe: poorly drained; seasonal high water table; clayey subsoil; ponding.	Severe: poorly drained; clayey subsoil; ponding.	Severe: poorly drained; ponding.	Severe: poorly drained; ponding.	Severe: poorly drained; ponding.	Severe: poorly drained; ponding.
Severe: [3] seasonal high water table; clayey subsoil.	Severe: seasonal high water table; clayey subsoil.	Severe: [3] clayey subsoil.	Slight	Moderate: moderately well drained; slow permeability; slope.	Moderate: slow permeability.	Slight.
Severe: plastic, clayey subsoil; high shrink-swell potential.	Severe: seasonal high water table; plastic, clayey subsoil.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Moderate: sandy loam surface layer.	Moderate: very slow permeability; slope.	Moderate: very slow permeability.	Slight.
Severe: plastic, clayey subsoil; high shrink-swell potential.	Severe: seasonal high water table; plastic, clayey subsoil.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Moderate: sandy loam surface layer; slope.	Severe: very slow permeability; slope.	Moderate: very slow permeability.	Moderate: slope.
Moderate: moderate shrink-swell potential.	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Moderate: moderate shrink-swell potential; slope.	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: clay loam surface layer; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: clayey subsoil.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: seasonal high water table; clayey subsoil; flooding.	Severe: seasonal high water table; clayey subsoil; flooding.	Severe: clayey subsoil; flooding.	Moderate: flooding.	Moderate: moderately well drained; moderately slow permeability; slope; flooding.	Severe: flooding	Moderate: flooding.
Severe: seasonal high water table; clayey subsoil.	Severe: seasonal high water table; clayey subsoil.	Severe: clayey subsoil.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained.
Slight	Slight	Slight	Slight	Moderate: slope	Slight	Slight.
Moderate: moderate shrink-swell potential.	Severe: clayey subsoil; excess pebbles.	Moderate: moderate shrink-swell potential.	Moderate: excess pebbles.	Severe: excess pebbles.	Severe: excess pebbles.	Severe: excess pebbles.

TABLE 7.—*Limitations of the soils for use*

Soils	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements [1]
Edgehill—Continued				
244C	Moderate: moderate permeability; slope.	Severe: excess pebbles; slope.	Severe: excess pebbles; slope.	Moderate: moderate shrink-swell potential; slope.
244D	Severe: slope	Severe: excess pebbles; slope.	Severe: excess pebbles; slope.	Severe: slope
244E	Severe: slope	Severe: excess pebbles; slope.	Severe: excess pebbles; slope.	Severe: slope
*Enon:				
50C For Vance part, see Vance series.	Severe: [2] slow permeability; bedrock at a depth of 3 to 4 feet.	Severe: [2] bedrock at a depth of 3 to 4 feet; slope.	Severe: plastic, clayey subsoil; bedrock at a depth of 3 to 4 feet.	Severe: plastic, clayey subsoil; high shrink-swell potential; bedrock at a depth of 3 to 4 feet.
50F For Louisburg part, see Louisburg series.	Severe: [2] slow permeability; bedrock at a depth of 3 to 4 feet; slope.	Severe: [2] bedrock at a depth of 3 to 4 feet; slope.	Severe: plastic, clayey subsoil; bedrock at a depth of 3 to 4 feet; slope.	Severe: plastic, clayey subsoil; high shrink-swell potential; bedrock at a depth of 3 to 4 feet; slope.
*Faceville:				
110B, 157B, 162B For Gritney part of 110B, 157B, 162B, see Gritney series.	Slight	Moderate: moderate permeability; slope.	Moderate: clayey subsoil.	Slight
110C, 162C	Moderate: slope	Severe: slope	Moderate: clayey subsoil.	Moderate: slope
Fluvaquents: 1A, 3A. Too variable for valid estimates.				
Forestdale: 37	Severe: [2] poorly drained; very slow permeability; flooding.	Severe: [2] seasonal high water table; flooding.	Severe: poorly drained; clayey subsoil; flooding.	Severe: poorly drained; clayey subsoil; high shrink-swell potential; flooding.
Gritney:				
17B	Severe: slow permeability.	Moderate: slope	Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.
17C	Severe: slow permeability.	Severe: slope	Moderate: clayey subsoil; slope.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.
*Grover:				
241C, 305C For Louisburg part of 241C, see Louisburg series.	Moderate: [2] moderate permeability; slope.	Severe: [2] slope	Moderate: slope	Moderate: slope
305B	Moderate: [2] moderate permeability.	Moderate: [2] moderate permeability; seepage; slope.	Slight	Slight
305D	Severe: [2] slope	Severe: [2] slope	Severe: slope	Severe: slope
305E	Severe: [2] slope	Severe: [2] slope	Severe: slope	Severe: slope
Hydraquents: 100. Too variable for valid estimates.				
*Kempsville:				
82B For Bourne part, see Bourne series.	Slight [2]	Severe: [2] moderate permeability; seepage.	Slight	Slight
82C For Bourne part, see Bourne series.	Moderate: [2] slope	Severe: [2] moderate permeability; seepage; slope.	Moderate: slope	Moderate: slope

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Dwellings without basements [1]	Sanitary landfill (trench type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Moderate: moderate shrink-swell potential; slope.	Severe: clayey subsoil; excess pebbles.	Moderate: moderate shrink-swell potential; slope.	Moderate: excess pebbles; slope.	Severe: excess pebbles; slope.	Severe: excess pebbles.	Severe: excess pebbles.
Severe: slope	Severe: clayey subsoil; excess pebbles.	Severe: slope	Severe: slope	Severe: excess pebbles; slope.	Severe: excess pebbles; slope.	Severe: excess pebbles; slope.
Severe: slope	Severe: clayey subsoil; excess pebbles; slope.	Severe: slope	Severe: slope	Severe: excess pebbles; slope.	Severe: excess pebbles; slope.	Severe: excess pebbles; slope.
Severe: plastic, clayey subsoil; high shrink-swell potential.	Severe: [2] plastic, clayey subsoil; bedrock at a depth of 3 to 4 feet.	Severe: plastic, clayey subsoil; high shrink-swell potential; bedrock at a depth of 3 to 4 feet.	Moderate: slope	Severe: slope	Moderate: slow permeability; slope.	Moderate: slope.
Severe: plastic, clayey subsoil; high shrink-swell potential; slope.	Severe: [2] plastic, clayey subsoil; bedrock at a depth of 3 to 4 feet; slope.	Severe: plastic, clayey subsoil; high shrink-swell potential; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Slight	Moderate slope	Slight	Slight.
Moderate: slope	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate slope	Moderate: slope.
Severe: poorly drained; seasonal high water table; clayey subsoil; high shrink-swell potential; flooding.	Severe: [2] poorly drained; seasonal high water table; clayey subsoil; flooding.	Severe: poorly drained; clayey subsoil; high shrink-swell potential; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; very slow permeability; flooding.	Severe: poorly drained; very slow permeability; flooding.	Severe: poorly drained; flooding.
Moderate: clayey subsoil; moderate shrink-swell potential.	Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Moderate: slow permeability; slope.	Slight	Slight.
Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Slight	Moderate: [2] slope.	Moderate: too silty; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Slight	Slight [2]	Moderate: too silty.	Slight	Moderate: slope	Slight	Slight.
Moderate: slope Severe: slope	Severe: [2] slope Severe: [2] slope	Severe: slope Severe: slope	Severe: slope Severe: slope	Severe: slope Severe: slope	Severe: slope Severe: slope	Severe: slope. Severe: slope.
Slight	Slight [2]	Moderate: too silty.	Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Slight [2]	Moderate: too silty; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.

TABLE 7.—*Limitations of the soils for use*

Soils	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements [1]
Lenoir:				
30B	Severe: somewhat poorly drained; slow permeability.	Severe: seasonal high water table.	Severe: somewhat poorly drained; seasonal high water table; clayey subsoil.	Severe: somewhat poorly drained; seasonal high water table; clayey subsoil.
67B	Severe: somewhat poorly drained; slow permeability; flooding.	Severe: seasonal high water table; flooding.	Severe: somewhat poorly drained; seasonal high water table; clayey subsoil; flooding.	Severe: somewhat poorly drained; seasonal high water table; clayey subsoil; flooding.
Louisa, variant: 505D, 505F	Severe: [2] slope	Severe: [2] moderately rapid permeability; slope.	Severe: slope	Severe: slope
Louisburg:				
105C	Severe: bedrock at a depth of 2 to 5 feet.	Severe: rapid permeability; bedrock at a depth of 2 to 5 feet; slope.	Severe: bedrock at a depth of 2 to 5 feet; slope.	Severe: bedrock at a depth of 2 to 5 feet.
105D	Severe: bedrock at a depth of 2 to 5 feet; slope.	Severe: rapid permeability; bedrock at a depth of 2 to 5 feet; slope.	Severe: bedrock at a depth of 2 to 5 feet; slope.	Severe: bedrock at a depth of 2 to 5 feet; slope.
105E	Severe: bedrock at a depth of 2 to 5 feet; slope.	Severe: rapid permeability; bedrock at a depth of 2 to 5 feet; slope.	Severe: bedrock at a depth of 2 to 5 feet; slope.	Severe: bedrock at a depth of 2 to 5 feet; slope.
*Lucy:				
212B For Orangeburg part, see Orangeburg series.	Slight	Severe: moderate permeability; seepage.	Slight	Slight
212C For Orangeburg part, see Orangeburg series.	Moderate: slope	Severe: moderate permeability; seepage; slope.	Moderate: slope	Moderate: slope
Made land: 15. Too variable for valid estimates.				
Masada:				
103B, 106B, 117B	Moderate: moderate permeability.	Moderate: seepage; slope.	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.
103C, 106C, 117C	Moderate: moderate permeability; slope.	Severe: slope	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.
*Mayodan:				
59B, 151B, 201B For Creedmoor part of 201B, see Creedmoor series.	Moderate: [2] moderate permeability.	Moderate: [2] seepage; slope.	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.
59C, 151C, 201C, 251C For Creedmoor part of 201C and 251C, see Creedmoor series. For Edgehill part of 251C, see Edgehill series.	Moderate: [2] moderate permeability; slope.	Severe: [2] slope	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.
59D, 151D, 201D, 201F, 251D, 251F For Creedmoor part of 201D, 251D, and 251F, see Creedmoor series. For Edgehill part of 251D and 251F, see Edgehill series. For Pinkston part of 201F, see Pinkston series.	Severe: [2] slope	Severe: [2] slope	Severe: clayey subsoil; slope.	Severe: slope
Molena: 53B	Slight [2]	Severe: [2] rapid permeability; seepage.	Severe: too sandy.	Slight
Norfolk: 70B	Moderate: moderate permeability.	Moderate; moderate permeability; slope.	Slight	Slight
Ochrepts: 172D, 172E, 172F. Too variable for valid estimates.				

in town and country planning—Continued

Dwellings without basements [1]	Sanitary landfill (trench type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Moderate: seasonal high water table; clayey subsoil.	Severe: seasonal high water table; clayey subsoil.	Moderate: seasonal high water table; clayey subsoil.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained.
Severe: seasonal high water table; clayey subsoil; flooding.	Severe: seasonal high water table; clayey subsoil; flooding.	Severe: seasonal high water table; clayey subsoil; flooding.	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding.
Severe: slope	Severe: [2] slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: bedrock at a depth of 2 to 5 feet; slope.	Severe: bedrock at a depth of 2 to 5 feet.	Moderate: bedrock at a depth of 2 to 5 feet.	Moderate: bedrock at a depth of 2 to 5 feet; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: bedrock at a depth of 2 to 5 feet.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: bedrock at a depth of 2 to 5 feet; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Slight	Slight	Moderate: too sandy.	Moderate: too sandy; slope.	Moderate: too sandy.	Moderate: too sandy.
Moderate: slope	Slight	Moderate: slope	Moderate: too sandy; slope.	Severe: slope	Moderate: too sandy; slope.	Moderate: too sandy; slope.
Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Severe: clayey subsoil.	Slight	Moderate: slope	Slight	Slight.
Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope	Severe: clayey subsoil.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: clayey subsoil; moderate shrink-swell potential.	Severe: [2] clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Severe: [2] clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: [2,4] clayey subsoil.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Severe: rapid permeability.	Slight	Moderate: too sandy.	Moderate: too sandy; slope	Moderate: too sandy.	Moderate: too sandy.
Slight	Slight	Moderate: too silty.	Slight	Moderate: slope	Slight	Slight.

TABLE 7.—*Limitations of the soils for use*

Soils	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements [1]
Orange:				
48B	Severe: somewhat poorly drained; slow permeability.	Moderate: bedrock at a depth of 3½ to 5 feet.	Severe: somewhat poorly drained; plastic, clayey subsoil.	Severe: somewhat poorly drained; seasonal high water table; plastic, clayey subsoil; high shrink-swell potential.
48C	Severe: somewhat poorly drained; slow permeability.	Severe: slope	Severe: somewhat poorly drained; plastic, clayey subsoil.	Severe: somewhat poorly drained; seasonal high water table; plastic, clayey subsoil; high shrink-swell potential.
*Orangeburg:				
112B For Faceville part, see Faceville series.	Slight	Moderate: moderate permeability; seepage; slope.	Slight	Slight
112C For Faceville part, see Faceville series.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope
Orthents: 16. Too variable for valid estimates.				
Pamunkey:				
51B	Slight [2]	Severe: [2] seepage	Slight	Slight
51C	Moderate: [2] slope	Severe: [2] seepage; slope.	Moderate: slope	Moderate: slope
51D	Severe: [2] slope	Severe: [2] seepage; slope.	Severe: slope	Severe: slope
Pinkston:				
165C	Severe: [2] bedrock at a depth of 2 to 3½ feet.	Severe: [2] bedrock at a depth of 2 to 3½ feet; slope.	Severe: bedrock at a depth of 2 to 3½ feet.	Severe: bedrock at a depth of 2 to 3½ feet.
165D	Severe: [2] bedrock at a depth of 2 to 3½ feet; slope.	Severe: [2] bedrock at a depth or 2 to 3½ feet; slope.	Severe: bedrock at a depth of 2 to 3½ feet; slope.	Severe: bedrock at a depth of 2 to 3½ feet; slope.
165F	Severe: [2] bedrock at a depth of 2 to 3½ feet; slope.	Severe: [2] bedrock at a depth of 2 to 3½ feet; slope.	Severe: bedrock at a depth of 2 to 3½ feet; slope.	Severe: bedrock at a depth of 2 to 3½ feet; slope.
Pouncey: 159B	Severe: poorly drained; slow permeability; bedrock at a depth of 2 to 3½ feet.	Severe: seasonal high water table; bedrock at a depth of 2 to 3½ feet.	Severe: poorly drained; seasonal high water table; clayey subsoil; bedrock at a depth of 2 to 3½ feet.	Severe: poorly drained; seasonal high water table; clayey subsoil; high shrink-swell potential; bedrock at a depth of 2 to 3½ feet.
Roanoke: 137	Severe: poorly drained; slow permeability; flooding.	Severe: flooding	Severe: poorly drained; seasonal high water table; clayey subsoil; flooding.	Severe: poorly drained; seasonal high water table; clayey subsoil; flooding.
Rumford:				
92B	Slight [2]	Severe: [2] moderately rapid permeability; seepage.	Slight	Slight
92C	Moderate: [2] slope	Severe: [2] moderately rapid permeability; seepage; slope.	Moderate: slope	Moderate: slope

in town and country planning—Continued

Dwellings without basements [1]	Sanitary landfill (trench type)	Local roads and streets	Lawns, gardens, and lansdcaping	Playgrounds	Camp areas	Picnic areas
Severe: plastic, clayey subsoil; high shrink-swell potential.	Severe: seasonal high water table; plastic, clayey subsoil; bedrock at a depth of 3½ to 5 feet.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained.
Severe: plastic, clayey subsoil; high shrink-swell potential.	Severe: seasonal high water table; plastic, clayey subsoil; bedrock at a depth of 3½ to 5 feet.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Moderate: somewhat poorly drained; slow permeability; slope.	Severe: slope	Moderate: somewhat poorly drained; slow permeability; slope.	Moderate: somewhat poorly drained; slope.
Slight	Slight	Slight	Moderate: too sandy.	Moderate: too sandy; slope.	Moderate: too sandy.	Moderate: too sandy.
Moderate: slope	Slight	Moderate: slope	Moderate: too sandy; slope.	Severe: slope	Moderate: too sandy; slope.	Moderate: too sandy; slope.
Slight	Severe: [2] seepage	Slight	Slight	Moderate: slope	Slight	Slight.
Moderate: slope	Severe: [2] seepage	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: [2] seepage	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: bedrock at a depth of 2 to 3½ feet; slope.	Severe: [2] bedrock at a depth of 2 to 3½ feet; slope.	Moderate: bedrock at a depth of 2 to 3½ feet; slope.	Moderate: bedrock at a depth of 2 to 3½ feet; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Severe: [2] bedrock at a depth of 2 to 3½ feet; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: [2] bedrock at a depth of 2 to 3½ feet; seepage; slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: poorly drained; seasonal high water table; clayey subsoil; high shrink-swell potential.	Severe: poorly drained; clayey subsoil; bedrock at a depth of 2 to 3½ feet.	Severe: poorly drained; clayey subsoil; high shrink-swell potential.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.
Severe: poorly drained; seasonal high water table; clayey subsoil; flooding.	Severe: poorly drained; clayey subsoil; flooding.	Severe: poorly drained; clayey subsoil; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; flooding.
Slight	Severe: [2] moderately rapid permeability; seepage.	Slight	Moderate: too sandy.	Moderate: too sandy; slope.	Moderate: too sandy.	Moderate: too sandy.
Moderate: slope	Severe: moderately rapid permeability; seepage.	Moderate: slope	Moderate: too sandy; slope.	Severe: slope	Moderate: too sandy; slope.	Moderate: too sandy; slope.

TABLE 7.—*Limitations of the soils for use*

Soils	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements [1]
Spotsylvania:				
24B	Moderate: moderate permeability.	Moderate: moderate permeability; seepage; slope.	Severe: clayey subsoil.	Moderate: clayey subsoil.
24C	Moderate: moderate permeability; slope.	Severe: slope	Severe: clayey subsoil.	Moderate: clayey subsoil; slope.
Starr: 101B	Severe: [2] seasonal high water table.	Severe: [2] moderately rapid permeability; seepage.	Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.
Tetotum:				
8B	Severe: moderately well drained; ponding.	Severe: seasonal high water table; ponding.	Severe: seasonal high water table; ponding.	Severe: seasonal high water table; ponding.
158B	Severe: moderately well drained.	Severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Toccoa: 26B	Severe: [2] flooding	Severe: [2] moderately rapid permeability; flooding.	Severe: flooding	Severe: flooding
Turbeville:				
107B, 108B	Moderate: [2] moderate permeability.	Moderate: [2] moderate permeability; seepage; slope.	Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.
107C, 108C	Moderate: [2] moderate permeability; slope.	Severe: [2] slope	Moderate: clayey subsoil; slope.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.
Udifluvents: 2. Too variable for valid estimates.				
Vance:				
210B	Severe: [2] slow permeability.	Moderate: [2] slope	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.
210C	Severe: [2] slow permeability; slope.	Severe: [2] slope	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.
210D	Severe: [2] slow permeability; slope.	Severe: [2] slope	Severe: clayey subsoil; slope.	Severe: slope
Varina: 66B	Severe: slow permeability.	Moderate: slope	Slight	Moderate: seasonal high water table in lower part of subsoil.
Vaucluse:				
163B	Severe: [2] slow permeability; fragipan.	Moderate: [2] seepage; slope.	Slight	Slight
163C	Severe: [2] slow permeability; fragipan.	Severe: [2] slope	Moderate: slope	Moderate: slope
Wedowee:				
142C	Moderate: [2] moderate permeability; slope.	Severe: [2] slope	Moderate: slope	Moderate: moderate shrink-swell potential; slope.
142D	Severe: [2] slope	Severe: [2] slope	Severe: slope	Severe: slope
142E	Severe: [2] slope	Severe: [2] slope	Severe: slope	Severe: slope
Worsham: 6B	Severe: poorly drained; moderately slow to very slow permeability.	Moderate: slope	Severe: poorly drained; seasonal high water table; clayey subsoil.	Severe: poorly drained; seasonal high water table; clayey subsoil.

[1] Rating applies to small industrial, institutional, or commercial buildings of similar size.
[2] In places there is a hazard of ground water pollution to nearby streams.

in town and country planning—Continued

Dwellings without basements [1]	Sanitary landfill (trench type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Moderate: clayey subsoil.	Severe: clayey subsoil.	Severe: clayey subsoil.	Slight	Moderate: slope	Slight	Slight.
Moderate: clayey subsoil; slope.	Severe: clayey subsoil.	Severe: clayey subsoil.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: clayey subsoil; moderate shrink-swell potential.	Severe: [2] clayey subsoil; seepage.	Severe: clayey subsoil.	Moderate: too clayey.	Moderate: too clayey; slope.	Moderate: too clayey.	Moderate: too clayey.
Severe: ponding	Severe: seasonal high water table; ponding.	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding	Severe: ponding.
Moderate: seasonal high water table; moderate shrink-swell potential.	Severe: seasonal high water table.	Moderate: too silty.	Slight	Moderate: slope	Slight	Slight.
Severe: flooding	Severe: [2] seepage; flooding.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Moderate: clayey subsoil; moderate shrink-swell potential.	Moderate: [2] clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: [2] clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: clayey subsoil; moderate shrink-swell potential.	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Moderate: slow permeability; slope.	Moderate: slow permeability.	Slight.
Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate: slow permeability; slope.	Moderate: slope.
Severe: slope	Severe: clayey subsoil.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Slight	Moderate: clayey subsoil.	Moderate: clayey subsoil.	Slight	Moderate: slope	Slight	Slight.
Slight	Slight [2]	Slight	Moderate: too sandy.	Moderate: too sandy; slope.	Moderate: slow permeability.	Slight.
Moderate: slope	Slight [2]	Moderate: slope	Moderate: too sandy; slope.	Severe: slope	Moderate: slow permeability; slope.	Moderate: slope.
Moderate: moderate shrink-swell potential; slope.	Slight [2]	Moderate: moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: slope	Moderate: [2] slope.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: slope	Severe: [2] slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: poorly drained; seasonal high water table; clayey subsoil.	Severe: poorly drained; clayey subsoil.	Severe: poorly drained; clayey subsoil.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.

[3] Locally this soil has low strength and weak support for foundation.
[4] Slope is a limitation for 201F and 251F.

under forest vegetation, which is generally low in organic-matter content. In addition, the present climate favors rapid decay of plant material, oxidation of organic matter, and leaching.

Man has also altered the surface layer of the soil by clearing woodland, plowing, adding farm chemicals, and mixing soil horizons.

Parent material

Two general classes of parent material have given rise to the soils of Chesterfield County: residual material that is formed in place from the weathering and decomposition of the underlying rock and transported material that has been moved and deposited in other areas. Transported material ranges in thickness from a few feet to several hundreds of feet. The soils that formed in residual material are commonly on the uplands of the Piedmont, and those that formed in transported material are on flood plains, terraces, and Coastal Plain uplands.

Residual material.—Chesterfield County has a complex geology of Petersburg granite and Wissahickon granite gneiss rimming an old Triassic Lake basin (*4*). Basic dikes cut through this granite and granite gneiss in many places. At the contact of these formations with the sandstone and shale of the Triassic, coal measures were formed. Coal mining near Winterpock and Midlothian continued from the 1800's to the end of World War I.

The granite and granite gneiss have many intrusions of mica gneiss and mica schist. Some granite and granite gneiss contain large quantities of feldspars. Some of the soils that formed in the weathered products of these formations are sloping to steep Grover, Louisburg, Louisa, and Wedowee soils and gently sloping and sloping Appling, Cecil, Durham, and Vance soils on ridges and side slopes. Orange, Enon, Vance, and Cullen soils formed where hornblende gneiss dikes cut through the granite rocks.

Triassic sandstone and shale are interbedded. Complex bedding planes and color patterns occur, and they vary greatly over short distances. In the weathered products of these rocks, soils formed that are clayey, very strongly acid to extremely acid, and high in content of aluminum. Mayodan and Creedmoor soils formed in this area. They are gently sloping soils on ridgetops and sloping to moderately steep soils on side slopes. The sloping to steep Pinkston soils commonly formed on side slopes.

Transported material.—Transported material is in about five main landscape positions: upland ridgetops, upland depressions, Coastal Plain uplands and side slopes, stream terraces, and stream flood plains. Soils that formed in this material on upland ridgetops are at the highest elevations in the county. Some of these are Augusta, Edgehill, Masada, and Turbeville soils. Some that formed in upland depressions are Abell and Pouncey soils. Coastal Plain sediment ranges from several feet thick to more than hundreds of feet thick east of U.S. Highway 1–301 (fig. 9). Many different soils formed in this sediment. Stream terraces are throughout the entire length of the county along the James and Appomattox Rivers. Among the soils that formed on these terraces are Dogue, Forestdale, Lenoir, Molena, and Pamunkey. Soils that formed on flood plains of streams are a few feet to many feet thick. They are frequently flooded. Some of these soils lack profile development. Among them are Buncombe, Chastain, Chewacla, and Toccoa soils.

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, Appling, Louisburg, and Worsham soils all formed in material weathered from granite. Appling soils are deep; have a thick, clayey subsoil; are gently sloping; and formed on ridges where gentle relief slows down geologic erosion. The moderately deep, steep Louisburg soils, however, formed adjacent to Appling soils and in similar parent material. Here, geologic erosion removes the soil material at a faster rate, and the soil material does not remain in place long enough for a thick, clayey subsoil to develop. Thus, Louisburg soils have a thinner, loamy subsoil and a thin, discontinuous argillic horizon. In flat areas, commonly near upland depressions, the nearly level and very gently sloping Worsham soils formed in parent material similar to that of Appling and Louisburg soils. Here, runoff and seepage stays on and in the soil for long periods. Geologic erosion is lacking or is extremely slow, and deep, poorly drained soils that have a clayey subsoil form, mostly as a result of topography or relief.

Time

The soils of Chesterfield County have a wide range in age. Appling soils formed in place for a long time and have developed distinct profiles. Other soils, such as Toccoa, have little or no profile development and are known as young soils. Time is one of the main factors contributing to the lack of subsoil development.

***Figure 9.*—Road cut near Falling Creek Reservoir. The soil on the left formed in the weathered product of weathered granite; the soil on the right formed in Coastal Plain sediment. The gravel layer at the base of the Coastal Plain sediment overlies granite.**

Morphology of Soils

Horizon nomenclature and the processes involved in horizon development are described in this section.

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. 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. In some soils in Chesterfield County, the A2 horizon is brownish in color because of the oxidation of iron.

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 layers. 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

In Chesterfield County 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 generally at the same time throughout the profile. Such processes have been going on for thousand 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 Chesterfield County the organic-matter content of the surface layer averages about 2 percent.

For soils to have distinct subsoil horizons, it is believed that some of the lime and other 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 Chesterfield County have a yellowish brown to red subsoil. These colors are caused mainly by thin coatings of iron oxides on sand and silt grains; although, in some soils the colors are inherited from the materials in which they formed. The structure is weak to moderate, subangular blocky; and the subsoil contains more clay than the overlying surface horizons.

A fragipan has developed in the subsoil of many of the moderately well drained and somewhat poorly drained soils in the county. These horizons are very firm and brittle when moist, and they are very hard when dry. Soil particles are tightly packed so that bulk density is high and pore space is low. Genesis of these horizons is not fully understood, but studies show that swelling and shrinking takes place in alternating wet and dry periods. This may account for the packing of soil particles, and also for a gross polygonal pattern of cracks in the fragipan. Clay, silica, and oxides of aluminum are the most likely cementing agents causing brittleness and hardness.

The reduction and transfer of iron is associated mainly with the wetter, more poorly drained soils. This process is called gleying. 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 Worsham, Roanoke, and Forestdale soils, the subsoil and underlying materials are grayish colored, which indicates reduction and transfer of iron by removal in solution.

Classification of Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodland; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the current system should search the latest literature available (*3*, *6*, *7*, *9*).

The current system of classification has six categories. Beginning with broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped. In table 8 the soil series of Chesterfield County are placed in four categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two excep-

TABLE 8.—*Classification of soil series*

[Placement of some soil series in the current system of classification, especially in families, may change as more precise information becomes available]

Soil name	Family	Subgroup	Order
Abell	Fine-loamy, mixed, thermic	Aquic Hapludults	Ultisols.
Appling	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Aquults		Aquults	Ultisols.
Atlee	Fine-loamy, siliceous, thermic	Fragiaquic Paleudults	Ultisols.
Augusta [1]	Fine-loamy, mixed, thermic	Aeric Ochraquults	Ultisols.
Bourne	Fine-loamy, mixed, thermic	Typic Fragiudults	Ultisols.
Buncombe	Mixed, thermic	Typic Udipsamments	Entisols.
Cecil [1]	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Chastain	Fine, kaolinitic, acid, thermic	Typic Haplaquepts	Inceptisols.
Chewacla	Fine-loamy, mixed, thermic	Fluvaquentic Dystrochrepts	Inceptisols.
Colfax [1]	Fine-loamy, mixed, thermic	Aquic Fragiudults	Ultisols.
Colfax variant	Fine-loamy, siliceous, thermic	Aquic Fragiudults	Ultisols.
Coxville	Clayey, kaolinitic, thermic	Typic Paleaquults	Ultisols.
Craven [1]	Clayey, mixed, thermic	Aquic Hapludults	Ultisols.
Creedmoor	Clayey, mixed, thermic	Aquic Hapludults	Ultisols.
Cullen [1]	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Dogue variant	Fine, mixed, thermic	Aquultic Hapludalfs	Alfisols.
Dunbar	Clayey, kaolinitic, thermic	Aeric Paleaquults	Ultisols.
Durham [1]	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols.
Edgehill	Clayey-skeletal, mixed, thermic	Typic Hapludults	Ultisols.
Enon	Fine, mixed, thermic	Ultic Hapludalfs	Alfisols.
Faceville [1]	Clayey, kaolinitic, thermic	Typic Paleudults	Ultisols.
Fluvaquents		Typic and Aeric Fluvaquents	Entisols.
Fluvaquents, ponded		Humaqueptic Fluvaquents	Entisols.
Forestdale [1]	Fine, montmorillonitic, thermic	Typic Ochraqualfs	Alfisols.
Gritney	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Grover [1]	Fine-loamy, micaceous, thermic	Typic Hapludults	Ultisols.
Hydraquents		Hydraquents	Entisols.
Kempsville	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols.
Lenoir	Clayey, mixed, thermic	Aeric Paleaquults	Ultisols.
Louisa variant	Loamy, micaceous, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols.
Louisburg	Coarse-loamy, mixed, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols.
Lucy [1]	Loamy, siliceous, thermic	Arenic Paleudults	Ultisols.
Masada	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Mayodan	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Molena	Sandy, mixed, thermic	Psammentic Hapludults	Ultisols.
Norfolk [1]	Fine-loamy, siliceous, thermic	Typic Paleudults	Ultisols.
Ochrepts		Dystrochrepts	Inceptisols.
Orange [1]	Fine, montmorillonitic, thermic	Albaquic Hapludalfs	Alfisols.
Orangeburg [1]	Fine-loamy, siliceous, thermic	Typic Paleudults	Ultisols.
Orthents		Udorthents	Entisols.
Pamunkey	Fine-loamy, mixed, thermic	Ultic Hapludalfs	Alfisols.
Pinkston	Coarse-loamy, mixed, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols.
Pouncey	Clayey, mixed, thermic	Typic Albaquults	Ultisols.
Roanoke	Clayey, mixed, thermic	Typic Ochraquults	Ultisols.
Rumford	Coarse-loamy, siliceous, thermic	Typic Hapludults	Ultisols.
Spotsylvania	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Starr	Fine-loamy, mixed, thermic	Fluventic Dystrochrepts	Inceptisols.
Tetotum	Fine-loamy, mixed, thermic	Aquic Hapludults	Ultisols.
Toccoa	Coarse-loamy, mixed, nonacid, thermic	Typic Udifluvents	Entisols.
Turbeville	Clayey, mixed, thermic	Typic Paleudults	Ultisols.
Udifluvents		Typic and Aquic Udifluvents	Entisols.
Udults		Udults	Ultisols.
Vance [1]	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Varina	Clayey, kaolinitic, thermic	Plinthic Paleudults	Ultisols.
Vaucluse	Fine-loamy, siliceous, thermic	Typic Fragiudults	Ultisols.
Wedowee	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Worsham	Clayey, mixed, thermic	Typic Ochraquults	Ultisols.

[1] These soils are taxadjuncts. Their differences from the classified series are given in the descriptions of the soil series.

tions to this are the Entisols and Histosols, which occur in many different climates.

SUBORDER. Each order is subdivided into suborders that are based primarily on those soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence of water-logging, or soil differences resulting from the climate or vegetation.

GREAT GROUP. Soil suborders are separated into great groups on the basis of uniformity in the kinds and se-

quence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and those surface layers that are thick and dark colored. The features used are the self mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark red and dark brown colors associated with basic rocks, and the like.

SUBGROUP. Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order.

FAMILY. Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizon, and consistence.

General Nature of the County

This section gives some general information about the county. It discusses the history and development and gives recent information about transportation and farming. It also describes the physiography, relief, drainage, water resources, and climate.

History and Development [6]

By the early 1600's, settlers began migrating from Jamestown to areas along the James River. Areas around Bermuda Hundred became populated quickly, and by 1616 it became the largest settlement in the country with a population of 119. Over the years plenty of iron ore was found, and the first iron furnace in the country was built near Bermuda Hundred in 1619. With time this area grew in population and industry, and in 1749 Chesterfield County was formed from Henrico County and named after the Earl of Chesterfield. In 1784 Patrick Henry moved to Chesterfield County and made his home near Midlothian.

Industrial growth accelerated rapidly in the first half of the 19th century due partly to easily accessible railroads, highways, and the abundance of coal. In 1802 the Manchester Turnpike was constructed to transport coal from the coal pits to Richmond. This road was paved and had the distinction of being the first paved road in the state. This road is now U.S. 60. By 1850, highways and railroads with steam powered locomotives were common, thus triggering increased industry in the county.

During the Civil War, Drewery's Bluff served as a defense center to protect Richmond from the encroaching Union ships along the James River.

By the late 1800's coal mining, along with other industries, began to cease operations and farming again became the most important business.

In the 1870's a Board of Supervisors was elected, and they took over the administrative functions of the county. About the same time, public education began in the county with an initial 31 schools.

From the late 1800's until now, enormous growth has taken place along with the transition from farming to industry. The growth and transition are mainly due to the enormous supply of water, hydroelectric power, natural resources, transportation convenience of the bordering James River, and the job market of nearby Richmond.

Physiography, Relief, and Drainage [7]

In Chesterfield County the landscape is gently sloping to steep. The county is strongly dissected by the major drainage systems. In areas close to major streams, this strong dissection has given rise to narrow ridges, and steep side slopes. Back from the streams are areas of broad ridges and sloping to moderately steep side slopes. A narrow to wide area of nearly level to gently sloping river terraces is along the Appomattox River in the south and east and along the James River south of the City of Richmond. Low lying areas are along the James River south and east of Kingsland Creek and north and east of Swift Creek. These low lying areas have large areas of swamp and tidal marshes.

The altitude ranges roughly from about sea level along the marshes and swamps on the eastern part of the county to approximately 390 feet near the Powhatan County line along U.S. 60. Generally the land surface slopes gently to the southeast at an average rate of nearly 20 feet per mile.

Chesterfield County has three large drainage systems. The James River and its tributaries drain the northern third of the county; Swift Creek and its tributaries drain the central portion; and the Appomattox and its tributaries drain the southern part of the county.

The drainage pattern is, in general, dendritic but has some irregular branching. The general fluvial cycle ranges from stages of late youth to maturity.

Water Supply [7]

The eastern third of Chesterfield County is in the Coastal Plain province and is underlain by strata of clay, silt, sand, gravel, and marl. This series of sedimentary formation lies on granite bedrock and increases in thickness from a thin capping on the highest hills in the western part of this province to more than 250 feet near the eastern limits of the county. The central part of the county is in the Piedmont province and is underlain by granite and granite gneiss. The western part of the county is underlain by sandstone and shale and rimmed by granitized gneiss and schist.

In the Coastal Plain the ground water is available from sand and gravel strata in the sedimentary deposits and

[6] Information from "Chesterfield County, Virginia: A History," 1970, edited and compiled by Bettie Woodson Weaver.

[7] Information from "Economic Data, Chesterfield County, Virginia, 1961," Division of Industrial Development and Planning (revised November 1961).

from fractures in the deep, underlying granite bedrock. The most productive wells penetrate to a depth of 50 to 100 feet. They produce an average of 50 gallons per minute.

Most wells in the granitic rock of the Piedmont province are for rural domestic use and have depths of less than 150 feet. Those wells that are more than 150 feet to 300 feet deep produce an average of 25 gallons per minute.

Wells that are in sandstone and shale in the western part of the county range in depth from 200 to 400 feet. They yield from 4 to 50 gallons per minute and average about 25 gallons per minute. However, one well in the Skinquarter community that is 1,000 feet deep produces only 1 gallon per minute.

Chesterfield County, at the present time, has three reservoirs. The reservoir on Falling Creek near Route 10 is about 100 acres in size, the Swift Creek Reservoir near U.S. 360 has about 1,700 acres of storage area, and the reservoir on the Appomattox River, west of Matoaca, has about 3,200 acres of storage area. These reservoirs are centrally located and should help in future waterlime installation costs as the county expands and needs more water.

Climate [8]

Chesterfield County, situated in the east central part of Virginia, has warm summers, relatively mild winters, and normally adequate rainfall. The county is located well inland from the Atlantic Ocean, which has only a very small moderating effect on the climate. Although the area is near the mean path of winter storms, the Appalachian Mountains to the west tend to lessen their intensity.

The county is often in the paths of warm, moist air currents moving from the south or southwest and of cold, dry air currents moving southward and eastward. These alternating currents frequently bring sharp changes in the day-to-day weather and contribute greatly to variations in weather from one season to another. Weather on a particular day in one part of the area may differ from that in another part, but elevation differences are not large enough to cause significant differences in climate.

Mean annual temperatures vary slightly from year to year and are mostly 55° to 60° F. Maximum temperatures are 90° or higher on an average of about 48 days per year, and reach 100° or more only about every 3 years on the average. Minimum temperatures are 32° or lower about 80 to 100 days per year and occur on a few more days in the rural parts of the county than near the urban areas. A few hard freezes occur in winter, but temperatures of 0° or below are very rare. Prolonged periods of very cold or very warm weather are unusual. There are occasional mild spells in winter and periods of mild weather with lower humidities relieve stretches of warm, humid weather in summer.

The frost free growing season is about 200 days. This growing season is long enough to allow proper maturity of a large variety of crops and provide a long season for growth of horticultural specialties without protection. The pasture season is a little longer, but winter months are cold enough to require some feeding and shelter of livestock.

Precipitation amounts are quite variable over both long and short periods in the area. Any given month may be deficient in rainfall in a period of a few years and occasionally will have excessive rainfall. Although rainfall is generally greatest in July and August, it is often insufficient during these months because this is the time when vegetation demands for moisture are greatest and evaporation is highest. Thundershowers occur on an average of about 37 days per year mainly in summer. Some are heavy and result in considerable runoff. Hurricanes pass inland every few years near the area and usually cause extremely heavy rains.

The average annual relative humidity is about 71 percent. Average relative humidity varies from about 63 percent in April to 77 percent in August. Relative humidity throughout the day generally varies inversely as the temperature. It averages about 82 percent in early morning and about 53 percent in early afternoon.

The prevailing wind direction is south, although winds are from all directions a considerable part of the time. Southerly winds are most frequent in summer, but winds from south to west inclusive prevail in all months except October and February. During those months the prevailing direction is north-northwest. Windspeeds average 7.7 miles per hour annually, ranging from 6.7 miles per hour in August to 9.1 miles per hour in March. Windspeeds are moderate except for a few times each year when windstorms may cause scattered local damage in the area.

Clouds cover 60 percent of the sky, on an average, between sunrise and sunset. Cloud cover is least in fall but the percent of possible sunshine is greatest in summer when overcast days are less frequent.

Temperatures and precipitation data are given in table 9, and dates of selected freezing temperatures are given in table 10.

Transportation [9]

The principal highways through Chesterfield County are U.S. Highways 1 and 301 and Interstate 95 that run north and south and U.S. Highways 60 and 360 that run east and west. State and county roads and some circumferential highways connect them with all parts of the area.

Freight transportation by many interstate and intrastate carriers serve the area. Passenger service is provided by major bus lines, and nationwide connections are made at Richmond.

The Atlantic Coast Line Railroad and a branch of the Southern Railroad run through Chesterfield County. These railroads connect with other major railroads at Petersburg and Richmond to provide freight service to all parts of the nation.

Byrd Airport, in adjoining Henrico County 16 miles southeast of Richmond, serves Chesterfield County, also. Major airlines give direct service to many points and connections to all part of the nation and the world from Byrd Field. Chesterfield County now has a county airport just north of Chesterfield that accommodates small and medium sized airplanes.

Deepwater Terminal, located on the James River just north of Chesterfield County, is a port that provides docking facilities for ships of many countries.

[8] By M. H. BAILEY, Weather Bureau climatologist for Virginia, National Weather Service, U.S. Agronomy Department, V.P.I., Department of Commerce.

[9] Information from "Economic Data, Chesterfield County, Virginia, 1961," Division of Industrial Development and Planning (revised November 1961).

TABLE 9.—*Temperature and precipitation*

[All data from Richmond, Virginia]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Two years in 10 will have at least 4 days with—		Average monthly total	One year in 10 will have—		Days with snow cover of 1 inch or more	Average depth of snow on days with snow cover
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—		
	°F	°F	°F	°F	*Inches*	*Inches*	*Inches*		*Inches*
January	48	29	66	13	3.5	1.2	5.3	4	5
February	51	29	67	16	2.9	1.4	4.4	2	4
March	59	36	73	23	3.4	1.8	5.0	2	5
April	70	46	86	32	3.2	1.7	5.2	(1)	1
May	79	55	88	43	3.7	1.4	7.3		
June	87	63	93	53	3.8	1.2	8.2		
July	89	67	95	60	5.6	2.2	10.2		
August	86	65	94	56	5.5	1.8	9.2		
September	82	59	91	47	3.6	0.8	7.5		
October	71	47	83	37	3.0	0.9	5.3		
November	60	37	73	26	3.0	0.8	5.3	(1)	2
December	50	30	66	16	3.0	1.3	4.7	2	4
Year	69	47	[2] 99	[3] 8	44.2	31.5	53.5	10	4

[1] Less than half a day. [2] Average annual highest temperature. [3] Average annual lowest temperature.

TABLE 10.—*Probabilities of last freezing temperatures in spring and first in fall*

[All data from Hopewell, Virginia]

Probability	Dates for given probability and temperature				
	16° F	20° F	24° F	28° F	32° F
Spring:					
1 year in 10 later than	March 3	March 19	March 31	April 14	April 26
2 years in 10 later than	February 23	March 12	March 24	April 7	April 20
5 years in 10 later than	February 9	February 27	March 12	March 26	April 9
Fall:					
1 year in 10 earlier than	December 5	November 23	November 8	October 29	October 12
2 years in 10 earlier than	December 11	November 28	November 13	November 3	October 17
5 years in 10 earlier than	December 25	December 8	November 22	November 12	October 27

Farming[10]

Recent reports show farming is decreasing in Chesterfield County. In 1959, 23.6 percent of the county, or 70,953 acres, was in 533 farms. In 1970 the number of farms had fallen to 417. In 1970 greenhouse and nursery products were the leading source of farm income, about 25 percent. Dairying ranked second at 21 percent, field crops produced 20 percent, poultry 20 percent, and meat animals about 10 percent.

[10] Information from "Economic Data, Chesterfield County, Virginia, 1961," Division of Industrial Development and Planning (revised November 1961).

Approximately 77 percent of the county, or 232,130 acres, was in woodland in 1957, of which 230,130 acres were commercial and 2,000 acres were noncommercial woodland.

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Glossary

Accelerated erosion. Erosion more rapid than normal geologic erosion. It is generally the result of activities of man or animals.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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

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

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

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.

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

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

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.

Fine textured (heavy 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.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. the term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

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

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus; or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

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

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.

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

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—few, common, and many; size—fine, medium, and coarse; and contrast—faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three

single variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Parent material. The variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are very slow (less than 0.06 inch), slow (0.06 to 0.20 inch), moderately slow (0.2 to 0.6 inch), moderate (0.6 to 2.0 inches), moderately rapid (2.0 to 6.0 inches), rapid (6.0 to 20 inches), and very rapid (more than 20 inches).

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called groundwater runoff or seepage flow from ground water.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained, each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by 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, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of each mapping unit, refer to the description of the mapping unit and the soil series to which the mapping unit belongs. In referring to a capability unit or a woodland group, read the introduction to the section it is in for general information about its management.

Map symbol	Mapping unit	Described on page	Capability unit	Woodland group
			Symbol	Symbol
1A	Fluvaquents	29	------	---
2	Udifluvents	52	------	---
3A	Fluvaquents, ponded	29	------	---
6B	Worsham fine sandy loam, 0 to 4 percent slopes	55	Vw-1	2w3
7B	Colfax fine sandy loam, 2 to 6 percent slopes	19	IIIw-2	3w1
8B	Tetotum fine sandy loam, ponded	50	IIIw-1	2w2
15	Made land	36	------	---
16	Orthents-Udults-Mine pits complex	44	------	---
17B	Gritney fine sandy loam, 2 to 6 percent slopes	31	IIe-1	3o1
17C	Gritney fine sandy loam, 6 to 12 percent slopes	31	IIIe-1	3o1
21B	Atlee silt loam, 0 to 4 percent slopes	13	IIw-2	3o1
24B	Spotsylvania fine sandy loam, 2 to 6 percent slopes	48	IIe-1	4o1
24C	Spotsylvania fine sandy loam, 6 to 12 percent slopes	48	IIIe-1	4o1
26B	Toccoa fine sandy loam, 0 to 4 percent slopes	51	IIIw-1	1o1
28	Chewacla loam	18	IIIw-1	1w1
30B	Lenoir silt loam, 0 to 4 percent slopes	34	IIIw-2	2w2
31	Chastain loam	17	IVw-3	2w3
33B	Coxville loam, 2 to 6 percent slopes	20	IVw-3	2w3
37	Forestdale silt loam	30	Vw-1	1w2
38B	Cecil fine sandy loam, 2 to 6 percent slopes	16	IIe-1	3o1
38C	Cecil fine sandy loam, 6 to 12 percent slopes	16	IIIe-1	3o1
38D	Cecil fine sandy loam, 12 to 20 percent slopes	17	IVe-1	3r1
41B	Craven fine sandy loam, 2 to 6 percent slopes	21	IIIe-4	3w1
42B	Appling sandy loam, 2 to 6 percent slopes	11	IIe-5	3o1
42C	Appling sandy loam, 6 to 12 percent slopes	11	IIIe-6	3o1
42D	Appling sandy loam, 12 to 20 percent slopes	11	IVe-1	3r1
45B	Durham-Bourne fine sandy loams, 2 to 6 percent slopes	26	IIe-2	4d1
48B	Orange sandy loam, 2 to 6 percent slopes	43	IIIe-4	4w1
48C	Orange sandy loam, 6 to 12 percent slopes	43	IVe-4	4w1
49B	Bourne fine sandy loam, 2 to 6 percent slopes	14	IIe-2	4d1
49C	Bourne fine sandy loam, 6 to 12 percent slopes	15	IIIe-4	4d1
50C	Enon-Vance complex, 2 to 12 percent slopes	27	IIIe-4	4o1
50F	Enon-Louisburg complex, 12 to 40 percent slopes	27	VIIe-1	4r1
51B	Pamunkey loam, 0 to 6 percent slopes	44	IIe-1	2o1
51C	Pamunkey loam, 6 to 12 percent slopes	44	IIIe-1	2o1
51D	Pamunkey loam, 12 to 20 percent slopes	45	IVe-1	2r1
53B	Molena loamy sand, 2 to 6 percent slopes	41	IIIs-1	3s1
59B	Mayodan sandy loam, clayey substratum, 2 to 6 percent slopes	38	IIe-5	3o1
59C	Mayodan sandy loam, clayey substratum, 6 to 12 percent slopes	39	IIIe-6	3o1
59D	Mayodan sandy loam, clayey substratum, 12 to 20 percent slopes	39	IVe-1	3r1
61B	Creedmoor fine sandy loam, 2 to 6 percent slopes	22	IIe-2	3w1
61C	Creedmoor fine sandy loam, 6 to 12 percent slopes	22	IIIe-4	3w1
61C2	Creedmoor fine sandy loam, 6 to 12 percent slopes, eroded	22	IVe-4	3w1
65B	Abell sandy loam, 2 to 8 percent slopes	10	IIe-1	2o1
66B	Varina fine sandy loam, 0 to 4 percent slopes	53	IIe-2	3o1
67B	Lenoir loam, flooded, 0 to 4 percent slopes	34	IIIw-1	2w2
68B	Dogue loam, variant, 0 to 4 percent slopes	24	IIw-2	2w2
70B	Norfolk fine sandy loam, 0 to 6 percent slopes	41	IIe-1	2o1
71B	Buncombe loamy fine sand, 0 to 4 percent slopes	16	IIIs-1	2s1
80B	Colfax fine sandy loam, variant, 0 to 4 percent slopes	20	IIIw-2	3w1
82B	Kempsville-Bourne complex, 2 to 6 percent slopes	33	IIe-2	4d1
82C	Kempsville-Bourne complex, 6 to 12 percent slopes	33	IIIe-4	4d1
92B	Rumford loamy fine sand, 2 to 6 percent slopes	47	IIe-1	3o1
92C	Rumford loamy fine sand, 6 to 12 percent slopes	48	IIIe-1	3o1
100	Hydraquents	32	------	---
101B	Starr soils, clayey substratum, 2 to 6 percent slopes	49	IIe-1	1o1

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit	Woodland group
			Symbol	Symbol
103B	Masada gravelly fine sandy loam, 2 to 6 percent slopes	37	IIe-5	3o1
103C	Masada gravelly fine sandy loam, 6 to 12 percent slopes	37	IIIe-6	3o1
105C	Louisburg sandy loam, 4 to 12 percent slopes	35	IVe-2	3o2
105D	Louisburg sandy loam, 12 to 20 percent slopes	35	VIe-2	3r2
105E	Louisburg sandy loam, 20 to 45 percent slopes	35	VIIe-1	3r2
106B	Masada fine sandy loam, 2 to 6 percent slopes	37	IIe-5	3o1
106C	Masada fine sandy loam, 6 to 12 percent slopes	37	IIIe-6	3o1
107B	Turbeville fine sandy loam, 2 to 6 percent slopes	51	IIe-1	3o1
107C	Turbeville fine sandy loam, 6 to 12 percent slopes	51	IIIe-1	3o1
108B	Turbeville gravelly fine sandy loam, 2 to 6 percent slopes	51	IIe-1	3o1
108C	Turbeville gravelly fine sandy loam, 6 to 12 percent slopes	52	IIIe-1	3o1
110B	Faceville-Gritney gravelly fine sandy loams, 2 to 6 percent slopes	29	IIe-1	3o1
110C	Faceville-Gritney gravelly fine sandy loams, 6 to 12 percent slopes	29	IIIe-1	3o1
112B	Orangeburg-Faceville sandy loams, 2 to 6 percent slopes	43	IIe-1	2o1
112C	Orangeburg-Faceville sandy loams, 6 to 12 percent slopes	44	IIIe-1	2o1
117B	Masada loam, 2 to 6 percent slopes	38	IIe-5	3o1
117C	Masada loam, 6 to 12 percent slopes	38	IIIe-6	3o1
123B	Creedmoor gravelly fine sandy loam, 2 to 6 percent slopes	22	IIe-2	3w1
123C	Creedmoor gravelly fine sandy loam, 6 to 12 percent slopes	22	IIIe-4	3w1
137	Roanoke loam	47	Vw-1	2w3
142B	Appling gravelly sandy loam, 2 to 6 percent slopes	11	IIe-5	3o1
142C	Appling-Wedowee fine sandy loams, 6 to 12 percent slopes	11	IIIe-6	3o1
142D	Appling-Wedowee fine sandy loams, 12 to 20 percent slopes	11	IVe-1	3r1
142E	Wedowee gravelly fine sandy loam, 20 to 40 percent slopes	55	VIIe-1	3r1
151B	Mayodan gravelly sandy loam, clayey substratum, 2 to 6 percent slopes	39	IIe-5	3o1
151C	Mayodan gravelly sandy loam, clayey substratum, 6 to 12 percent slopes	39	IIIe-6	3o1
151D	Mayodan gravelly sandy loam, clayey substratum, 12 to 20 percent slopes	39	IVe-1	3r1
157B	Faceville-Gritney fine sandy loams, 2 to 6 percent slopes	29	IIe-1	3o1
158B	Tetotum loam, clayey substratum, 2 to 6 percent slopes	50	IIe-3	3o1
159B	Pouncey fine sandy loam, 0 to 6 percent slopes	46	IVw-3	2w3
162B	Faceville fine sandy loam, 2 to 6 percent slopes	28	IIe-1	3o1
162C	Faceville fine sandy loam, 6 to 12 percent slopes	29	IIIe-1	3o1
163B	Vaucluse sandy loam, 2 to 6 percent slopes	54	IIIe-4	3o1
163C	Vaucluse sandy loam, 6 to 12 percent slopes	54	IVe-4	3o1
165C	Pinkston gravelly sandy loam, 6 to 12 percent slopes	45	IVe-2	4d2
165D	Pinkston gravelly sandy loam, 12 to 20 percent slopes	45	VIe-2	4r2
165F	Pinkston gravelly sandy loam, 20 to 45 percent slopes	45	VIIe-1	4r2
167	Augusta fine sandy loam, high terrace, 0 to 4 percent slopes	14	IIIw-2	2w1
169B	Bourne sandy loam, 2 to 6 percent slopes	15	IIe-2	4d1
169C	Bourne sandy loam, 6 to 12 percent slopes	15	IIIe-4	4d1
172D	Ochrepts and Udults, sloping	42	IVe-1	2o1
172E	Ochrepts and Udults, strongly sloping	42	VIe-1	2r1
172F	Ochrepts and Udults, steep	42	VIIe-1	2r1
188	Dunbar fine sandy loam, 0 to 4 percent slopes	25	IIw-2	2w1
191	Aquults	12	Vw-1	2w3
201B	Mayodan, clayey substratum-Creedmoor sandy loams, 2 to 6 percent slopes	39	IIe-2	3o1
201C	Mayodan, clayey substratum-Creedmoor sandy loams, 6 to 12 percent slopes	39	IIIe-4	3o1
201D	Mayodan, clayey substratum-Creedmoor sandy loams, 12 to 20 percent slopes	39	IVe-4	3r1
201F	Mayodan, clayey substratum-Pinkston sandy loams, 20 to 45 percent slopes	40	VIIe-1	3r1
202B	Creedmoor-Worsham sandy loams, 2 to 6 percent slopes	22	IVw-3	3w1
202C	Creedmoor-Worsham sandy loams, 6 to 12 percent slopes	22	IVe-4	3w1
207C	Colfax sandy loam, 6 to 12 percent slopes	19	IIIe-4	3w1
210B	Vance fine sandy loam, 2 to 6 percent slopes	52	IIIe-4	3o1

Map symbol	Mapping unit	Described on page	Capability unit	Woodland group
			Symbol	Symbol
210C	Vance fine sandy loam, 6 to 12 percent slopes	53	IVe-4	3o1
210D	Vance fine sandy loam, 12 to 20 percent slopes	53	VIe-1	3r1
212B	Lucy-Orangeburg loamy sands, 2 to 6 percent slopes	36	IIs-1	3s1
212C	Lucy-Orangeburg loamy sands, 6 to 12 percent slopes	36	IIIs-2	3s1
241C	Grover-Louisburg complex, 6 to 12 percent slopes, eroded	32	IVe-2	3o2
244B	Edgehill very gravelly fine sandy loam, 2 to 6 percent slopes	27	IIIs-2	3o1
244C	Edgehill very gravelly fine sandy loam, 6 to 12 percent slopes	27	IVe-1	3o1
244D	Edgehill very gravelly fine sandy loam, 12 to 20 percent slopes	27	VIe-1	3r1
244E	Edgehill very gravelly fine sandy loam, 20 to 40 percent slopes	27	VIIe-1	3r1
245B	Appling-Spotsylvania sandy loams, 2 to 6 percent slopes	11	IIe-1	3o1
251C	Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 2 to 12 percent slopes	40	IVe-4	3o1
251D	Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 12 to 20 percent slopes	40	VIe-1	3r1
251F	Mayodan-Creedmoor-Edgehill very gravelly sandy loams, 20 to 40 percent slopes	40	VIIe-1	3r1
261B	Bourne-Colfax complex, 2 to 6 percent slopes	15	IIIw-2	4d1
305B	Grover fine sandy loam, 2 to 6 percent slopes, eroded	31	IIe-5	3o1
305C	Grover fine sandy loam, 6 to 12 percent slopes	32	IIIe-6	3o1
305D	Grover fine sandy loam, 12 to 20 percent slopes	32	IVe-1	3r1
305E	Grover fine sandy loam, 20 to 35 percent slopes	32	VIe-1	3r1
340B	Cullen loam, 2 to 6 percent slopes	23	IIe-1	3o1
340C	Cullen clay loam, 6 to 12 percent slopes, eroded	23	IVe-3	4c1
340D	Cullen clay loam, 12 to 20 percent slopes, eroded	23	VIe-1	4c1
505D	Louisa loam, variant, 12 to 20 percent slopes	34	VIe-2	4r1
505F	Louisa loam, variant, 20 to 45 percent slopes	35	VIIe-1	4r1
542B	Appling loam, 2 to 6 percent slopes	11	IIe-5	3o1
542C	Appling loam, 6 to 12 percent slopes	11	IIIe-6	3o1

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