Issued May 1971

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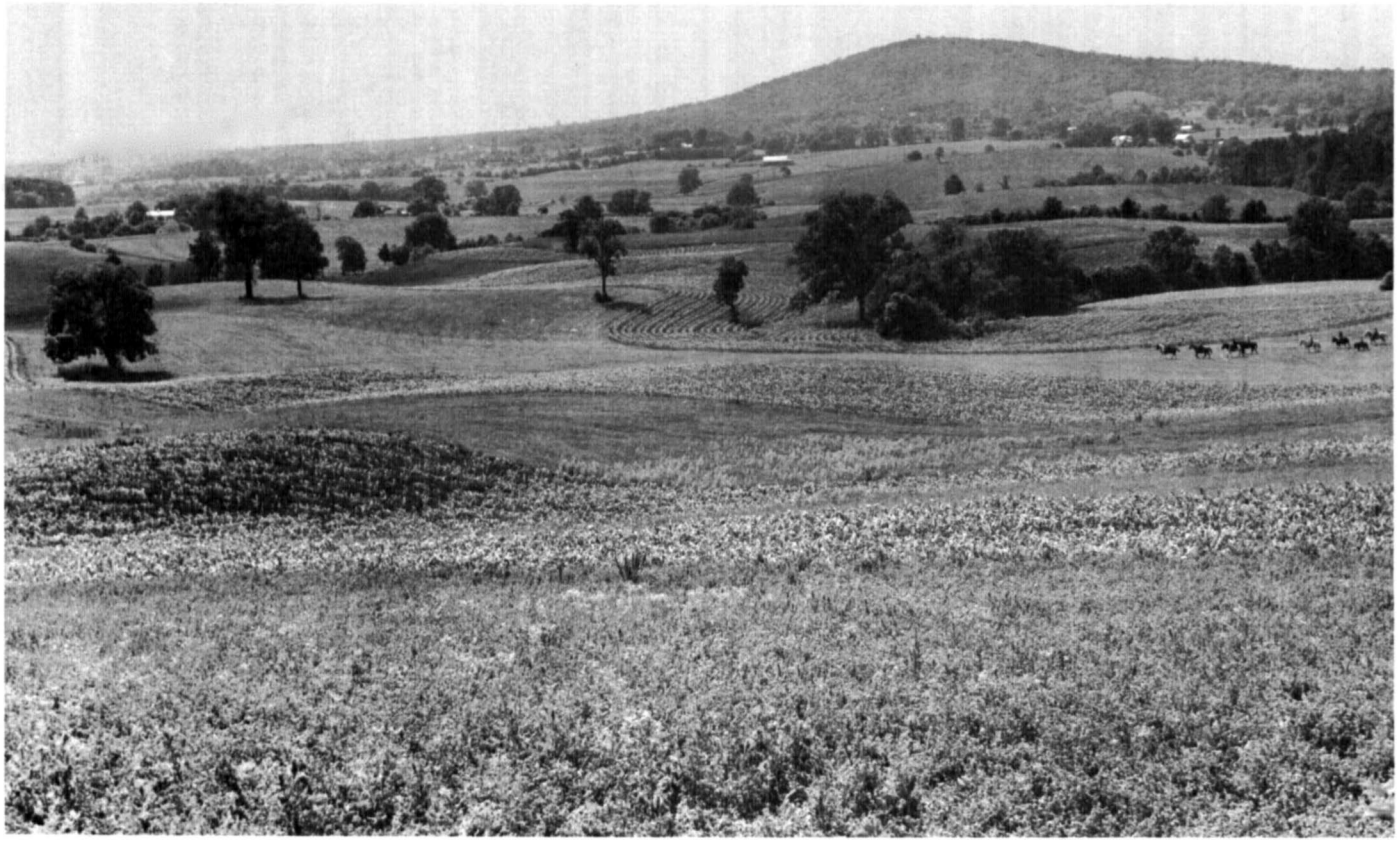
SOIL SURVEY

Orange County, Virginia



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
VIRGINIA AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1959–64. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1964. This survey was made cooperatively by the Soil Conservation Service and the Virginia Agricultural Equipment Station; it is part of the technical assistance furnished to the Culpeper Soil and Water Conservation District.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased, on individual order, from the Cartographic Division, Soil Conservation Service, USDA, Washington, D.C. 20250.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

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

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. 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" in the back of this survey can be used to find information in the survey. This guide lists all of the soils of the county in alphabetic order by map symbol. It shows the page where each kind of soil is described, and also the page for the capability unit and woodland group in which the soil has been placed.

Interpretations not included in the text can be developed by using the soil map and information in the text. Translucent material can be used as an overlay 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 woodland suitability groups.

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

Game managers, sportsmen, and others concerned with wildlife will find information about soils and wildlife in the section "Soil Interpretations for Wildlife Habitat."

Community planners and others concerned with nonfarm development can read about the soil properties that affect the choice of homesites, industrial sites, schools, and parks in the section "Nonfarm Uses of the Soils."

Engineers and builders will find under "Engineering Uses of the Soils" tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

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

Newcomers in Orange 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 section "Additional Facts About the County," which gives additional information about this area.

Cover picture: Typical farming scene in the uplands of Orange County. Bucks silt loam, 2 to 7 percent slopes, eroded, and Wadesboro fine sandy loam, 2 to 7 percent slopes, eroded, are in the foreground. Mayodan fine sandy loam, 7 to 15 perecent slopes, eroded, and Pinkston fine sandy loam, 15 to 25 peercent slopes, are in the wooded areas in the background.

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Issued May 1971

SOIL SURVEY OF ORANGE COUNTY, VIRGINIA

BY J. B. CARTER, J. W. WILLS, AND W. E. CUMMINS, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE VIRGINIA AGRICULTURAL EXPERIMENT STATION

ORANGE COUNTY is in the northern part of Virginia (fig. 1). Orange, the county seat, is about 75 miles southwest of Washington, D.C., and 60 miles northwest of Richmond, the State capital. The total area is 354 square miles, or 226,560 acres. In 1960 the population of the county was 12,900, according to the U.S. Bureau of the Census.

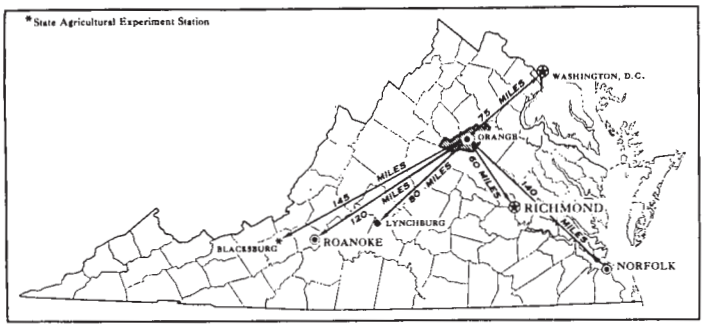

Figure 1.—Location of Orange County in Virginia.

The Rapidan River forms the entire northern boundary of the county, and it separates this county from Culpeper County and Madison County. Orange County is bounded on the west by Greene County, on the east by Spotsylvania County, and on the south by Albemarle and Louisa Counties. The North Anna River forms part of the boundary between Orange and Louisa Counties.

Many of the soils in the county are suited to a large number of crops, and farming is the main occupation. The climate is favorable both for general farming and the raising of livestock. A large part of the area is suited to the use of modern farm machinery. Much of the land in farms is used for pasture and hay. Corn, barley, oats, and other crops are grown and are fed mainly to livestock on the farm. Dairy cattle and beef cattle are the principal kinds of livestock, but sheep, hogs, and horses are raised, and poultry and poultry products are an important source of farm income. In 1964 slightly more than 88 percent of the total income from the sale of farm products was derived from the sale of livestock and livestock products, including dairy products, poultry, and poultry products.[1]

[1] From figures of the U.S. Census of Agriculture.

Many different industries are located in the county. Among these are lumber mills, grain mills, creameries, hatcheries, and plants where metal products, bricks (fig. 2), textiles, and electronic equipment are manufactured.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Orange 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. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; 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 roots of plants.

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. To use this survey efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

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. Orange and Roanoke, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that go with their behavior in the natural landscape. Soils of one series can differ somewhat in texture of the soil and in slope, stoniness, or some other characteristic that affects use of the soils by man.

Many soil series contain soils that differ in texture of their surface layer. According to such differences in texture, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Rapidan silt loam and

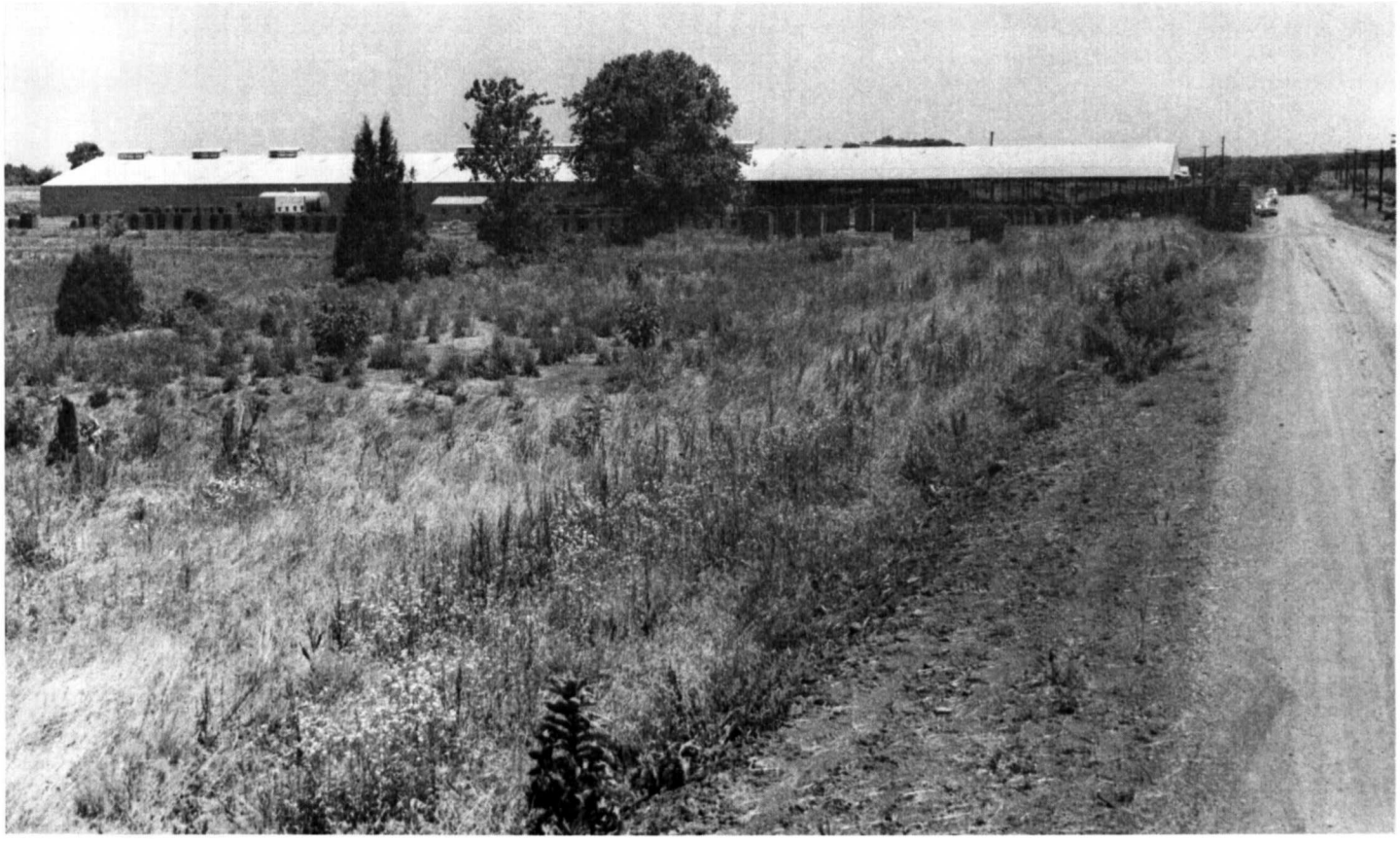

Figure 2.—**Plant near Somerset where bricks are manufactured from the red shale that underlies the Bucks and Penn soils.**

Rapidan silty clay loam are two soil types in the Rapidan series. The difference in texture of their surface layers is apparent from their names.

Some types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting their use, that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into phases. The name of a soil phase indicates a feature that affects management. For example, Rabun clay loam, 2 to 7 percent slopes, eroded, is one of several phases of Rabun clay loam, a soil type that ranges from nearly level to steep.

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 greatly help in drawing boundaries accurately. The soil map in the back of this survey was prepared from the aerial photographs.

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

In preparing some detailed maps, the soil scientists have a problem of delineating areas where different kinds of soils are so intricately mixed or occur in areas so small in size that it is not practical to show them separately on the map. Therefore, they show this mixture of soils as one mapping unit and call it a soil complex. Ordinarily, a soil complex is named for the major kinds of soil in it, for example, Calverton-Creedmoor complex, 2 to 7 percent slopes.

Most surveys include areas where the soil material is so rocky, so shallow, or so frequently worked by wind and water that it cannot be classified by soil series. These areas are shown on the map like other mapping units, but are given descriptive names, such as Mixed alluvial land or Rock land, and are called land types.

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

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in a way that it is readily useful to different groups of readers, among them farmers, ranchers, mana-

gers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in the soil survey. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups, and then test them by further study and by consultation with farmers, agronomists, engineers, and others. Then, the scientists 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 present 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 Orange 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 farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The 16 soil associations in Orange County are described in the following pages. More detailed information about the individual soils in each association can be obtained by studying the detailed soil map and by reading the section "Descriptions of the Soils."

1. Elioak-Hazel-Glenelg-Watt Association

Deep to shallow, well-drained to excessively drained, gently sloping to moderately steep soils on dissected uplands

This soil association is in the extreme western part of the county in an area about 3 miles wide that extends from the Rapidan River to the Albemarle County line. It is strongly dissected by intermittent and permanent streams and has a well-defined drainage pattern. Most of the association is gently sloping or sloping, but some areas on bluffs near streams and drainageways are moderately steep. Elevations range from 400 to 600 feet. The association makes up about 6 percent of the county.

Elioak soils, which occupy about 45 percent of the acreage, are deep, well drained, and gently sloping or sloping. They have formed in material that weathered from mica schist and gneiss. The surface layer of these soils is predominantly brown fine sandy loam, and the subsoil is red heavy silty clay loam. The lower part of the subsoil contains mica flakes.

Hazel soils, which make up about 14 percent of the acreage, are shallow to moderately deep, excessively drained, and sloping to moderately steep. They are on side slopes that lead toward drainageways. The material from which these soils formed has weathered from schist, phyllite, and sandstone. The surface layer of the Hazel soils is brown or dark-brown loam. The subsoil is poorly defined and consists of brown or dark-brown very fine sandy loam.

Glenelg soils, which make up about 10 percent of the acreage, are deep, well drained, and gently sloping or sloping. They are highly micaceous and have formed in material that weathered from quartz mica schist and gneiss. The surface layer of the Glenelg soils is brownish loam, and their subsoil is strong-brown to yellowish-red silty clay loam to heavy silt loam.

Watt soils, which occupy about 7 percent of the acreage, occur in an area known locally as Pea Ridge, or Blue Hill. This area is along Virginia Highway No. 644, which extends from the Albemarle County line, through Eheart, and northeastward toward the Rapidan River. Watt soils are shallow to moderately deep, excessively drained, and gently sloping to moderately steep. They have formed in material that weathered from graphitic schist and slate. The surface layer of these soils is very dark gray or black silt loam. Their subsoil is weakly defined and consists of very dark gray silt loam.

Minor soils of this association are the Manor, Cecil, and Appling, on uplands, and the Worsham soils and Mixed alluvial land, along drainageways. These soils occupy about 24 percent of the acreage.

Farms on this association are generally less than 150 acres in size, and the crops most commonly grown are corn, small grains, and hay. More than half the association is suitable for cultivation. Except where severe erosion has taken place, the soils are in good tilth and crops respond well to proper management. The raising of beef cattle is an important enterprise.

Ground water is in good supply. Springs are plentiful, and wells that are fairly shallow provide water of good quality. The association has good potential for residential, industrial, and recreational development.

2. Mayodan-Pinkston-Wadesboro Association

Deep or moderately deep, well-drained or somewhat excessively drained, gently sloping to moderately steep soils on dissected uplands

This association lies west of Barboursville. In one part of it, Haudricks Mountain rises abruptly above the surrounding terrain. The area south of Haudricks Mountain is gently sloping and sloping, but the mountainous area is moderately steep or steep. Elevations range from 460 to 916 feet. In the half of the association not occupied by Haudricks Mountain, the drainage pattern is not well defined. This association makes up about 2 percent of the county.

Mayodan soils, which occupy about 42 percent of the acreage, are deep, well drained, and gently sloping or sloping. They have formed in material that weathered from sandstone, shale, and sandstone conglomerate of Triassic age. The surface layer of these soils is mainly yellowish-brown fine sandy loam, and their subsoil is predominantly reddish sandy clay loam to light clay.

Pinkston soils, which occupy about 15 percent of the acreage, are moderately deep or deep, are well drained or somewhat excessively drained, and are sloping to

moderately steep. They are on side slopes extending from ridgetops, where they have formed in material that weathered from sandstone conglomerate of Triassic age. The surface layer of the Pinkston soils is brown or dark-brown fine sandy loam. Their subsoil is weakly defined and generally consists of reddish-brown sandy loam.

Wadesboro soils, which occupy about 10 percent of the acreage, are deep, well drained, and gently sloping to moderately steep. They are on side slopes and ridgetops and have formed in material weathered from sandstone, shale, and sandstone conglomerate of Triassic age. The surface layer of these soils is brownish fine sandy loam, and the subsoil is reddish silty clay loam to clay.

Minor soils occupy about 33 percent of this association. They are the Penn and Albano on uplands; the Calverton and Creedmoor along intermittent drainageways and on foot slopes; and the Rowland and Bowmansville soils and Mixed alluvial land on flood plains.

Farms on this association are generally less than 150 acres in size, and most of them are operated by part-time farmers. Corn, small grains, and hay are the most commonly grown crops. More than half of the acreage is suited to cultivation.

Ground water is in good supply. Springs are fairly plentiful, and wells that are only moderately deep provide water of good quality. The association has good potential for residential, industrial, and recreational development.

3. Bucks-Wadesboro-Penn Association

Deep or moderately deep, well-drained, gently sloping or sloping soils on uplands

This association is mainly in an area about 1½ miles wide that extends in a northeasterly direction from Barboursville to the Rapidan River. It occupies other smaller areas east of the Rapidan River near Rapidan and Raccoon Ford. Most of the association is gently sloping or sloping. It is weakly dissected by a few intermittent and a few permanent streams, but the drainage pattern is not well defined. Elevations range from 340 to 500 feet. This association makes up about 3 percent of the county.

Bucks soils, which occupy about 39 percent of the acreage, are deep, well drained, and gently sloping or sloping. They are on broad ridgetops and on side slopes that extend toward drainageways, and they have formed in material weathered from Triassic red shale and conglomerate. The surface layer of these soils is reddish-brown silt loam, and their subsoil is dark-red silty clay loam.

Wadesboro soils, which occupy about 28 percent of the acreage, are also deep, well drained, and gently sloping or sloping. They have formed in material weathered from sandstone, shale, and conglomerate of Triassic age. The surface layer of these soils is brownish fine sandy loam, and their subsoil is mostly red sandy clay loam to clay.

Penn soils, which occupy about 16 percent of the acreage, are moderately deep, well drained, and gently sloping or sloping. They have formed in material weathered from red shale, sandstone, and conglomerate. The surface layer of these soils is dusky-red to dark reddish-brown silt loam, and their subsoil is dark reddish-brown to weak-red shaly silt loam.

Minor soils that together occupy about 17 percent of the acreage are the Bermudian, Rowland, the Bowmansville on flood plains, mostly along Blue Run; the Mayodan, Calverton, Albano, and Klinesville on uplands; and the Manassas in depressions at the heads of streams.

Farms on this association are generally more than 300 acres in size. The soils in more than half the association are well suited to cultivation, but the most important farm enterprises are the raising of dairy cattle and beef cattle. Corn, small grains, and hay are the crops most commonly grown.

Ground water is in good supply in this association. Springs are plentiful, and water of good quality can be obtained at a moderate depth from wells. The association has good potential for residential, industrial, and recreational development.

4. Rapidan-Bucks-Penn Association

Deep or moderately deep, well-drained, gently sloping or sloping soils on uplands

This association occupies a narrow area that extends from Barboursville to Montford, and it occupies other small areas south of the Rapidan River from Liberty Mills to Raccoon Ford. The soils have formed in material weathered from red shale and conglomerate of Triassic age. The association is dissected by intermittent and permanent streams and has a well-defined drainage pattern. Most of the association is gently sloping and sloping, but bluffs near the streams and drainageways are steep. Elevations range from 380 to 520 feet. This association makes up about 3 percent of the county.

Rapidan soils, which occupy about 26 percent of the acreage, are deep, well drained, and gently sloping or sloping. They have a surface layer of dark reddish-brown silt loam and a subsoil of dark reddish-brown to dark-red silty clay loam and clay.

Bucks soils, which occupy about 23 percent of the acreage, are also deep, well drained, and gently sloping or sloping. They have a surface layer of reddish-brown silt loam and a subsoil of dark-red silty clay loam.

Penn soils, which occupy about 15 percent of the acreage, are moderately deep, well drained, and sloping. They have a surface layer of dark reddish-brown to dusky-red silt loam. The subsoil is weakly defined and consists of a thin layer of weak-red shaly silt loam.

Minor soils are the Klinesville, Wadesboro, Calverton, Davidson, Manassas, Rowland, and Bowmansville, which together constitute about 36 percent of the acreage. All of these soils, except the Davidson, were derived from material of Triassic age. The Davidson soils were derived from material weathered from greenstone.

Farms on this association are generally less than 300 acres in size. Dairying and the raising of beef cattle are the most important farm enterprises. Most of the Rapidan and Bucks soils are well suited to cultivation, but the Penn soils are only poorly suited to crops. Corn,

small grains, and hay are the crops most commonly grown. Except where erosion has taken place, the soils are in good tilth. Good response is received from proper management.

Ground water is in good supply. Springs are not plentiful, but an adequate supply of water can generally be obtained from wells that are less than 150 feet deep. The association has good potential for residential, industrial, and recreational development.

5. Fauquier-Catoctin-Myersville Association

Deep to shallow, well-drained to excessively drained, gently sloping to steep soils on dissected uplands

This association occupies a strip about 1½ miles wide that lies west of Somerset in the northwestern part of the county and extends to the Rapidan River. It is dissected by intermittent and permanent streams and has a well-defined drainage pattern. Elevations range from 400 to 560 feet. This association makes up about 1 percent of the county.

Fauquier soils, which occupy about 44 percent of the acreage, are deep, well drained, and sloping or gently sloping. They have formed in material weathered from greenstone, or metabasite. The surface layer of these soils is reddish-brown silt loam, and their subsoil is red to dark-red silty clay loam to clay. These soils are moderately permeable and are medium acid.

Catoctin soils, which occupy about 15 percent of the acreage, are shallow to moderately deep, excessively drained, and sloping to steep. They occur on side slopes that extend toward drainageways, and they have formed in material weathered from greenstone. The surface layer of these soils is brown to dark-brown silt loam. The subsoil, generally also silt loam, is weakly defined. These soils are medium acid. A few areas are stony.

Myersville soils, which occupy 12 percent of the acreage, are deep, well drained, and gently sloping or sloping. They are on ridgetops and side slopes and have formed in material weathered from greenstone. The surface layer of these soils is brown to dark-brown silt loam, and their subsoil is strong-brown and yellowish-red silty clay loam. Myersville soils are medium acid to strongly acid.

Minor soils that occupy about 29 percent of the association are the Zion and Elbert soils and Rock land, basic, of the uplands, and Starr soils along small streams and at the heads of drainageways.

Most farms in this association are 500 acres or more in size. Most of the acreage is in field crops and pasture, and dairying and the raising of beef cattle and horses are important enterprises. Nearly all of the well-drained soils on uplands are suited to cultivation. Except where severe erosion has taken place, the soils are in good tilth and good response is obtained from proper management. The crops most commonly grown are corn, small grains, alfalfa, and hay.

Ground water is in good supply. Springs are not plentiful, but the ones that do occur provide a good flow of water. A good supply of well water can be obtained only from deep wells. This association has good potential for residential, industrial, and recreational development.

6. Davidson Association

Deep, well-drained, gently sloping to steep soils on dissected uplands

This association is in the mountainous part of the county. It consists of one large area, about 3 miles wide, that extends from west of Gordonville through the central part of the county to the Rapidan River near Raccoon Ford. The headwaters for many of the streams in the county rise in this area, and the drainage pattern is well defined. Most of the association is sloping to moderately steep. Elevations range from 500 to 1,000 feet. This association makes up about 15 percent of the county.

Davidson soils, which occupy about 80 percent of the acreage, are deep, well drained, and gently sloping to steep. They have formed in material weathered from greenstone. The surface layer of these soils is dark reddish-brown clay loam, and their subsoil is dark-red, permeable clay.

Starr soils, which occupy less than 2 percent of the association, are also deep and well drained. They are along small drainageways and have formed in colluvium washed from the Davidson soils. The surface layer of the Starr soils is dark reddish-brown silt loam, and their subsoil is dark reddish-brown to dark-red and red, permeable clay loam and silty clay loam.

Minor soils are the Catoctin, Dyke, Elbert, Myersville, and Rabun, which together occupy about 18 percent of the acreage.

Farms on this association are generally more than 300 acres in size, and most of them are operated by a farm manager. Dairying and the raising of beef cattle and horses are important enterprises. The soils are among the most fertile in the county.

The supply of ground water is limited, but springs are numerous enough that they supply most farms with adequate water. Wells are difficult to dig in the hard greenstone, and they produce little water. This association has good potential for residential, industrial, and recreational development.

7. Rabun-Davidson-Rock Land, Basic Association

Deep, well-drained, gently sloping to steep soils on dissected uplands

This association is in rough, mountainous areas of the county at elevations ranging from 700 to 1,197 feet. Much of it is moderately steep or steep. The association makes up about 3 percent of the county.

Rabun soils, which occupy about 75 percent of the acreage, are deep, well drained, and gently sloping to steep. They occur at the highest elevation in the association, and they have formed in material weathered from greenstone. The surface layer of these soils is dark reddish-brown and dark-red clay loam, and their subsoil is mostly dark-red, permeable clay and silty clay loam.

Stony Davidson soils, which occupy about 15 percent of the acreage, are also deep and well drained, and they range from gently sloping to steep. The surface layer of

these soils is dark reddish-brown stony clay loam, and their subsoil is dark-red, permeable clay. Stones cover 3 to 15 percent of the surface and make tillage impractical.

Areas of Rock land, basic, which are sloping to steep miscellaneous land types, occupy less than 2 percent of the acreage. Loose stones and outcrops of rock cover 25 to 50 percent of the surface and make tillage impractical.

Minor soils make up the rest of the association. These are the Myersville, Catoctin, and Starr soils.

Most of this association is too steep and rough for general farming. Much of the acreage could be used for pasture or orchards, but a large part of the association is in forest.

The supply of ground water is limited. Few springs are available to supply water. Wells are difficult to dig, and they produce little water. The association has potential for residential and recreational development, but its potential is limited for industrial development.

8. Comus-Hiwassee-Elsinboro Association

Deep, well-drained, nearly level to sloping soils on first bottoms and on stream terraces

This association consists of small areas of soils on alluvium along the Rapidan River, especially in bends and curves of that river. The relief ranges from nearly level to sloping, and the drainage pattern is not clearly defined. Elevations range from 200 to 400 feet. The association makes up about 5 percent of the county.

Comus soils, which occupy about 14 percent of the acreage, are deep, well drained, and nearly level. They are on first bottoms along the river and are subject to flooding. The surface layer of these soils is brown or dark-brown fine sandy loam or silt loam. Beneath the surface layer is dark-brown or dark yellowish-brown soil material of variable texture.

Hiwassee soils, which occupy about 10 percent of the acreage, are deep, well drained, and gently sloping or sloping. These soils occupy small areas at the highest elevations in the association. Their surface layer is dark reddish-brown loam, and their subsoil is mostly dark-red clay and silty clay loam.

Elsinboro soils, which occupy about 7 percent of the acreage, are on benches or stream terraces above the Comus soils and below the Hiwassee soils. They are also deep, well drained, and gently sloping or sloping. Their surface layer is dark-brown loam, and their subsoil is mostly brown to reddish-brown clay loam.

Among the minor soils are the Buncombe, Chewacla, State, and Wehadkee soils on bottom lands, which occupy about 24 percent of the association. Other minor soils are the Altavista, Augusta, Roanoke, Masada, and Turbeville soils on stream terraces; these occupy another 32 percent. The remaining 13 percent consists of small areas of Elioak, Hazel, Nason, Tatum, Manteo, Klinesville, Penn, Davidson, Catoctin, and Rapidan soils, all formed in material weathered from the underlying rocks.

Dairying and the raising of beef cattle are important enterprises in this association. The soils are well suited to field crops and to grasses and legumes grown for hay and pasture. Most of the association is used for pasture and field crops, mainly corn, alfalfa, red clover, orchardgrass, and small grains. Crops respond well to good management.

Ground water is in good supply, and springs are plentiful. The association has poor potential for residential or industrial development, but it has good potential for recreational development.

9. Masada-Turbeville Association

Deep, well-drained, gently sloping or sloping soils on stream terraces

This association is in a narrow strip that extends from the town of Gordonsville to Madison Run, and thence along the west side of Mountain Run to the Rapidan River. The soils are underlain by alluvium. Mostly, they are gently sloping or sloping, but a few areas near drainageways are moderately steep. Elevations range from 300 to 450 feet. The association makes up about 3 percent of the county.

Masada soils, which occupy about 22 percent of the acreage, are deep, well drained, and gently sloping to sloping. Their surface layer is brownish loam, and their subsoil is yellowish-brown and yellowish-red clay loam.

Turbeville soils, which occupy about 21 percent of the acreage, are deep, well drained, and gently sloping or sloping. Their surface layer is dark-brown loam, and their subsoil is mostly dark-red clay.

Minor soils include the Altavista, Augusta, and Roanoke soils on stream terraces; these occupy about 19 percent of the acreage. Other minor soils are the Chewacla and Wehadkee soils and Mixed alluvial land on first bottoms, which occupy an additional 10 percent. The rest of the acreage consists of York, Nason, Tatum, Lignum, and Manteo soils.

Nearly all of this association has been cleared for crops and pasture. Dairy farming and the raising of beef cattle are important enterprises. The soils are in good tilth. They are suited to corn, small grains, hay, and other general crops, and the Turbeville soils are well suited to alfalfa. The crops respond well to good management.

Ground water is in good supply. Some springs provide water, and water of good quality is obtained from wells at a moderate depth. The association has good potential for industrial and recreational development, but it is less suitable for residential development.

10. Mixed Alluvial Land-Chewacla Association

Moderately deep to deep, poorly drained to well-drained, nearly level soils on first bottoms

This association consists mostly of soils on flood plains along Mountain Run, Terrys Run, Pamunkey Creek, the North Anna River, and other major streams in the county. These soils have formed in alluvium, and for the most part, they are nearly level. Elevations range from 250 to 350 feet. This association makes up about 2 percent of the county.

Mixed alluvial land, which occupies about 48 percent of the acreage, is a miscellaneous land type that is subject to flooding in most places. It has no definite profile,

and it consists of a mixture of soil material that ranges from silt loam to sandy loam in texture. Drainage ranges from good to poor.

Chewacla soils, which occupy about 32 percent of the acreage, are moderately well drained or somewhat poorly drained and are on first bottoms subject to flooding. Their surface layer is brown to dark-brown silt loam, and their subsoil is mottled grayish and brownish silt loam.

Minor soils, which occupy nearly 20 percent of the acreage, are the Comus and Wehadkee soils of flood plains. The rest of the acreage is occupied by small areas of soils on terraces.

Most of this association is in forest because the soils are susceptible to frequent flooding and are too wet to be well suited to crops. A few areas have been drained and are in corn.

Ground water is in good supply in this association, and springs in some areas adjacent to the uplands are a source of water. This association has poor potential for residential or industrial development, but it has good potential for recreational purposes.

11. Nason-Tatum-Manteo Association

Deep or shallow, well-drained or excessively drained, gently sloping to steep soils on dissected uplands

This association is mostly in the eastern part of the county. It is dissected by intermittent and permanent streams, and it has a well-defined drainage pattern. Much of the association is gently sloping or sloping, but some areas on bluffs along streams and drainageways are steep. Elevations range from 275 to 525 feet. This is the largest of the associations. It makes up about 42 percent of the county.

Nason soils, which occupy about 50 percent of the acreage, are deep, well drained, and gently sloping to moderately steep. They have formed in material weathered from fine-grained sericite schist. These soils have a surface layer of grayish-brown and yellowish-brown silt loam and a subsoil of yellowish-brown, strong-brown, and yellowish-red silty clay loam. They are extremely acid.

Tatum soils, which occupy about 20 percent of the acreage, are also deep, well drained, and gently sloping to moderately steep. They have formed in material weathered from fine-grained sericite schist. These soils have a surface layer that is mostly yellowish-brown silt loam and a subsoil that is mostly red silty clay. They are very strongly acid to extremely acid.

Manteo soils, which occupy about 8 percent of the acreage, are shallow over bedrock, excessively drained, and gently sloping to steep. They have formed in material weathered from sericite schist and phyllite. These soils have a surface layer, mostly of brown to yellowish-brown silt loam, and a weakly defined subsoil of yellowish-brown very shaly silt loam. They are extremely acid.

Minor soils, which occupy about 22 percent of the association, are the York, Lignum, Worsham, Seneca, Chewacla, and Wehadkee soils, and Mixed alluvial land.

Farms on this association are generally more than 400 acres in size. Corn, small grains, and hay are the crops most commonly grown. General farming is practiced, and the raising of beef cattle is an important enterprise. A large part of the acreage is suitable for crops and pasture, but the Manteo soils are not suited to cultivation.

Ground water is in good supply in this association. Springs are plentiful. Shallow wells provide water of good quality, but the yield is low to moderate. This association has good potential for residential, industrial, and recreational development.

12. Tatum-Nason Association

Deep, well-drained, gently sloping to moderately steep soils on dissected uplands

This association occupies small areas in the eastern part of the county. The largest area is near Richards Shop. The association is dissected by intermittent and permanent streams, and it has a well-defined drainage pattern. Mostly it is gently sloping or sloping, but some areas are moderately steep. Elevations range from 325 to 525 feet. This association makes up about 4 percent of the county.

Tatum soils, which occupy about 49 percent of the acreage, are deep, well drained, and gently sloping to moderately steep. They have formed in material weathered from sericite schist. The surface layer of these soils is mainly yellowish-brown silt loam, and their subsoil is mainly red silty clay and silty clay loam.

Nason soils, which occupy about 25 percent of the acreage, are also deep, well drained, and gently sloping to moderately steep. They have formed in material weathered from sericite schist. The surface layer of these soils is mainly yellowish-brown silt loam, and their subsoil is mostly strong-brown to yellowish-red silty clay loam.

Minor soils, which together occupy about 26 percent of the acreage, are the Manteo, Worsham, Lignum, Seneca, and Chewacla, and areas of Mixed alluvial land.

Farms in this association are less then 300 acres in size. Corn, small grains, and hay are the crops most commonly grown, and the raising of beef cattle is an important enterprise. Except where severe erosion has taken place, the soils are in good tilth and response is good to proper management.

Ground water is in good supply, and springs are plentiful. Fairly shallow wells provide water of good quality. The yields of water are not large, but they are adequate for most needs. The association has good potential for residential, industrial, and recreational development.

13. Lloyd-Wilkes-Orange-Iredell Association

Deep or moderately deep, moderately well drained to excessively drained, nearly level to moderately steep soils on dissected uplands

This association is in the southeastern part of the county near Lahore. It is dissected by intermittent and permanent streams and has a well-defined drainage pattern. Much of the association is nearly level, but some moderately steep or steep areas are along the permanent

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streams. Elevations range from 325 to 475 feet. This association makes up about 3 percent of the county.

Lloyd soils, which occupy about 20 percent of the acreage, are deep, well drained, and gently sloping to moderately steep. They have formed in mixed material weathered from basic and acidic rocks. The surface layer of these soils is brownish loam, and their subsoil is mostly red or dark-red clay and clay loam.

Wilkes soils, which occupy about 19 percent of the acreage, are moderately deep, excessively drained, and sloping to moderately steep. They are mostly on side slopes of drainageways, and they have formed in mixed material weathered from basic and acidic rocks. The surface layer of these soils is very dark grayish-brown sandy loam. Their subsoil is weakly defined and consists of yellowish-brown sandy loam.

Orange and Iredell soils, which together occupy about 21 percent of the acreage, are nearly level and gently sloping. They are intermingled in such an intricate pattern that they were not mapped separately. The Orange soils have a grayish-brown surface layer and a light yellowish-brown subsurface layer, both of silt loam. The subsoil is mainly olive-gray and light olive-brown clay loam and clay. In the Iredell soils, the surface layer is dark grayish-brown silt loam and the subsoil is mainly olive-brown and light olive-brown clay.

Among the minor soils are the Fluvanna, which occupy about 16 percent of the acreage. They are deep, well drained, and gently sloping or sloping, and they have formed in material weathered from hornblende schist and gneiss. The surface layer of these soils is light yellowish-brown and strong-brown silt loam, and their subsoil is mostly yellowish-red clay.

Other minor soils make up the remaining 24 percent of the acreage. They are the Zion, Bremo, Elbert, and Mecklenburg.

Farms on this association are generally less than 300 acres in size. The raising of beef cattle is the most important farm enterprise. Corn, small grains, and hay are the crops most commonly grown.

Ground water is not in good supply, but some springs are a source of water. Water of good quality can be obtained from deep wells, but yields are low. This association has poor potential for residential or industrial development, but it has good potential for recreational development.

14. Orange-Fluvanna-Elbert Association

Deep, well-drained to poorly drained, nearly level to sloping soils on uplands

Most of this association is nearly level and gently sloping. It is in the eastern part of the county near the community of Wilderness, and it extends to the Rapidan River. Because much of the area is nearly flat, the drainage pattern is not well defined. Elevations range from 300 to 420 feet. The association makes up about 2 percent of the county.

Soils of the Orange series, concretionary variant, occupy about 56 percent of the acreage. They are deep, moderately well drained, and nearly level to sloping, and they have formed in material that weathered from quartz monzonite and hornblende gneiss. The surface layer of these soils is mostly light yellowish-brown silt loam. The upper part of their subsoil is mainly a compact layer containing black mineral concretions at a depth of about 17 inches. Below this layer the subsoil is yellowish-brown clay.

Fluvanna soils, which occupy about 10 percent of the acreage, are deep, well drained, and gently sloping or sloping. They have formed in material that weathered from hornblende schist and gneiss. The surface layer of these soils is grayish-brown, light yellowish-brown, and strong-brown silt loam, and their subsoil is mainly yellowish-red clay.

Elbert soils, which occupy about 8 percent of the acreage, are deep, poorly drained, and nearly level. They have formed in material weathered from greenstone, diorite, and hornblende gneiss. The surface layer of these soils is mottled, grayish-brown and light brownish-gray silt loam, and their subsoil is distinctly mottled, mainly light brownish-gray and olive-gray, very plastic clay. During wet seasons, water stands on the surface of these soils for long periods.

Minor soils that together occupy about 26 percent of the acreage are the Bremo, Lloyd, Nason, and Tatum.

Farms on this association are generally less than 300 acres in size. The soils are not well suited to cultivation. Most areas are nearly level and wet, and water stands on their surface for long periods of time.

Ground water is not in good supply, and springs are few. Water can be obtained from deep wells, but yields are low. The association has poor potential for residential or industrial development, but it has good potential for recreational development.

15. Appling-Cecil-Colfax Association

Deep or moderately deep, well-drained or somewhat poorly drained, gently sloping or sloping soils on dissected uplands

This association occupies two areas in the eastern part of the county. The larger area extends from a point near Locustgrove to a point northeast of St. Just. The smaller one is near Monrovia. Most of the association is gently sloping and sloping, but some steeper areas are along the intermittent and permanent streams that dissect the area. The drainage pattern is well defined. Elevations range from 350 to 475 feet. The association makes up about 2 percent of the county.

Appling soils, which occupy about 54 percent of the acreage, are deep, well drained, and gently sloping or sloping. They have formed in material weathered from granite and granite gneiss. The surface layer of these soils is mainly yellowish-brown sandy loam, and their subsoil is mostly yellowish-red, moderately permeable clay loam. Appling soils are strongly acid.

Cecil soils, which occupy about 21 percent of the acreage, are also deep, well drained, and gently sloping or sloping. They have formed in material weathered from granite and granite gneiss. The surface layer of these soils is brown loam or fine sandy loam, and their subsoil is mostly moderately permeable, red clay. The Cecil soils are very strongly acid.

Colfax soils, which occupy about 10 percent of the acreage, are deep or moderately deep, somewhat poorly

drained, and gently sloping. They have formed in material weathered from granite and granite gneiss. The surface layer of these soils is grayish-brown and pale-brown loam, and their subsoil is mottled grayish and brownish, slowly permeable sandy clay loam and sandy loam. Colfax soils have a fragipan at a depth of about 20 inches. They are very strongly acid.

Minor soils, which together occupy about 15 percent of the acreage, are the Vance, Helena, and Louisburg, on uplands, and Worsham soils, along and at the heads of drainageways.

Farms on this association are generally about 200 acres in size. The raising of beef cattle is an important farm enterprise. Corn, small grains, and hay are the most commonly grown crops.

Ground water is in good supply, and springs are plentiful. Water of good quality can be supplied from wells that are fairly deep. This association has good potential for residential, industrial, and recreational development.

16. Grover-Madison-Louisburg Association

Deep or moderately deep, well-drained or excessively drained, gently sloping to moderately steep soils on dissected uplands

This association is in the southeastern part of the county, along the boundary between Orange County and Spotsylvania County. It contains many intermittent and permanent streams and has a well-defined drainage pattern. Most of the association is gently sloping or sloping, but some steep areas are along streams and drainageways. Elevations range from 300 to 450 feet. This association makes up about 4 percent of the county.

Grover soils, which occupy about 45 percent of the acreage, are deep, well drained, and gently sloping or sloping. They have formed in material weathered from granite gneiss. The surface layer of these soils is dark grayish-brown to brownish-yellow sandy loam. Their subsoil is mostly yellowish-red, moderately permeable clay loam and sandy clay loam. Grover soils are highly micaceous and are easily eroded. They are very strongly acid.

Madison soils, which occupy about 13 percent of the acreage, are also deep, well drained, and gently sloping or sloping. They have formed in material weathered from granite gneiss. The surface layer of these soils is yellowish-brown and reddish-brown sandy loam, and their subsoil is mostly red, moderately permeable clay and silty clay loam. Madison soils are highly micaceous and are easily eroded. They are strongly acid.

Louisburg soils, which occupy about 12 percent of the acreage, are moderately deep or deep, excessively drained, and gently sloping to moderately steep or steep. They have formed largely in material weathered from granite and granite gneiss. The surface layer of these soils is dark grayish-brown sandy loam, and their subsoil is yellowish-brown, rapidly permeable sandy loam. Louisburg soils are very strongly acid.

Minor soils, which together occupy about 30 percent of the acreage, are the Appling, Cecil, Vance, Colfax, Helena, and Worsham.

Farms on this association are generally about 450 acres in size. The raising of beef cattle is the most important farm enterprise. Corn, small grains, and hay are the most commonly grown crops.

Ground water is in good supply, and springs are plentiful. Water of good quality can be obtained from wells that are fairly deep. The association has good potential for residential, industrial, and recreational development.

Descriptions of the Soils

In this section the soils of Orange County are described in detail. The procedure is to describe first each soil series and then the mapping unit in that series. Thus, to get full information on any one mapping unit, it is necessary to read the description of that unit and also the description of the soil series to which the unit belongs.

The description of the soil series includes (1) a brief introductory statement that mentions drainage, depth, position on the landscape, and other significant features common to all the soils of the series; (2) a summary description of the color and texture of the surface layer, of the finest textured part of the subsoil, and of the material beneath the subsoil; (3) a detailed description of a profile that is considered representative of the soils of the series; and (4) a summary of the observed range in variation from the representative profile. If the profile of a given mapping unit differs significantly from the representative profile, the differences are stated in the description of the mapping unit, unless they are apparent from the name of the mapping unit. The colors described are for moist soil, unless otherwise noted. Many of the more common terms used in describing soil series and mapping units are defined in the Glossary, and some are defined in the section "How This Survey Was Made."

The approximate acreage and proportionate extent of the soils are shown in table 1. At the back of the survey is the "Guide to Mapping Units," which lists the mapping units in the county and shows the capability unit and the woodland suitability group each mapping unit is in and the page where each of these kinds of groupings is described.

Albano Series

The Albano series consists of deep, poorly drained, nearly level or gently sloping soils of the uplands. These soils are on upland flats and at the heads and along the upper courses of drainageways. They have formed in material weathered from Triassic sandstone and shale. The native vegetation is pin, swamp, chestnut, white, black, and willow oaks, elm, blackgum, boxelder, sedge nutgrass, and rushes.

In a typical profile, the surface layer is predominantly dark grayish-brown silt loam about 10 inches thick. The main part of the subsoil is highly mottled, gray silty clay to clay. Weathered shale is at a depth of about 40 inches.

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

Soil	Acres	Percent
Albano silt loam	400	0.2
Altavista loam, 0 to 2 percent slopes	260	.1
Altavista loam, 2 to 7 percent slopes	520	.2
Altavista loam, 2 to 12 percent slopes, eroded	420	.2
Appling sandy loam, 2 to 7 percent slopes	240	.1
Appling sandy loam, 2 to 7 percent slopes, eroded	1,590	.7
Appling sandy loam, 7 to 15 percent slopes, eroded	1,690	.8
Augusta silt loam, 0 to 2 percent slopes	730	.3
Augusta silt loam, 2 to 7 percent slopes	500	.2
Bermudian silt loam	90	(1)
Bowmansville silt loam	90	(1)
Bremo silt loam, 4 to 15 percent slopes	420	.2
Bremo silt loam, 15 to 25 percent slopes	140	(1)
Bucks silt loam, 2 to 7 percent slopes, eroded	1,990	.9
Bucks silt loam, 7 to 15 percent slopes, eroded	810	.4
Bucks silt loam, conglomerate substratum, 2 to 7 percent slopes, eroded	790	.3
Bucks silt loam, conglomerate substratum, 7 to 15 percent slopes, eroded	760	.3
Bucks silty clay loam, 7 to 15 percent slopes, severely eroded	150	(1)
Buncombe loamy fine sand	380	.2
Calverton loam, 2 to 7 percent slopes	230	.1
Calverton-Creedmoor complex, 2 to 7 percent slopes	630	.3
Catoctin silt loam, 5 to 15 percent slopes	490	.2
Catoctin silt loam, 15 to 25 percent slopes	360	.2
Catoctin stony silt loam, 10 to 25 percent slopes	260	.1
Catoctin stony silt loam, 25 to 45 percent slopes	210	(1)
Cecil fine sandy loam, 2 to 7 percent slopes, eroded	850	.4
Cecil fine sandy loam, 7 to 15 percent slopes, eroded	340	.2
Cecil loam, 2 to 7 percent slopes, eroded	680	.3
Cecil loam, 7 to 15 percent slopes, eroded	240	.1
Cecil clay loam, 4 to 15 percent slopes, severely eroded	300	.1
Chewacla silt loam	3,820	1.7
Colfax loam, 2 to 7 percent slopes	670	.3
Comus fine sandy loam	860	.4
Comus silt loam	780	.3
Davidson clay loam, 2 to 7 percent slopes, eroded	4,660	2.1
Davidson clay loam, 7 to 15 percent slopes, eroded	3,950	1.7
Davidson clay loam, 15 to 25 percent slopes, eroded	820	.4
Davidson stony clay loam, 7 to 15 percent slopes	360	.2
Davidson stony clay loam, 15 to 25 percent slopes	990	.4
Davidson stony clay loam, 25 to 45 percent slopes	960	.4
Davidson clay, 2 to 7 percent slopes, severely eroded	2,580	1.1
Davidson clay, 7 to 15 percent slopes, severely eroded	12,280	5.4
Davidson clay, 15 to 25 percent slopes, severely eroded	1,780	.8
Dyke loam, 2 to 7 percent slopes, eroded	290	.1
Dyke loam, 7 to 15 percent slopes, eroded	120	(1)
Elbert silt loam	880	.4
Elbert silt loam, overwash	2,820	1.2
Elioak fine sandy loam, 2 to 7 percent slopes, eroded	2,780	1.2
Elioak fine sandy loam, 7 to 15 percent slopes, eroded	2,160	1.0
Elioak clay loam, 2 to 7 percent slopes, severely eroded	170	(1)
Elioak clay loam, 7 to 15 percent slopes, severely eroded	1,090	0.5
Elsinboro loam, 2 to 7 percent slopes	280	.1
Elsinboro loam, 2 to 7 percent slopes, eroded	360	.2
Elsinboro loam, 7 to 15 percent slopes, eroded	200	.1
Fauquier silt loam, 2 to 7 percent slopes, eroded	470	.2
Fauquier silt loam, 7 to 15 percent slopes, eroded	300	.1
Fauquier silty clay loam, 4 to 20 percent slopes, severely eroded	240	.1
Fluvanna silt loam, 2 to 7 percent slopes	180	(1)
Fluvanna silt loam, 2 to 7 percent slopes, eroded	1,070	.5
Fluvanna silt loam, 7 to 15 percent slopes, eroded	580	.3
Glenelg loam, 2 to 7 percent slopes, eroded	490	.2
Glenelg loam, 7 to 15 percent slopes, eroded	810	.4
Grover sandy loam, 2 to 7 percent slopes, eroded	1,580	.7
Grover sandy loam, 7 to 15 percent slopes, eroded	1,980	.9
Grover sandy clay loam, 7 to 15 percent slopes, severely eroded	360	.2
Hazel loam, 7 to 15 percent slopes	1,010	.4
Hazel loam, 15 to 30 percent slopes	850	.4
Helena fine sandy loam, 2 to 7 percent slopes	160	(1)
Helena fine sandy loam, 2 to 10 percent slopes, eroded	170	(1)
Hiwassee loam, 2 to 7 percent slopes	290	.1
Hiwassee loam, 2 to 7 percent slopes, eroded	830	.4
Hiwassee loam, 7 to 15 percent slopes, eroded	330	.2
Hiwassee clay loam, 4 to 15 percent slopes, severely eroded	340	.2
Klinesville silt loam, 15 to 25 percent slopes	620	.3
Klinesville silt loam, 25 to 45 percent slopes	110	(1)
Lignum silt loam, 2 to 7 percent slopes	5,540	2.4
Lloyd loam, 2 to 7 percent slopes, eroded	1,830	.8
Lloyd loam, 7 to 15 percent slopes, eroded	570	.3
Lloyd clay loam, 2 to 7 percent slopes, severely eroded	180	(1)
Lloyd clay loam, 7 to 15 percent slopes, severely eroded	800	.4
Lloyd clay loam, 15 to 25 percent slopes, severely eroded	90	(1)
Louisburg sandy loam, 5 to 15 percent slopes	780	.3
Louisburg sandy loam, 7 to 15 percent slopes, eroded	110	(1)
Louisburg sandy loam, 15 to 25 percent slopes	470	.2
Louisburg sandy loam, 15 to 25 percent slopes, eroded	170	(1)
Madison sandy loam, 2 to 7 percent slopes, eroded	690	.3
Madison sandy loam, 7 to 15 percent slopes, eroded	160	(1)
Madison clay loam, 7 to 15 percent slopes, severely eroded	280	.1
Manassas silt loam, 2 to 7 percent slopes	730	.3
Manor silt loam, 10 to 25 percent slopes	330	.1
Manteo silt loam, 2 to 7 percent slopes	420	.2
Manteo silt loam, 7 to 15 percent slopes	3,560	1.6
Manteo silt loam, 15 to 25 percent slopes	4,870	2.1
Manteo silt loam, 25 to 45 percent slopes	820	.4
Masada loam, 2 to 7 percent slopes	720	.3
Masada loam, 2 to 7 percent slopes, eroded	890	.4
Masada loam, 7 to 15 percent slopes, eroded	570	.3
Masada sandy clay loam, 7 to 15 percent slopes, severely eroded	200	(1)
Mayodan fine sandy loam, 2 to 7 percent slopes	590	.3
Mayodan fine sandy loam, 2 to 7 percent slopes, eroded	530	.2
Mayodan fine sandy loam, 7 to 15 percent slopes, eroded	450	.2
Mecklenburg silt loam, 2 to 7 percent slopes, eroded	250	.1

See footnote at end of table.

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

Soil	Acres	Percent
Mecklenburg silt loam, 7 to 15 percent slopes, eroded	200	(1)
Mixed alluvial land	4, 730	2. 1
Myersville silt loam, 2 to 7 percent slopes, eroded	400	. 2
Myersville silt loam, 7 to 15 percent slopes, eroded	250	. 1
Nason loam, 2 to 7 percent slopes, eroded	970	. 4
Nason loam, 7 to 15 percent slopes, eroded	1, 490	. 7
Nason silt loam, 2 to 7 percent slopes	5, 890	2. 6
Nason silt loam, 2 to 7 percent slopes, eroded	20, 210	8. 9
Nason silt loam, 7 to 15 percent slopes	2, 120	. 9
Nason silt loam, 7 to 15 percent slopes, eroded	22, 440	9. 9
Nason silt loam, 15 to 25 percent slopes, eroded	260	. 1
Nason silty clay loam, 5 to 15 percent slopes, severely eroded	900	. 4
Orange silt loam, concretionary variant, 0 to 2 percent slopes	1, 040	. 5
Orange silt loam, concretionary variant, 2 to 7 percent slopes	1, 340	. 6
Orange silt loam, concretionary variant, 2 to 7 percent slopes, eroded	290	. 1
Orange silt loam, concretionary variant, 7 to 15 percent slopes, eroded	110	(1)
Orange-Iredell silt loams, 0 to 2 percent slopes	1, 010	. 4
Orange-Iredell silt loams, 2 to 7 percent slopes	380	. 2
Orange-Iredell silt loams, 2 to 7 percent slopes, eroded	190	(1)
Penn silt loam, 2 to 7 percent slopes	370	. 2
Penn silt loam, 7 to 15 percent slopes	1, 930	. 9
Pinkston fine sandy loam, 7 to 15 percent slopes	160	(1)
Pinkston fine sandy loam, 15 to 25 percent slopes	370	. 2
Rabun clay loam, 2 to 7 percent slopes, eroded	200	(1)
Rabun clay loam, 7 to 15 percent slopes, eroded	2, 370	1. 0
Rabun clay loam, 15 to 25 percent slopes, eroded	2, 970	1. 3
Rabun clay loam, 25 to 45 percent slopes, eroded	390	. 2
Rabun clay, 15 to 25 percent slopes, severely eroded	140	(1)
Rapidan silt loam, 2 to 7 percent slopes, eroded	950	. 4
Rapidan silt loam, 7 to 15 percent slopes, eroded	500	. 2
Rapidan silty clay loam, 7 to 15 percent slopes, severely eroded	390	0. 2
Roanoke silt loam	320	. 1
Rock land, acidic, sloping	290	. 1
Rock land, acidic, moderately steep	190	(1)
Rock land, basic, sloping	170	(1)
Rock land, basic, steep	280	. 1
Rowland silt loam	620	. 3
Seneca fine sandy loam, 2 to 7 percent slopes	2, 730	1. 2
Starr silt loam, 2 to 10 percent slopes	3, 110	1. 4
State loam, 0 to 4 percent slopes	190	(1)
Tatum loam, 2 to 7 percent slopes, eroded	3, 280	1. 4
Tatum loam, 7 to 15 percent slopes, eroded	1, 600	. 7
Tatum silt loam, 2 to 7 percent slopes	3, 080	1. 4
Tatum silt loam, 2 to 7 percent slopes, eroded	14, 960	6. 6
Tatum silt loam, 7 to 15 percent slopes	250	. 1
Tatum silt loam, 7 to 15 percent slopes, eroded	5, 040	2. 2
Tatum silty clay loam, 2 to 7 percent slopes, severely eroded	300	. 1
Tatum silty clay loam, 7 to 15 percent slopes, severely eroded	1, 620	. 7
Turbeville loam, 2 to 7 percent slopes	270	. 1
Turbeville loam, 2 to 7 percent slopes, eroded	590	. 3
Turbeville loam, 7 to 15 percent slopes, eroded	280	. 1
Vance fine sandy loam, 2 to 7 percent slopes	120	(1)
Vance fine sandy loam, 2 to 7 percent slopes, eroded	110	(1)
Wadesboro fine sandy loam, 2 to 7 percent slopes, eroded	1, 320	. 6
Wadesboro fine sandy loam, 7 to 15 percent slopes, eroded	790	. 3
Wadesboro fine sandy loam, 15 to 25 percent slopes, eroded	280	. 1
Watt silt loam, 2 to 7 percent slopes	390	. 2
Watt silt loam, 7 to 15 percent slopes	220	(1)
Watt silt loam, 15 to 30 percent slopes	260	. 1
Wehadkee silt loam	1, 080	. 5
Wilkes sandy loam, 7 to 15 percent slopes	770	. 3
Wilkes sandy loam, 15 to 25 percent slopes	940	. 4
Worsham silt loam, 2 to 7 percent slopes	2, 500	1. 1
York silt loam, 2 to 7 percent slopes	1, 200	. 5
Zion silt loam, 2 to 7 percent slopes	430	. 2
Zion silt loam, 7 to 15 percent slopes, eroded	160	(1)
Quarries	20	(1)
Water	250	. 1
Total	226, 560	100. 0

[1] Less than 0.1 percent.

Albano soils are strongly acid and are low to medium in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is moderate. These soils receive seepage from adjacent soils. They have a seasonal high water table.

These soils are used mainly for pasture and for trees that can grow where drainage is restricted.

Representative profile of Albano silt loam in a forest of mixed hardwoods, about 500 feet southwest of the junction of U.S. Highway No. 33 and Highway No. 658:

O1—½ to ¼ inch, partly decomposed forest litter of leaves, sticks, and twigs from deciduous trees.

O2—¼ inch to 0, black (N 2/0), partly decomposed organic matter.

A1—0 to 2 inches, very dark gray (10YR 3/1) silt loam; moderate, fine and very fine, granular structure; friable when moist; many fine roots; clear, smooth boundary.

A2—2 to 10 inches, dark grayish-brown (2.5Y 4/2) silt loam; few, medium, distinct mottles of brownish yellow (10YR 6/6); moderate, fine, granular structure; friable when moist; many fine and medium roots; few black mineral concretions; strongly acid; clear, smooth boundary.

B1tg—10 to 15 inches, light brownish-gray (2.5Y 6/2) silty clay loam; few, coarse, prominent mottles of yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6); moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few medium and coarse roots; many black mineral concretions; few quartz pebbles; strongly acid; clear, smooth boundary.

B21tg—15 to 23 inches, gray (N 5/0) silty clay; common, coarse, prominent mottles of yellowish brown (10YR 5/6), dark grayish brown (2.5Y 4/2), and reddish yellow (7.5YR 6/8); moderate, medium to coarse, subangular blocky structure; firm when moist, hard when dry, sticky and plastic when wet; thin, patchy clay films; few fine roots; few, small, weathered fragments of shale; strongly acid; gradual, smooth boundary.

B22tg—23 to 35 inches, gray (N 5/0) and dark grayish-brown (2.5Y 4/2) silty clay to clay; common mottles of light olive brown (2.5Y 5/4); moderate to strong, medium and coarse, subangular blocky structure; very firm when moist, hard when dry, sticky and plastic when wet; clay films on vertical surfaces of peds; few black mineral concretions; strongly acid; clear, smooth boundary.

B3g—35 to 40 inches, olive-gray (5Y 5/2) silty clay loam mottled with dark grayish brown (2.5Y 4/2); weak, coarse, angular blocky structure; firm to friable when moist, hard when dry, sticky and slightly plastic when wet; few weathered fragments of sandstone and shale; strongly acid; clear, smooth boundary.

C—40 to 46 inches, weathered gray, brown, and red shale, with gray, silty soil material in crevices between the rocks; shale firm in place but easily dug with a spade; rock-controlled structure; strongly acid; gradual boundary.

R—46 inches +, hard, reddish-gray shale.

Thickness of the A horizon ranges from 6 to 10 inches. Color of that horizon ranges from very dark gray to dark grayish brown mottled with brownish yellow. The B2 horizons range from clay to silty clay in texture. They are predominantly gray but contain common mottles that range from yellowish brown or light olive brown to dark grayish brown and reddish yellow in color. The solum ranges from 26 to 40 inches in thickness. In many places black mineral concretions are common. Base saturation is greater than 35 percent in the lower part of the profile. The C horizon consists of weathered sandstone, conglomerate, or shale. Depth to bedrock ranges from 3½ to 6 feet.

Albano soils occur with Bucks, Calverton, Manassas, and Penn soils. They are more grayish and are more poorly drained than any of these soils.

Albano silt loam (0 to 2 percent slopes) (Ab).—This is the only soil of the Albano series mapped in Orange County. Included with it in mapping were a few small areas in which the surface is covered by a layer of recently deposited material a few inches thick. Also included were small areas of Calverton soils.

About 62 percent of the acreage is in forest, 34 percent is in pasture, and 4 percent is in field crops. This soil is too wet to be suitable for cultivation, but it is well suited to fescue, Ladino clover, white clover, and bluegrass. (Capability unit Vw-1; woodland suitability group 3)

Altavista Series

Soils of the Altavista series are deep, moderately well drained, and nearly level to sloping. They are on terrace benches along Mountain Run and along the Rapidan and North Anna Rivers and other large streams. These soils have formed in alluvial deposits of sand, silt, clay, and gravel that washed from soils of the Piedmont Plateau. The native vegetation is white, post, and red oaks, elm, maple, sweetgum, and Virginia pine.

In a typical profile, the surface layer is brown to dark-brown loam about 9 inches thick. The subsoil is yellowish-brown and light olive-brown sandy clay loam that is mottled in the lower part. Gravel embedded in sand and silt is at a depth of about 53 inches.

Altavista soils are strongly acid, have a medium content of organic matter, and have medium natural fertility. Surface runoff is slow, and the available moisture capacity is high. Infiltration is moderately rapid in the surface layer. Permeability of the subsoil is moderate.

These soils are used mainly for field crops and pasture.

Representative profile of Altavista loam, 2 to 7 percent slopes, along Marsh Run in a field of orchardgrass and red clover grown for hay, one-half mile south of the junction of Highways No. 609 and No. 644:

Ap—0 to 9 inches, brown to dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable when moist; many fine roots; a few rounded quartz pebbles; clear, smooth boundary.

B1—9 to 16 inches, yellowish-brown (10YR 5/6) light sandy clay loam; weak, fine and medium, subangular blocky structure; friable when moist; many fine and medium roots; many polished, rounded grains of sand; few rounded quartz pebbles; many pores; gradual, smooth boundary.

B21t—16 to 29 inches, yellowish-brown (10YR 5/4) sandy clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; few fine and medium roots; few rounded quartz pebbles; few fine pores; gradual, smooth boundary.

B22t—29 to 35 inches, yellowish-brown (10YR 5/4) sandy clay loam; common, fine, distinct mottles of dark yellowish brown (10YR 4/4) and a few faint mottles of light brownish gray (2.5Y 6/2); moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; few rounded quartz pebbles as much as 2 inches in diameter; gradual, wavy boundary.

B3—35 to 53 inches, light olive-brown (2.5Y 5/4) sandy clay loam; common, medium, distinct mottles of light brownish gray (2.5Y 6/2), yellowish brown (10YR 5/8), and dark yellowish brown (10YR 4/4); weak, fine and medium, subangular blocky structure; friable when moist; few rounded quartz pebbles; abrupt, wavy boundary.

C—53 inches +, compact layer of river gravel and stones embedded in sand and silt; stones as large as 5½ inches in diameter.

The A horizon ranges from 4 to 14 inches in thickness and from brown or dark brown to dark grayish brown or light yellowish brown in color. Texture of the B horizons ranges from sandy clay loam to clay loam. Mottling generally occurs at a depth of about 32 inches, but it begins at a greater depth in some places. The solum ranges from 36 to 55 inches in thickness. In most places the C horizon consists of gravel and sand. The alluvial material in which these soils have formed is generally about 5 feet thick, but it ranges from 4 to 7 feet in thickness. In most places hard rock is at a depth of about 7 feet.

Altavista soils occur with Augusta, Elsinboro, and Roanoke soils. They are less brownish and are less well drained than the Elsinboro soils but are better drained than the Augusta and Roanoke soils.

Altavista loam, 0 to 2 percent slopes (AlA).—The surface layer of this soil is slightly thicker than the one in the profile described as representative of the series, but the profile is similar in other respects. Included in mapping were small areas in which the surface layer is silt loam, and other small areas where the surface layer is fine sandy loam. Also included were a few areas that have on the surface waterworn pebbles that are not numerous enough to interfere with tillage. Other inclusions consist of small, scattered areas of an unidentified soil that occurs along the Rapidan River and that has a clay subsoil and gray mottling at a depth of about 28 inches; a few areas of a soil that occurs along Flat Run and that contains a fragipan; and small areas of an Augusta silt loam.

About 52 percent of the acreage is in field crops, 26 percent is in pasture, and 22 percent is in forest. Corn, small grains, and hay are the crops commonly grown. Moderate wetness makes this soil unsuitable for alfalfa. (Capability unit IIw-2; woodland suitability group 12)

Altavista loam, 2 to 7 percent slopes (AlB).—This soil has the profile described as representative of the series. About 60 percent of the acreage is in field crops, 20 percent is in pasture, and another 20 percent is in forest. Corn, small grains, and hay are the crops most commonly grown. Alfalfa can be grown, but it is not long lived, because of the excess water in the soil in winter and early in spring. (Capability unit IIe-3; woodland suitability group 12)

Altavista loam, 2 to 12 percent slopes, eroded (AlC2).—This soil is eroded to the extent that the surface layer is only 4 to 6 inches thick. Also, the plow layer has a more yellowish color than the one in the profile described as typical of the series because material from the subsoil has been mixed into it by tillage.

Most of the acreage is used for field crops and pasture. Corn, small grains, and hay are the crops most commonly grown. Alfalfa can be grown, but this soil is not well suited to it. (Capability unit IIe-3; woodland suitability group 12)

Appling Series

The Appling series consists of deep, well-drained soils that are gently sloping and sloping. These soils are on Piedmont uplands, mainly in small areas near Locustgrove, where they have formed in material weathered from granite and granite gneiss. The native vegetation is white, red, black, scarlet, and chestnut oaks, bitternut hickory, dogwood, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown and yellowish-brown sandy loam about 6 inches thick. The subsoil extends to a depth of about 50 inches. It is strong-brown sandy clay loam in the upper part and grades to yellowish-red clay loam that is highly mottled with strong brown, yellow, and red in the lower part.

Appling soils are very strongly acid. They are low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

Forest and pasture are the main uses of these soils.

Representative profile of Appling sandy loam, 2 to 7 percent slopes, eroded, in a forest of pines and hardwoods, 1½ miles north of Mine Run at the end of Highway No. 608:

O1—2 inches to 1 inch, undecomposed forest litter.

O2—1 inch to 0, very dark brown (10YR 2/2), partly decomposed duff; abrupt, smooth boundary.

A1—0 to 1 inch, dark grayish-brown (2.5Y 4/2) sandy loam; weak, very fine, granular structure; very friable when moist; many fine roots; abrupt, smooth boundary.

A2—1 to 6 inches, yellowish-brown (10YR 5/6) sandy loam; moderate, fine, granular structure; very friable when moist; many fine and medium roots; a few very small quartz pebbles; gradual, wavy boundary.

B1t—6 to 15 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, fine, subangular blocky structure; friable when moist; few roots; common quartz pebbles; many sand grains; gradual, smooth boundary.

B21t—15 to 24 inches, yellowish-red (5YR 5/6) clay loam; moderate, medium, subangular blocky structure; friable when moist; few thin clay films; few quartz pebbles; many sand grains; gradual, wavy boundary.

B22t—24 to 35 inches, yellowish-red (5YR 5/6) heavy clay loam streaked with red (2.5YR 4/8) and strong brown (7.5YR 5/6); strong, medium, subangular blocky structure; friable when moist; many continuous clay films; few coarse and medium roots; a few fragments of weathered granite; few fine mica flakes; gradual, smooth boundary.

B3t—35 to 50 inches, yellowish-red (5YR 4/6) clay loam mottled with strong brown (7.5YR 5/6), yellow (10YR 7/8), and red (2.5YR 5/6); weak, fine, subangular blocky structure; friable when moist; many fragments of weathered granite and a few fragments of quartz; common fine mica flakes; gradual, wavy boundary.

C—50 to 60 inches, yellowish-red (5YR 4/6) sandy clay loam mottled with strong brown (7.5YR 5/6), weak red (10YR 5/4), yellowish brown (10YR 5/6), and some white; material similar to weathered rock; firm in place; friable if disturbed; contains weathered granite and a few pockets of clay loam; clay films along cracks and in crevices.

The combined thickness of the A horizons ranges from 4 to 12 inches. In general the color of the A horizons ranges from dark grayish brown to yellowish brown, but the color is pale brown in some cultivated areas. Small, angular quartz pebbles are scattered on the surface in a few places. Texture of the B2 horizons ranges from clay loam to clay. In most places the color of the B2 horizons is yellowish red, but the color ranges to yellowish brown in some places. Small mica flakes are scattered throughout the profile in places, and they are especially numerous in the lower part. The thickness of the solum ranges from 36 to 55 inches. In most places granite or granite gneiss is the underlying rock, but metasedimentary rocks underlie these soils in the western part of the county. Depth to hard rock ranges from 4 to as much as 20 feet, but the depth is about 7 feet in many places.

Appling soils occur with Cecil, Louisburg, and Colfax soils. They have a less reddish profile than the Cecil soils, and they are deeper, contain much more clay, and have a more clearly defined subsoil than the Louisburg soils. Appling soils are better drained than the Colfax soils, and they lack the fragipan that is typical in the profile of the Colfax soils.

Appling sandy loam, 2 to 7 percent slopes (ApB).—This soil is on broad ridgetops. Its profile is similar to the one described as representative of the series, except that the surface layer is 8 to 10 inches thick and has a more grayish color. Included in mapping were small areas in which the surface layer is loam or fine sandy loam. Also included were small areas where enough quartz fragments are on the surface that they interfere with cultivation. Other inclusions consist of small areas of a Grover sandy loam and of a Seneca fine sandy loam.

Nearly all of the acreage is in forest. This soil is well suited to row crops, however, and to small grains, hay, and pasture. (Capability unit IIe-3; woodland suitability group 10)

Appling sandy loam, 2 to 7 percent slopes, eroded (ApB2).—This soil has the profile described as representative of the series. The surface layer in cultivated fields is pale brown, but the color ranges to dark grayish brown in wooded areas. The subsoil is 20 to 50 inches thick. In many spots in cultivated fields, sheet erosion has exposed the subsoil. Included with this soil in mapping were small areas of Cecil, Elioak, Grover, and Vance soils. Also included were a few areas of rock outcrops that are indicated on the soil map by an appropriate symbol.

About 50 percent of the acreage is in forest, 25 percent is in field crops, and the rest is in pasture. Corn, small grains, and hay are the crops most commonly grown. (Capability unit IIe-3; woodland suitability group 10)

Appling sandy loam, 7 to 15 percent slopes, eroded (ApC2).—This soil is on side slopes that extend downward from ridgetops. Its surface layer is only 4 to 6 inches thick, and it ranges from pale brown to yellowish brown in color. Included with this soil in mapping were small areas of Seneca soils along small drainageways and at the bases of slopes. Also included were a few areas of Cecil and Elioak soils that have lost all of their original surface layer through erosion and that now have a surface layer of red sandy clay loam. Other inclusions consist of areas where rock or loose gravel crops out on the surface, and these areas are indicated on the soil map by an appropriate symbol.

About 60 percent of the acreage is in forest, 28 percent is in pasture, and 12 percent is in field crops. Corn, small grains, and hay are the crops most commonly grown. (Capability unit IIIe-3; woodland suitability group 10)

Augusta Series

Soils of the Augusta series are deep, moderately well drained or somewhat poorly drained, and nearly level or gently sloping. They are on stream terraces along Mountain Run, the Rapidan and North Anna Rivers, and other large streams. These soils formed in alluvial deposits of sand, silt, clay, and gravel washed from soils of the Piedmont Plateau. The native vegetation is post, pin, and willow oaks, red maple, blackgum, sweetgum, and a few Virginia pines.

In a typical profile, the surface layer is yellowish-brown silt loam about 8 inches thick. The subsoil is predominantly mottled, yellowish-brown to brown clay loam. It is more grayish and more mottled in the lower than in the upper part. The subsoil is underlain by mottled, yellowish-brown, sandy material at a depth of about 44 inches.

Augusta soils are strongly acid. They are low or very low in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is moderately slow in the subsoil. The available moisture capacity is high.

These soils are mainly in pasture and trees.

Representative profile of Augusta silt loam, 0 to 2 percent slopes, in a pasture of fescue and orchardgrass along Highway No. 626 near the Rapidan River; 1 mile west of the intersection of Highways No. 636 and No. 626:

Ap—0 to 8 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; very friable when moist; many fine roots; few rounded quartz pebbles; clear, smooth boundary.

B1t—8 to 11 inches, brownish-yellow (10YR 6/6) sandy clay loam; few, fine, distinct mottles of grayish brown (10YR 5/2) and strong brown (7.5YR 5/6); weak, fine, subangular blocky structure; friable when moist; many roots; many worm channels and pores; a few rounded quartz pebbles; gradual, smooth boundary.

B21t—11 to 18 inches, yellowish-brown (10YR 5/4) clay loam; common, medium, distinct mottles of grayish brown (10YR 5/2) and light brownish gray (10YR 6/2); moderate, medium, subangular blocky structure; friable when moist; few faint clay films; common fine roots; gradual, smooth boundary.

B22t—18 to 40 inches, brown (10YR 5/3) clay loam; many, medium, distinct mottles of grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6); moderate, medium, angular blocky structure; hard when dry, sticky and plastic when wet; common prominent clay films; gradual, smooth boundary.

B3tg—40 to 44 inches, light brownish-gray (2.5Y 6/2) sandy clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8); weak, fine, subangular blocky structure; friable when moist; few rounded quartz pebbles; clear, smooth boundary.

IIC—44 to 49 inches, yellowish-brown (10YR 5/8) loamy fine sand; common, medium, distinct mottles of yellowish red (5YR 5/6); friable when moist; a few lenses or pockets of sandy clay loam, stream-deposited material; few rounded quartz pebbles.

The A horizon ranges from 6 to 14 inches in thickness and from dark grayish brown to yellowish brown in color. In cultivated areas the A horizon is lighter colored than in areas that are not cultivated, because the supply of organic matter has been depleted. Grayish mottling in the B horizons begins at depths ranging from 6 to 18 inches, and the mottles increase in number with increasing depth. The combined thickness of the B horizons ranges from 20 to 40 inches. Texture of the B2 horizons ranges from clay loam to silty clay loam. Thickness of the alluvial material in which these soils have formed is generally about 4½ feet, but it ranges from 4 to 7 feet. Depth to bedrock is generally about 6 feet, but it is as much as 8 feet in places.

Augusta soils occur with Altavista, Elsinboro, and Roanoke soils. They are slightly more grayish and are less well drained than the Altavista and Elsinboro soils, and they are better drained and have less clay in the subsoil than the Roanoke soils.

Augusta silt loam, 0 to 2 percent slopes (AuA).—This soil has the profile described as typical of the series. In a few areas, rounded pebbles are on the surface. Included with this soil in mapping were some areas of a soil along the North Anna River that has a loam surface layer and a distinctly mottled subsoil of sandy clay to clay. Also included were small areas of an Altavista loam and of a Roanoke silt loam.

About 65 percent of the acreage is in pasture, 25 percent is in hay and field crops, and 10 percent is in forest. Corn, small grains, and hay are the most commonly grown crops. This soil is not suited to alfalfa. It is better suited to pasture than to field crops. (Capability unit IIIw-2; woodland suitability group 15)

Augusta silt loam, 2 to 7 percent slopes (AuB).—The profile of this soil is similar to the one described as representative of the series. The surface layer is only 6 to 10 inches thick, however, and it is underlain by a distinctly mottled subsoil that is 20 to 36 inches thick. In wooded areas the surface layer is stained with organic matter. A few pebbles are on the surface in a few places. Included with this soil in mapping were some areas that have been affected by sheet erosion to the extent that the present plow layer consists partly of material from the upper part of the subsoil. Also included were small areas of Altavista soils.

About 60 percent of the acreage is in pasture, 25 percent is in hay and field crops, and 15 percent is in forest. This soil is better suited to pasture than to field crops. (Capability unit IIIw-2; woodland suitability group 15)

Bermudian Series

The Bermudian series consists of deep, well-drained, nearly level soils on flood plains along Blue Run. These soils are subject to very frequent flooding. They have formed in loamy soil material washed chiefly from reddish soils of Triassic age. The native vegetation is yel-

low-poplar, black walnut, white and red oaks, white ash, hackberry, red birch, blue beech, elm, sycamore, and boxelder.

In a typical profile, the surface layer is dark reddish-brown silt loam about 6 inches thick. The subsoil is about 42 inches thick. It is reddish-brown fine sandy loam in the upper part, dark reddish-brown loam in the middle part, and weak-red silt loam in the lower part. The subsoil is underlain by yellowish-red loam. Sand and gravel are at a depth of about 60 inches.

The Bermudian soils are medium acid to strongly acid and are high in content of organic matter and in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderate to moderately rapid in the subsoil. The available moisture capacity is high.

These soils are used mainly for pasture.

Representative profile of Bermudian silt loam in a forest along Blue Run, 1¼ miles east of Liberty Mills:

A1—0 to 6 inches, dark reddish-brown (5YR 3/3) silt loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; many fine pores; gradual, smooth boundary.

B1—6 to 18 inches, reddish-brown (5YR 4/3) fine sandy loam; weak, fine, granular structure; friable when moist; many roots; gradual, smooth boundary.

B21—18 to 32 inches, dark reddish-brown (2.5YR 3/4) loam; weak, fine and medium, granular structure; friable when moist; few medium roots; gradual, smooth boundary.

B22—32 to 48 inches, weak-red (2.5YR 4/2) silt loam; weak, fine and medium, granular structure; friable when moist; few medium and coarse roots; gradual, smooth boundary.

IIC1—48 to 60 inches, yellowish-red (5YR 5/6) loam containing pockets of sand and silt; few, fine, faint mottles of dark reddish brown (5YR 3/4) and reddish gray (5YR 5/2); structureless; few pebbles and fragments of weathered shale; abrupt, smooth boundary.

IIC2—60 inches +, sand and gravel; gravel consists of rounded pebbles of quartz, sandstone, shale, and a few pebbles of greenstone; some small, black concretions.

The A horizon ranges from 5 to 14 inches in thickness and from reddish brown to dark reddish brown in color. The B horizons range from reddish brown or dark reddish brown to weak red in color. Thickness of the alluvial material ranges from 3½ to more than 10 feet, but it is about 5½ feet in most places. Depth to bedrock is generally about 7 feet, but it ranges from 4 to 10 feet.

Bermudian soils occur with Rowland and Bowmansville soils. They are free of mottling and they are better drained and have a more reddish subsoil than the Rowland soils. The Bermudian soils are much better drained than the Bowmansville soils, and they lack the grayish mottling that is typical in some parts of the Bowmansville profile.

Bermudian silt loam (0 to 2 percent slopes) (Be).—This is the only Bermudian soil mapped in Orange County. It occurs in narrow strips adjacent to Blue Run, and it is subject to frequent flooding. The surface layer is normally silt loam, but many areas where the surface layer is loam were included in mapping. Also included were areas where mottling begins at a depth of 40 inches; other areas where fine mica flakes are in the lower part of the profile; and small areas of Rowland soils.

About 82 percent of the acreage is in pasture, 10 percent is in field crops, and 8 percent is in forest. This soil is well suited to corn and truck crops. It is not suitable for alfalfa, because of the large amount of moisture and the hazard of flooding. (Capability unit IIw-1; woodland suitability group 1)

Bowmansville Series

The Bowmansville series consists of deep, poorly drained, nearly level soils on flood plains along Blue Run. These soils have formed in fairly recent, loamy alluvium washed chiefly from soils derived from shale and sandstone of Triassic age. They are subject to very frequent flooding and are wet most of the time. The native vegetation is buttonbush, alder, sycamore, spicebush, river birch, willow oak, elm, and willow.

In a typical profile, the surface layer is mottled, dark reddish-brown silt loam about 12 inches thick. The subsoil is mottled light silty clay loam. It is brown in the upper part, pale red in the middle part, and strong brown in the lower part. The subsoil is underlain by mottled, yellowish-brown sandy clay loam at a depth of about 41 inches. Stratified sand and gravel are at a depth of about 46 inches.

Bowmansville soils are very strongly acid and are medium in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are used mainly for forest and pasture.

Representative profile of Bowmansville silt loam in a pasture 2 miles northeast of Barboursville along Blue Run:

Ap—0 to 12 inches, dark reddish-brown (5YR 3/3) silt loam; common, medium, faint mottles of dark reddish gray (5YR 4/2); moderate, fine, granular structure; very friable when moist; many fine roots; abrupt, smooth boundary.

B21—12 to 20 inches, brown (7.5YR 5/2) light silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; friable when moist, hard when dry, slightly sticky when wet; many fine and medium pores; many black concretions; few quartz pebbles; clear, smooth boundary.

B22—20 to 27 inches, pale-red (2.5YR 6/2) light silty clay loam; many, medium, distinct mottles of strong brown (7.5YR 5/6) and brownish yellow (10YR 6/6); strong, coarse, subangular blocky structure; hard when dry, slightly sticky and slightly plastic when wet; numerous black concretions; gradual, wavy boundary.

B23—27 to 41 inches, strong-brown (7.5YR 5/8) light silty clay loam; many, coarse, prominent mottles of yellowish red (5YR 4/8) and light brownish gray (2.5Y 6/2); coarse angular blocky structure; massive; hard when dry, sticky and plastic when wet; many clay films; few black mineral concretions; few rounded pebbles; gradual, smooth boundary.

IIC1—41 to 46 inches, yellowish-brown (10YR 5/6) sandy clay loam; many, coarse, prominent mottles of gray (N 6/0); massive; slightly sticky when wet; few fragments of shale, quartz, sandstone, and greenstone; waterlogged; abrupt, wavy boundary.

IIC2—46 inches +, stratified sand and gravel.

The A horizon ranges from 6 to 12 inches in thickness and from dark brown to dark reddish brown in color. It generally has grayish mottling in the uppermost few inches. The B horizons range from silt loam to light silty clay loam in texture. Color of the mottles in those horizons ranges from gray or brown to yellow and red. The thickness of the alluvial deposits ranges from 4 to 10 feet, but it is about 6 feet in most places.

Bowmansville soils occur with Rowland and Bermudian soils. They are more poorly drained than the Rowland soils and are much more poorly drained than the Bermudian soils.

Bowmansville silt loam (0 to 2 percent slopes) (Bo).—This is the only soil of the Bowmansville series mapped in Orange County. It occurs along Blue Run. The water table may rise to within 12 inches of the surface in wet seasons, and it is at a depth no greater than 30 inches at other times. Sand and gravel are at depths ranging from 3 to 4 feet. Included with this soil in mapping were a few small areas in which the surface layer is loam, and a few areas in which the subsoil is clay. Also included were small areas of a Rowland silt loam, and minor areas in which a few inches of recent overwash are on the surface.

About 60 percent of the acreage is in forest, 38 percent is in pasture, and 2 percent is in field crops. This soil is better suited to pasture than to field crops. It is not well suited to cultivated crops, unless drainage is provided. (Capability unit IVw–2; woodland suitability group 3)

Bremo Series

The Bremo series consists of moderately deep, somewhat excessively drained, gently sloping to steep soils on uplands, mainly in the vicinity of Lahore. These soils have formed in material weathered from hornblende gneiss and other dark-colored basic rocks. The native vegetation is red, black, white, and scarlet oaks, hickory, redbud, dogwood, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is dark yellowish-brown silt loam about 12 inches thick. The subsoil is weakly defined and is predominantly yellowish-brown silt loam that has a high content of coarse fragments. It extends to a depth of about 20 inches and is underlain by yellowish-brown, black, and green hornblende schist. Bedrock is at a depth of about 25 inches.

Bremo soils are strongly acid and are medium in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is low to moderate.

These soils are used mainly for pasture and forest.

Representative profile of Bremo silt loam, 4 to 15 percent slopes, in a bluegrass pasture along Highway No. 669, 1 mile northeast of Monrovia:

Ap—0 to 12 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium and fine, granular structure; very friable when moist; many fine roots; clear, wavy boundary.

B—12 to 20 inches, predominantly yellowish-brown (10YR 5/4) silt loam; few, fine, faint mottles of strong brown (7.5YR 5/6) and yellowish red (5YR 5/6); weak, fine, subangular blocky structure; 50 to 60 percent of horizon is weathered fragments of black, green, yellowish-brown, and some white feldspar; few fine mica flakes; clear, wavy boundary.

C—20 to 25 inches, weathered yellowish-brown, black, and green hornblende schist; firm in place, but is friable silt loam if dug out; diffuse, irregular boundary.

R—25 inches +, rather hard basic rock.

The A horizon ranges from 3 to 12 inches in thickness and from dark brown to dark yellowish brown in color. The B horizon is weakly defined. It ranges from 5 to 10 inches in thickness, from yellowish brown to strong brown in color, and from silt loam to heavy silt loam in texture. Base saturation in the B horizon is normally more than 35 percent. In most places depth to bedrock is about 2 feet, but it is as much as 4 feet in some areas.

Bremo soils occur with Lloyd, Fluvanna, Orange, and Elbert soils. They are shallower over bedrock, are less reddish, and contain more coarse fragments and much less clay than the Lloyd and Fluvanna soils. Bremo soils lack the subsoil of plastic clay that is typical in the profile of the Orange and Elbert soils.

Bremo silt loam, 4 to 15 percent slopes (BrC).—This soil has the profile described as representative of the series. Included in mapping were small areas in which the surface layer is loam and areas in which the subsoil is clay. Also included were a few areas, indicated on the soil map by an appropriate symbol, where rock crops out on the surface. Other inclusions consist of areas of Wilkes, Lloyd, and Mecklenburg soils and a few small areas of severely eroded Bremo soils.

About 75 percent of the acreage is in pasture, 15 percent is in trees, and 10 percent is in cultivated crops. This soil is better suited to bluegrass pasture than to field crops. (Capability unit IVe–3; woodland suitability group 4)

Bremo silt loam, 15 to 25 percent slopes (BrD).—This soil is on the steeper side slopes of ridges and bluffs that border flood plains. It is adjacent to or near areas of Wilkes, Lloyd, Mecklenburg, and Zion soils. The combined thickness of the surface layer and the subsoil is only 6 to 18 inches. Included with this soil in mapping was a small acreage in which the slopes range from 25 to 45 percent. Also included were a few areas of rock outcrops and small areas of Wilkes soils.

About 60 percent of the acreage is in pasture, and 40 percent is in trees. This soil is better suited to bluegrass pasture or trees than to field crops. (Capability unit VIe–2; woodland suitability group 4)

Bucks Series

Soils that are deep, well drained, and gently sloping or sloping make up the Bucks series. These soils are on uplands throughout an area that extends in a northeasterly direction from Barboursville to the Rapidan River. They have formed in material weathered from red shale and conglomerate of Triassic age. The native vegetation is white, scarlet, black, and red oaks, hickory, redcedar, black walnut, dogwood, persimmon, and some Virginia pine.

In a typical profile, the surface layer is reddish-brown silt loam about 9 inches thick. The subsoil is dark-red silty clay loam that has a distinct purplish cast. It is underlain at a depth of about 36 inches by reddish silt loam.

Bucks soils are medium acid to strongly acid and have medium natural fertility and a medium content of organic matter. Their capacity for absorbing, retaining, and supplying moisture for plants is high. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil.

These are among the best soils for farming in Orange County.

Representative profile of Bucks silt loam, 2 to 7 percent slopes, eroded, in a field of alfalfa and orchardgrass grown for hay, 1 mile east of Somerset and one-half mile north of Highway No. 655:

Ap—0 to 9 inches, reddish-brown (2.5YR 4/4) silt loam; moderate, fine and medium, granular structure; very friable when moist; many fine roots; few quartz pebbles up to 1½ inches in diameter; clear, smooth boundary.

B21t—9 to 22 inches, dark-red (2.5YR 3/6) silty clay loam; moderate, medium, subangular blocky structure; friable when moist; few distinct clay films; many roots; a few fragments of red shale; gradual, smooth boundary.

B22t—22 to 27 inches, dark-red (2.5YR 3/6) silty clay loam; strong, medium and fine, subangular blocky structure; friable to firm when moist; few distinct clay films; few roots; a few fragments of red shale; gradual, smooth boundary.

B3t—27 to 36 inches, dark-red (2.5YR 3/6) silty clay loam streaked with weak red (10R 4/4); moderate, medium, subangular blocky structure; friable when moist; less than 20 percent of horizon consists of fragments of red shale; gradual, smooth boundary.

C—36 to 67 inches, weak-red (10R 4/4) silt loam mottled with dusky red (10R 3/3); highly weathered red shale of Triassic age; firm in place, but can be dug out rather easily and then is friable; becomes harder with increasing depth; black streaks along structural cracks.

The A horizon ranges from 8 to 12 inches in thickness and from brown to reddish brown or dark reddish brown in color. Some areas are severely eroded, and the surface layer in those places is silty clay loam. The B horizons range from reddish brown to red or dark red in color and from silty clay loam to clay in texture. They range from 10 to 36 inches in combined thickness but are 24 to 27 inches thick in most places. Depth to bedrock is about 4 feet or more.

Bucks soils occur with Rapidan, Penn, and Wadesboro soils. They have less clay throughout the profile than the Rapidan soils, and they have a finer texture, a thicker subsoil, and greater depth to bedrock than the Penn soils. Bucks soils are more reddish and finer textured than the Wadesboro soils, and they have a higher content of silt than those soils.

Bucks silt loam, 2 to 7 percent slopes, eroded (BsB2).—This soil has the profile described as representative of the series. Included with it in mapping were small areas of a Penn silt loam and a few areas in which the surface layer is loam. Also included were small areas of Manassas soils along small drainageways and in depressions; a small acreage of Bucks soils that are only slightly eroded or are not eroded; and severely eroded areas where the surface layer is silty clay loam.

About 90 percent of the acreage is in field crops and pasture, and the rest is in forest. This soil is well suited to the crops commonly grown in the area. (Capability unit IIe-1; woodland suitability group 6)

Bucks silt loam, 7 to 15 percent slopes, eroded (BsC2).—This soil is on side slopes of broad ridgetops. Its surface layer is only 4 to 6 inches thick. Included in mapping were small areas in which the surface layer is loam, other areas in which the soil is severely eroded, and still other areas in which the soil is not eroded or is only slightly eroded. Also included were a few small areas of Penn, Wadesboro, and Manassas soils.

About 38 percent of the acreage is in field crops, 34 percent is in trees, and 28 percent is in pasture. This soil is well suited to the crops commonly grown in the county. (Capability unit IIIe-1; woodland suitability group 6)

Bucks silt loam, conglomerate substratum, 2 to 7 percent slopes, eroded (BtB2).—This soil has formed in material weathered from conglomerate. Its profile is similar to the one described as representative of the series, except that the surface layer is less reddish and the subsoil is thicker and contains less silt. The subsoil is 28 to 40 inches thick. Depth to hard rock is 6 to 10 feet. Included with this soil in mapping were small areas of Penn, Manassas, and other Bucks soils.

About 60 percent of the acreage is in field crops, 25 percent is in pasture, and 15 percent is in forest. This soil is well suited to all the crops commonly grown in the area. (Capability unit IIe-1; woodland suitability group 6)

Bucks silt loam, conglomerate substratum, 7 to 15 percent slopes, eroded (BtC2).—The surface layer of this soil is less reddish than the one in the profile described as representative of the series, and the subsoil is 28 to 40 inches thick. Depth to bedrock is 6 to 10 feet. Included with this soil in mapping were small areas of Davidson and Penn soils and of other Bucks soils, some of which are severely eroded.

About 36 percent of the acreage is in field crops, another 36 percent is in forest, and 28 percent is in pasture. This soil is well suited to corn, alfalfa, small grains, and hay. (Capability unit IIIe-1; woodland suitability group 6)

Bucks silty clay loam, 7 to 15 percent slopes, severely eroded (BuC3).—This soil has lost most of its original surface layer through erosion. Included with it in mapping were small areas of Rapidan soils and of other Bucks soils.

About 52 percent of the acreage is in pasture, 36 percent is in forest, and 12 percent is in field crops. This soil is better suited to hay and pasture than to cultivated crops. Cultivation is difficult because of the silty clay loam surface layer. (Capability unit IVe-1; woodland suitability group 7)

Buncombe Series

The Buncombe series consists of deep, excessively drained, nearly level soils on first bottoms along the Rapidan River. These soils are near the stream channel and are subject to frequent flooding. They have formed in fairly recent alluvial material that has washed from soils of the Piedmont Plateau. The natural vegetation is sycamore, willow, elm, boxelder, and various kinds of oaks.

In a typical profile, the surface layer is yellowish-brown loamy fine sand about 20 inches thick. The underlying material is several feet thick and consists of yellowish-brown loamy sand to brown and grayish-brown sand.

Buncombe soils are strongly acid, low in content of organic matter, and low in natural fertility. Infiltration and permeability are rapid. The capacity to absorb and retain moisture for plants is low.

Representative profile of Buncombe loamy fine sand in a cornfield along Highway No. 636, 1½ miles west of U.S. Highway No. 522, along the Rapidan River:

A1—0 to 20 inches, yellowish-brown (10YR 5/4) loamy fine sand; single grain; very friable when moist; clear, smooth boundary.

C1—20 to 47 inches, yellowish-brown (10YR 5/4) loamy sand; single grain; very friable when moist; abrupt, smooth boundary.

C2—47 to 62 inches, brown (7.5YR 5/4) sand; single grain; loose, common, small, dark reddish-brown (5YR 3/2) concretions; abrupt, smooth boundary.

C3g—62 to 77 inches, grayish-brown (2.5Y 5/2) sand; single grain; loose; many dark reddish-brown (5YR 3/2) concretions; water table at a depth of about 69 inches.

The A horizon ranges from 12 to 24 inches in thickness and from grayish brown to yellowish brown in color. The C horizons generally consist of stratified sand and loamy fine sand. Their color below a depth of 40 inches ranges from brown to yellowish brown or grayish brown. Thickness of the alluvial material ranges from 3½ feet to more than 10 feet, but it is about 6 feet in most places.

Buncombe soils occur with well drained Comus and moderately well drained or somewhat poorly drained Chewacla soils. They are coarser textured than the Comus and Chewacla soils, and they differ also in being excessively drained.

Buncombe loamy fine sand (0 to 3 percent slopes) (Bw).—This is the only soil of the Buncombe series mapped in Orange County. Included in mapping were small areas where the underlying material is fine sandy loam; a few areas of a Comus loam; and sandbars in the bends of rivers.

About 90 percent of the acreage has been cleared and is in corn, hay, or pasture. About 10 percent is in forest. This soil is too droughty, too susceptible to flooding, and too low in natural fertility to be well suited to most crops. It is better suited to melons, early potatoes, early garden vegetables, and other early maturing crops than to crops that mature later in the growing season. (Capability unit IIIs–1; woodland suitability group 1)

Calverton Series

The Calverton series consists of deep, moderately well drained or somewhat poorly drained, gently sloping soils of uplands that have a fragipan. These soils are in depressions, at the bases of slopes, and around the heads of drainageways, where they have formed in material weathered from sandstone and shale of Triassic age. The native vegetation is maple, beech, elm, pin oak, and other plants that can tolerate restricted soil drainage.

In a typical profile, the surface layer is about 7 inches thick and consists of loam that is dark gray in the upper part and yellowish brown in the lower part. The subsoil above the fragipan is mainly yellowish-brown silty clay loam mottled with gray. The fragipan, at a depth of about 23 inches, is mottled yellowish-brown sandy clay loam about 8 inches thick. Below the fragipan is mottled, brown and dark-brown silty clay loam.

Calverton soils are very strongly acid and are low in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is moderate. During wet seasons, the water table is fairly high.

These soils are easy to conserve but are difficult to work and to keep in good tilth. They are used mainly for pasture.

Representative profile of Calverton loam, 2 to 7 percent slopes, in a forest of mixed hardwoods, 1 mile west of Barboursville, along Highway No. 658:

O1—1½ inches to ½ inch, undecomposed forest litter made up of sticks, twigs, and leaves.

O2—½ inch to 0, very dark brown (10YR 2/2), partly decomposed leaf litter; abrupt, smooth boundary.

A1—0 to 2 inches, dark-gray (10YR 4/1) loam; weak, fine, granular structure; very friable when moist; many fine roots; few quartz pebbles; abrupt, smooth boundary.

A2—2 to 7 inches, yellowish-brown (10YR 5/6) loam; weak, fine, granular structure; friable when moist; many fine and medium roots; few quartz pebbles; gradual, smooth boundary.

B1t—7 to 12 inches, brownish-yellow (10YR 6/6) light clay loam; few, fine, faint mottles of light yellowish brown (10YR 6/4); moderate, fine, subangular blocky structure; friable when moist; common fine and medium roots; few quartz pebbles; gradual, smooth boundary.

B21t—12 to 23 inches, yellowish-brown (10YR 5/4) silty clay loam; few, distinct, light-gray (5YR 7/1 mottles; moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few patchy clay films; clear, wavy boundary.

Bx—23 to 31 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, medium, distinct mottles of reddish yellow (5YR 6/6), light brownish gray (10YR 6/2), brown (10YR 5/3), and light gray (10YR 7/2); weak, thin, platy structure; when peds are moist, they crush easily in the hand but are slightly brittle and hard when dry and slightly sticky when wet; many small quartz pebbles; abrupt, wavy boundary.

B22t—31 to 40 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6); coarse angular blocky structure; friable when moist, sticky and plastic when wet; many continuous clay films; few medium roots; few weathered fragments of sandstone; gradual, smooth boundary.

B3—40 to 47 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; common, medium, distinct mottles of dark yellowish brown (10YR 4/4), reddish yellow (7.5YR 7/8), yellowish red (5YR 4/6), and gray (N 5/0); weak fine, subangular blocky structure; friable when moist; few, thin, patchy clay films; many weathered fragments of sandstone and some fragments of shale; gradual, smooth boundary.

C—47 to 58 inches, yellowish-brown (10YR 5/4) mixture of clay loam soil material and of weathered sandstone; common, medium, distinct mottles of light yellowish brown (10YR 6/4), dark yellowish brown (10YR 4/4), light gray (2.5Y 7/2), and gray (2.5Y 5/0); firm in place.

The A horizon ranges from loam to silt loam in texture and from 6 to 12 inches in thickness. In most places the uppermost 4 to 6 inches of the profile is free of mottling and ranges from yellowish brown to dark grayish brown in color. The B2 horizons are highly mottled and range from yellowish brown to gray in color. The Bx horizon, or fragipan, generally is at a depth of about 24 inches; it ranges from 7 to more than 20 inches in thickness. Depth to hard rock ranges from 5 to more than 10 feet.

Calverton soils occur with Mayodan, Albano, Penn, and Creedmoor soils. They have a mottled subsoil and are less well drained than the Mayodan soils, and they are better drained than the Albano soils. Calverton soils are less well drained and deeper than the Penn soils, and they have a less reddish color and have more distinct layers than the Penn soils. They have less clay in their subsoil than the Creedmoor soils, and they differ from the Creedmoor soils in containing a fragipan.

Calverton loam, 2 to 7 percent slopes (CaB).—This soil has the profile described as representative of the series. Included with this soil in mapping were a few small areas in which the surface layer is fine sandy loam; small areas where the material beneath the fragipan has a clay texture; and small areas of Albano and Mayodan soils.

About 62 percent of the acreage is in forest, 22 percent is in pasture, and 16 percent is in field crops. This soil is better suited to pasture than to cultivated crops. (Capability unit IIIw–2; woodland suitability group 15)

Calverton-Creedmoor complex, 2 to 7 percent slopes (CbB).—This soil complex occurs in an area extending from Barboursville through Somerset and on to Montford. It consists of Calverton and Creedmoor soils that are intermingled in such an intricate pattern that it was

not practical to map these soils separately. Calverton soils make up about 60 percent of the complex, and Creedmoor soils make up the rest. The Calverton soils have a silt loam surface layer, and they lack a dark-gray color. In other respects, however, their profile is similar to the profile described as representative of the Calverton series. The Creedmoor soils have a profile similar to the one described as representative of the Creedmoor series. Small areas of Albano and Manassas soils were included in mapping.

About 48 percent of the acreage is in forest, 42 percent is in pasture, and 10 percent is in field crops. These soils are suitable for pasture and for some hay crops. (Capability unit IIIw–2; woodland suitability group 15)

Catoctin Series

The Catoctin series consists of excessively drained, sloping to steep soils that are shallow to moderately deep over bedrock. These soils are on Piedmont uplands in the part of the county underlain by Catoctin greenstone, a dark basic rock. They have formed in material weathered from greenstone. The native vegetation is redbud, dogwood, hickory, red, white, black, and scarlet oaks, sassafras, and some pine.

In a typical profile, the surface layer is brown to dark-brown silt loam about 11 inches thick. The subsoil is weakly defined and consists of a strong-brown silt loam that is underlain by bedrock at a depth of about 22 inches. Fragments of greenstone make up 10 to 20 percent of the surface layer and 30 to 40 percent of the subsoil.

Catoctin soils are medium acid and are medium in content of organic matter and in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is moderate to low.

Representative profile of Catoctin silt loam, 5 to 15 percent slopes, in a hardwood forest along Highway No. 626, 1¼ miles north of Highway No. 627.

O2—1 inch to 0, dark-brown (7.5YR 3/2), partly decomposed forest litter; abrupt, smooth boundary.

A1—0 to 3 inches, brown to dark-brown (7.5YR 4/2) silt loam; weak, fine, granular structure; very friable when moist; many fine roots; 10 to 15 percent of horizon is fragments of greenstone up to 2 inches in diameter; gradual, smooth boundary.

A2—3 to 11 inches, brown (7.5YR 5/4) silt loam; moderate, fine, granular structure; friable when moist; many fine and medium roots; 15 to 20 percent of horizon is fragments of greenstone up to 3 inches in diameter; gradual, wavy boundary.

B—11 to 22 inches, strong-brown (7.5YR 5/6) silt loam; weak, fine, subangular blocky structure; friable when moist; few medium and coarse roots; 30 to 40 percent of horizon is fragments of greenstone up to 3 inches in diameter; thin clay films forming on rock faces; gradual, irregular boundary.

R—22 inches +, hard greenstone rock.

The A horizon ranges from 6 to 12 inches in thickness and from dark brown to yellowish brown in color. The B horizon is weakly defined. In most places it has a texture of silt loam, but it contains lenses or pockets of silty clay loam in places. Where the texture is silty clay loam, this horizon appears to contain illuvial clay. The B horizon ranges from 6 to 12 inches in thickness and from strong brown to yellowish red in color. The solum ranges from 12 to 27 inches in thickness. In the stony Catoctin soils, from 15 to 25 percent of the surface is covered with stones and cobblestones and from 15 to 25 percent of the profile, by volume, consists of stones and cobblestones. In the B horizon, base saturation is 35 to 65 percent and the content of clay is less than 35 percent. Depth to hard rock ranges from 12 to 30 inches.

Catoctin soils occur with Davidson, Fauquier, and Myersville soils. They are shallower over bedrock, are less reddish, and have less clay throughout the profile than any of those soils.

Catoctin silt loam, 5 to 15 percent slopes (CcC).—This soil has the profile described as representative of the series. Included in mapping, however, were small areas in which the surface layer is red or reddish brown. Also included were areas of rock outcrops and areas covered by loose stones, and these are indicated on the soil map by an appropriate symbol.

About 80 percent of the acreage is in forest, 15 percent is in pasture, and 5 percent is in field crops. This soil is well suited to trees and to bluegrass grown for pasture. It is not suited to cultivated crops, because of the low available moisture capacity and the bedrock near the surface. (Capability unit IVe–3; woodland suitability group 4)

Catoctin silt loam, 15 to 25 percent slopes (CcD).—This soil is steeper than the one for which a profile is described as representative of the series. Included with it in mapping were areas having slopes greater than 25 percent, and small areas in which the surface layer is reddish brown or red. Also included were areas where bedrock crops out or where loose stones are on the surface, and these areas are indicated on the soil map by an appropriate symbol.

About 90 percent of the acreage is in forest, and 10 percent is in pasture. This soil is better suited to forest and pasture than to field crops. (Capability unit VIe–2; woodland suitability group 4)

Catoctin stony silt loam, 10 to 25 percent slopes (CdD).—This soil has cobblestones and other stones strewn over the surface and embedded in the profile. These make up about 15 to 25 percent of the surface layer and the subsoil.

About 90 percent of the acreage is in forest, and 10 percent is in pasture. This soil should be kept in forest or pasture. The strong slopes, stones, and low available moisture capacity make it unsuitable for field crops. (Capability unit VIIs–1; woodland suitability group 4)

Catoctin stony silt loam, 25 to 45 percent slopes (CdE).—Cobblestones and other stones cover from 15 to 25 percent of the surface of this soil and make up from 15 to 25 percent of the soil profile. The profile contains more stones and is shallower over bedrock than the one described as representative of the series. Included in mapping were some areas where bedrock crops out at the surface and a few severely eroded spots in which the surface layer is red.

Nearly all of the acreage is in forest. This soil is better suited to forest than to pasture or field crops. (Capability unit VIIs–1; woodland suitability group 4)

Cecil Series

Deep, well-drained, gently sloping and sloping soils of Piedmont uplands make up the Cecil series. These soils occur near Locustgrove and throughout other areas of the county that are underlain by granitic rocks. They

have formed in acid material that has weathered from granite and granite gneiss. The native vegetation is white, scarlet, red, chestnut, and black oaks, hickory, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is brown to strong-brown loam about 7 inches thick. The subsoil, about 42 inches thick, is predominantly red clay, but the upper part of this layer is yellowish-red clay loam. The lower part, between depths of 35 and 49 inches, is mottled sandy clay loam.

Cecil soils are strongly acid or very strongly acid. They are low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are well suited to most of the crops commonly grown in the county.

Representative profile of Cecil loam, 2 to 7 percent slopes, eroded, in a cutover forest of pines and hardwoods east of Locustgrove, one-fourth mile north of Highway No. 20, along Highway No. 623:

O2—1 inch to 0, black (N 2/0), decayed forest litter; abrupt, smooth boundary.

A1—0 to 5 inches, brown (10YR 5/3) loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; few quartz pebbles up to 3 inches in diameter; clear, smooth boundary.

A2—5 to 7 inches, strong-brown (7.5YR 5/6) loam; moderate, fine, granular structure; friable when moist; many fine and medium roots; few quartz pebbles; common sand grains; gradual, smooth boundary.

B1t—7 to 13 inches, yellowish-red (5YR 4/8) clay loam; moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few, thin, continuous clay films; few quartz pebbles; few coarse sand grains; gradual, smooth boundary.

B2t—13 to 35 inches, red (2.5YR 4/6) clay; strong, medium, subangular blocky structure; firm when moist, hard when dry, slightly sticky and slightly plastic when wet; thin, continuous clay films; many medium and coarse roots; a few quartz pebbles; gradual, smooth boundary.

B3t—35 to 49 inches, red (2.5YR 4/8) sandy clay loam; few, medium, distinct mottles of strong brown (7.5YR 5/8), yellowish red (5YR 5/6), and very pale brown (10YR 8/4); weak, fine, subangular blocky structure; friable when moist; few, thin, patchy clay films; few weathered fragments of granitic rocks; some weathered feldspar; common fine mica flakes; gradual, wavy boundary.

C—49 to 67 inches, red (2.5YR 4/6) loamy soil material; strong-brown (7.5YR 5/6), yellowish-red (5YR 5/6), yellowish-brown (10YR 5/6), and very pale brown (10YR 7/3) mottles; hardness of soil material increases with depth; firm in place, friable if disturbed; many very fine mica flakes; numerous sand grains; can be dug out rather easily.

The A horizon is loam, fine sandy loam, or clay loam in texture. Extensive areas where the A horizon is loam are in the eastern part of the county. In those places the soils formed in material that weathered from granite and schist. Areas where the A horizon is fine sandy loam occur both in the western and eastern parts of the county. In the western part, these fine sandy loams have formed in material that weathered from metasediment, and in the eastern part they formed in material that weathered from granite and granite gneiss. In severely eroded areas, the A horizon is clay loam. The A horizon ranges from 4 to 10 inches in thickness. It generally is brown to yellowish brown, but this horizon is red or yellowish red in severely eroded places. In other areas it is brownish yellow to dark grayish brown. The B1t horizon is sandy clay loam in some places, and it ranges from 3 to 6 inches in thickness. The rest of the B horizon is 24 to 36 inches thick. The solum is 40 to 60 inches thick. Underlying the solum is intermingled red, yellowish-red, strong-brown, and yellowish-brown material that weathered from bedrock. Depth to hard rock ranges from 10 feet to more than 20 feet.

Cecil soils occur with Madison, Appling, Louisburg, and Colfax soils. They have a thicker, more clayey, less micaceous subsoil than the Madison soils and are more reddish than the Appling soils. Cecil soils have a thicker profile and more distinct horizons than the Louisburg soils. They are more reddish and are better drained than the Colfax soils, and they lack the fragipan that is typical in the profile of the Colfax soils.

Cecil fine sandy loam, 2 to 7 percent slopes, eroded (CeB2).—The profile of this soil is similar to the profile described as representative of the series, except that the surface layer is coarser textured, is 4 to 10 inches thick, and is brownish yellow to dark grayish brown. Included with this soil in mapping were small areas in which the surface layer is sandy loam. Also included were small areas of Seneca, Appling, Elioak, and Glenelg soils, and small areas of Cecil soils that are not eroded or that are only slightly eroded.

About 58 percent of the acreage is in forest, 23 percent is in field crops, and 19 percent is in pasture. Corn, small grains, alfalfa, and mixtures of grasses and legumes are the crops most commonly grown. (Capability unit IIe–2; woodland suitability group 8)

Cecil fine sandy loam, 7 to 15 percent slopes, eroded (CeC2).—The surface layer of this soil is coarser textured than the one in the profile described as representative of the series, and it is only 4 to 7 inches thick. Small areas in which the surface layer is sandy loam and small areas of Appling, Elioak, Glenelg, and Louisburg soils were included with this soil in mapping. Also included were small areas of uneroded Cecil soils.

About 53 percent of the acreage is in forest, 27 percent is in pasture, and 20 percent is in field crops. This soil is fairly well suited to the crops commonly grown in the county. (Capability unit IIIe–2; woodland suitability group 8)

Cecil loam, 2 to 7 percent slopes, eroded (CmB2).—This soil has the profile described as representative of the series. Included in mapping were small areas in which the surface layer is fine sandy loam, a few areas that are not eroded, and small areas of Appling and Seneca soils. Also included were a few areas of rock outcrops, which are indicated on the soil map by an appropriate symbol.

About 52 percent of the acreage is in forest, 28 percent is in pasture, and 20 percent is in field crops. This soil is well suited to corn, small grains, and hay. (Capability unit IIe–2; woodland suitability group 8)

Cecil loam, 7 to 15 percent slopes, eroded (CmC2).—This soil has a surface layer and a subsoil that are slightly thinner than those in the profile described as representative of the series. In most places the surface layer is 4 to 6 inches thick, but the subsoil is exposed in some places. Some areas contain shallow gullies. The subsoil is 18 to 40 inches thick. Included with this soil in mapping were small areas of Madison soils. Also included, at the bases of slopes and along small drainageways, were small areas of Seneca soils.

About 60 percent of the acreage is in forest, 25 percent is in pasture, and 15 percent is in field crops. This soil is well suited to corn, small grains, and hay. (Capability unit IIIe–2; woodland suitability group 8)

Cecil clay loam, 4 to 15 percent slopes, severely eroded (CsC3).—This soil is on side slopes adjacent to ridgetops. It has lost most, or all, of its original surface layer through erosion. The present plow layer consists mostly of material from the subsoil, and it is yellowish red or red. A few active gullies have formed. Included with this soil in mapping were small areas of Madison soils.

About 50 percent of the acreage is in forest, 30 percent is in pasture, and 20 percent is in field crops. This soil is better suited to hay and small grains than to row crops. It puddles readily because of the moderately fine texture of the surface layer, and a crust forms after hard rains. Erosion is the major hazard, and intensive practices are needed to reduce further losses of soil material. (Capability unit IVe–2; woodland suitability group 9)

Chewacla Series

The Chewacla series consists of deep, nearly level, moderately well drained or somewhat poorly drained soils on flood plains along many of the streams in the county. These soils have a high water table and are subject to frequent flooding. They have formed in fairly recent loamy alluvium washed from soils on uplands of the Piedmont Plateau. The native vegetation is willow, sycamore, alder, pin oak, white oak, elm, boxelder, and red maple.

In a typical profile, the surface layer is brown to dark-brown silt loam about 12 inches thick. The subsoil is mottled yellowish-brown and brown silt loam that grades to light brownish-gray silt loam at a depth of about 36 inches. Alluvial deposits of sand, silt, and gravel underlie the subsoil at a depth of about 63 inches.

Chewacla soils are medium acid to strongly acid. They have a high content of organic matter and high natural fertility. Infiltration and permeability are both moderate. The available moisture capacity is high.

These soils are used largely for pasture and field crops.

Representative profile of Chewacla silt loam in a field of timothy and lespedeza grown for hay, 1 mile northeast of Scuffletown along the Rapidan River:

A1—0 to 12 inches, brown to dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; few fine mica flakes; clear, smooth boundary.

B1—12 to 19 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; friable when moist; few, fine, faint mottles of strong brown (7.5YR 5/6); many fine mica flakes; gradual, smooth boundary.

B21—19 to 28 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6); weak, fine, subangular blocky structure; friable when moist; numerous fine mica flakes; a few quartz pebbles; few black concretions; gradual, smooth boundary.

B22—28 to 36 inches, brown (10YR 5/3) silt loam; many, coarse, prominent mottles of yellowish brown (10YR 5/6), light gray (N 7/0), and strong brown (7.5YR 5/6); weak, fine, subangular blocky structure; friable when moist; many fine mica flakes; few black concretions; gradual, smooth boundary.

B3g—36 to 63 inches, light brownish-gray (10YR 6/2) silt loam; common, coarse, prominent mottles of grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6); weak, fine, subangular blocky structure; friable when moist; many fine mica flakes; a few quartz pebbles; water table at a depth of 48 inches; abrupt, smooth boundary.

IIC—63 inches +, mottled alluvial deposits of sand and silt; many rounded quartz pebbles.

The A horizon ranges from 10 to 18 inches in thickness and from brown or dark brown to yellowish brown in color. The B horizons are mottled with brownish, yellowish, and grayish colors below depths of 12 to 20 inches. The texture of the B horizons ranges from slit loam to silty clay loam. Depth to the underlying gravelly material ranges from 24 to more than 70 inches. Depth to hard rock ranges from 4 to 8 feet, but generally it is about 6 feet.

Chewacla soils occur with Comus and Wehadkee soils. They are less well drained than the Comus soils, and unlike the Comus soils, they have a mottled subsoil. Chewacla soils are better drained than the Wehadkee soils.

Chewacla silt loam (0 to 2 percent slopes) (Cw).—This is the only soil of the Chewacla series mapped in Orange County. It is subject to flooding, and it receives extra moisture in runoff from higher lying areas. The soil material beneath the surface layer is mottled, and in places it is sticky and plastic when wet and is hard when dry. Included with this soil in mapping were a few small spots in which the surface layer is loam and some areas where the subsoil is silty clay loam. Also included were small areas of Comus and Wehadkee soils, and a few areas of gravelly and sandy soils along streambanks and in old streambeds.

About 40 percent of the acreage is in pasture, another 40 percent is in field crops, and 20 percent is in forest. This soil is well suited to permanent pasture, corn, and some hay crops. It is poorly suited to small grains, alfalfa, and many vegetable crops. (Capability unit IIIw–1; woodland suitability group 2)

Colfax Series

Deep and moderately deep, somewhat poorly drained, gently sloping soils of Piedmont uplands make up the Colfax series. These soils are mainly near Locustgrove, where they have formed in material that weathered from acid granite and granite gneiss. The native vegetation is maple, beech, elm, pin oak, and other trees that can tolerate restricted drainage.

In a typical profile, the surface layer is grayish-brown and pale-brown loam about 10 inches thick. The subsoil, about 30 inches thick, consists of mottled, brownish-yellow sandy clay loam over a fragipan of mottled, pale-brown, gray, yellowish-brown, and white sandy loam that occurs at a depth of about 20 inches. The fragipan is underlain by mottled, firm sandy loam at a depth of about 40 inches.

Colfax soils are very strongly acid. They are low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, but permeability is slow in the subsoil. These soils have moderate available moisture capacity and retain added plant nutrients well.

Pasture and forests are the main uses of these soils.

Representative profile of Colfax loam, 2 to 7 percent slopes, in a native grass pasture, 500 feet east of Locustgrove along Highway No. 20:

A1—0 to 3 inches, grayish-brown (10YR 5/2) loam; weak, very fine, granular structure; very friable when moist; many fine roots; many fine sand grains; clear, smooth boundary.

A2—3 to 10 inches, pale-brown (10YR 6/3) loam; weak, fine, granular structure; very friable when moist; common fine and medium roots; many medium pores; clear, smooth boundary.

B1—10 to 14 inches, brownish-yellow (10YR 6/6) light sandy clay loam; weak, fine, subangular blocky structure; friable when moist; slightly sticky when wet; many fine and medium roots; clear, smooth boundary.

B2t—14 to 20 inches, mottled brownish-yellow (10YR 6/6), light brownish-gray (2.5Y 6/2), gray (10YR 6/1), and yellowish-brown (10YR 5/6) sandy clay loam; moderate, fine, subangular blocky structure; slightly plastic and slightly sticky when wet; few, thin, continuous clay films; abrupt, smooth boundary.

Bx—20 to 40 inches, mottled pale-brown (10YR 6/3), gray (10YR 6/1), yellowish-brown (10YR 5/4), and white (10YR 8/2) sandy loam; moderate, thin, platy structure; friable when moist, hard and compact when dry and in place; brittle; few small quartz pebbles and fragments of rock; few mica flakes; clear, smooth boundary.

Cg—40 to 62 inches, mottled gray (5Y 6/1), light-gray (5Y 7/2), and brownish-yellow (10YR 6/6), firm sandy loam; when dug out, soil material is very friable; common small quartz pebbles and fragments of granite.

The A horizon ranges from 8 to 14 inches in thickness, and from dark grayish brown to yellowish brown and pale brown in color. The B1 and B2t horizons range from brownish yellow to light brownish gray or yellowish brown in color and from 10 to 18 inches in combined thickness. The Bx horizon (pan layer) ranges from 10 to 20 inches in thickness. The solum ranges from 30 to 60 inches in thickness. The underlying material has weathered from granite. Depth to hard rock ranges from 4 to 12 feet.

Colfax soils occur with Appling, Vance, and Worsham soils. They are less well drained than the Appling and Vance soils, and they lack the reddish subsoil that is typical in the profiles of those soils. Also, they have a fragipan in the lower part of the subsoil that is absent in the profiles of the Appling and Vance soils. Colfax soils are better drained and are less grayish throughout than the Worsham soils.

Colfax loam, 2 to 7 percent slopes (CxB).—This is the only soil of the Colfax series mapped in Orange County. Small areas of sandy loam, areas where quartz pebbles are strewn over the surface, and a few areas in which the texture of the fragipan is clay were included in mapping. Also included were small areas of Vance and Worsham soils.

About 57 percent of the acreage is in forest, 23 percent is in pasture, and 20 percent is in field crops. This soil is not suited to cultivated crops, nor is it suited to alfalfa. It is suitable for pasture, however, and it can be used to grow grasses and legumes, other than alfalfa, for mixed hay. (Capability unit IIIw–2; woodland suitability group 15)

Comus Series

In the Comus series are deep, well-drained, nearly level soils on first bottoms that are subject to infrequent flooding. These soils are along the large streams of the county. They have formed in fairly recent alluvial deposits of sand, silt, and clay that have washed from soils of Piedmont uplands. The native vegetation is yellow-poplar, black walnut, elm, sycamore, white oak, red oak, ash, beech, elm, and boxelder.

In a typical profile, the surface layer is brown to dark-brown fine sandy loam about 22 inches thick. The surface layer is underlain by dark-brown to yellowish-brown, predominantly fine sandy loam that extends to a depth of several feet.

The Comus soils are medium acid to strongly acid. They are high in content of organic matter and in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderately rapid or rapid in the subsoil. The available moisture capacity is high.

These soils are used mainly for field crops and pasture.

Representative profile of Comus fine sandy loam in a cornfield along the Rapidan River, 1½ miles west of U.S. Highway No. 522, along Highway No. 636:

A1—0 to 22 inches, brown to dark-brown (7.5YR 4/4) fine sandy loam; moderate, fine to medium, granular structure; very friable when moist; few fine mica flakes; many fine roots; gradual, smooth boundary.

C1—22 to 34 inches, dark-brown (7.5YR 3/2) fine sandy loam; weak, fine, granular structure; very friable when moist; common fine mica flakes; clear, smooth boundary.

C2—34 to 40 inches, dark yellowish-brown (10YR 3/4) loamy fine sand; single grain; very friable when moist; abrupt, smooth boundary.

C3—40 to 50 inches, dark-brown (10YR 3/3) very fine sandy loam; weak, medium, granular structure; very friable when moist; gradual, smooth boundary.

C4—50 to 73 inches, yellowish-brown (10YR 5/4) fine sandy loam; few, faint, gray mottles at a depth of about 68 inches; weak, fine, granular structure; friable when moist; water table at a depth of 70 inches.

The A horizon ranges from 12 to 24 inches in thickness and from brown or dark brown to light yellowish brown in color. In places the texture of the A horizon is silt loam. Because the profile consists mainly of stratified alluvial material, the layers vary considerably in color, texture, and thickness. In most places the profile contains very fine mica flakes, but the number of mica flakes is variable. Depth to mottling ranges from 30 to more than 60 inches. Gravel and cobblestones are at a depth of as much as 6 feet. Depth to hard rock ranges from 6 to 10 feet or more.

Comus soils occur with Buncombe, State, Chewacla, and Wehadkee soils. They have finer textured A and C horizons than the Buncombe soils, and unlike the Buncombe soils, they are well drained. They lack the clearly defined subsoil of the State soils, and they are better drained than the Chewacla and Wehadkee soils.

Comus fine sandy loam (0 to 2 percent slopes) (Cy).—This soil has the profile described as representative of the series. Included with it in mapping were a few areas in which the surface layer is loam, small areas of Buncombe soils, and a few wet spots occupied by Chewacla soils.

About 70 percent of the acreage is in field crops, 20 percent is in pasture, and 10 percent is in forest. This soil is well suited to corn and hay crops. It is exceptionally well suited to truck crops, even though it is subject to overflow. Alfalfa is not well suited, because of the excessive moisture. (Capability unit IIw–1; suitability group 2)

Comus silt loam (0 to 2 percent slopes) (Cz).—The profile of this soil is finer textured than the one described as typical of the series, and its surface layer is 12 to 20 inches thick. Like other Comus soils, this soil is well drained, but gray mottlings occur at a depth of 36 inches in many places. Included with this soil in mapping were small areas of Chewacla soils and areas of Comus soils that have a loam surface layer.

About 62 percent of the acreage is in field crops, 23 percent is in forest, and 15 percent is in pasture. This soil is well suited to corn and to most hay crops, except

alfalfa. Small grains are likely to lodge, however, and corn does not do well in some years, because of flooding. (Capability unit IIw-1; woodland suitability group 2)

Creedmoor Series

Soils of the Creedmoor series are deep, moderately well drained or somewhat poorly drained, and gently sloping. These soils are on uplands, where they have formed in material weathered from Triassic sandstone and shale. The native vegetation is maple, beech, elm, pin oak, and other plants tolerant of restricted drainage.

In a typical profile of a Creedmoor soil in Orange County, the surface layer is about 10 inches thick and consists partly of recent silt loam overwash from adjacent red soils of uplands. The overwash imparts a brownish to reddish color to the surface layer. The subsoil is about 42 inches thick. In the upper part, it is light yellowish-brown clay loam and yellowish-brown silty clay loam mottled with gray, yellowish brown, and brown. At a depth of about 28 inches, the soil material grades to light brownish-gray clay. A layer of brown clay loam is at depths between 45 and 52 inches.

The Creedmoor soils are strongly acid or very strongly acid and are low to medium in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is moderate to high.

These soils are mainly in forest or pasture.

The Creedmoor soils of Orange County are mapped only in a complex with Calverton soils. For a description of this complex, see the Calverton series.

Representative profile of a Creedmoor silt loam having slopes of 2 to 7 percent, in a pastured field of swamp grasses, 2 miles west of Orange and south of Highway No. 633:

A1—0 to 4 inches, brown to dark-brown (7.5YR 4/4) silt loam; weak, fine, granular structure; very friable when moist; many fine roots; abrupt, smooth boundary.

A2—4 to 10 inches, reddish-brown (5YR 4/4) silt loam; few, fine, faint mottles of light reddish brown (5YR 6/4); moderate, fine, granular structure; friable when moist; many fine roots; few mineral concretions; abrupt, smooth boundary.

B1t—10 to 21 inches, light yellowish-brown (10YR 6/4) light clay loam; fine, distinct mottles of yellowish brown (10YR 5/8) and brown (10YR 4/3); weak, fine, subangular blocky structure; friable when moist; few roots; common mineral concretions; few quartz pebbles; many fine pores; gradual, wavy boundary.

B21t—21 to 28 inches, yellowish-brown (10YR 5/6) silty clay loam; many, coarse, prominent mottles of strong brown (7.5YR 5/6) and light gray (10YR 7/2); coarse angular blocky structure; firm when moist; common clay films; few black mineral concretions and few quartz pebbles; abrupt, smooth boundary.

B22t—28 to 45 inches, light brownish-gray (2.5Y 6/2) clay; many, coarse, prominent mottles of yellowish brown (10YR 5/6), light yellowish brown (10YR 6/4), and strong brown (7.5YR 5/6); massive; hard when dry, plastic when wet; a few quartz pebbles; abrupt, smooth boundary.

B3t—45 to 52 inches, brown (7.5YR 4/4) clay loam; many, coarse, prominent mottles of strong brown (7.5YR 5/6), light gray (10YR 7/2), reddish brown (5YR 4/3), and weak red (10R 5/4); massive; plastic and slightly sticky when wet; few quartz pebbles; clear, smooth boundary.

C—52 to 59 inches, multicolored, highly weathered material from conglomerate rock; firm in place; if dug out, soil material is loamy and contains numerous fragments of rock.

Because of the recent overwash on the surface, the color of the A horizon of the Creedmoor soils in Orange County ranges from brown to dark brown to reddish brown. Thickness of the A horizon ranges from 4 to 12 inches. The B horizons are highly mottled. They range from light yellowish brown or brown to gray in color and from 36 to 54 inches in combined thickness. The underlying material is derived from weathered shale, sandstone, and conglomerate. Depth to hard rock ranges from 4 to 8 feet.

Creedmoor soils occur with Penn, Albano, and Calverton soils. They are deeper and have more clearly defined horizons than the Penn soils. They are less wet than the Albano soils. and they lack the fragipan that is typical in the profile of the Calverton soils.

Davidson Series

The Davidson series consists of deep, well-drained, gently sloping to steep soils of Piedmont uplands. These soils occur in a long strip, about 3 miles wide, that extends through the central part of the county. They have formed in material weathered from dark, basic Catoctin greenstone. The native vegetation is red, white, scarlet, and black oaks, black walnut, black locust, hickory, dogwood, redbud, yellow-poplar, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is dark reddish-brown clay loam about 7 inches thick. The subsoil is several feet thick and is dark-red and red clay.

The Davidson soils are medium acid and are medium in content of organic matter and in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderately rapid in the subsoil. The available moisture capacity is high.

Some Davidson soils are among those soils best suited to crops in this county. Others are less than well suited or are not suited to crops.

Representative profile of Davidson clay loam, 2 to 7 percent slopes, eroded, in a grazed forest of mixed hardwoods, one-fourth mile northeast of Red Hill Road and 1½ miles northeast of the town of Orange:

O2—½ inch to 0, reddish-black (10YR 2/1) material from decayed leaves; abrupt, smooth boundary.

A1—0 to 3 inches, dark reddish-brown (5YR 3/3) clay loam; moderate, medium, granular structure; friable when moist; many fine roots; few fragments of greenstone; clear, smooth boundary.

A3—3 to 7 inches, dark reddish-brown (5YR 3/4) clay loam; moderate, coarse, granular structure; friable when moist; many fine roots; a few fragments of greenstone; gradual, smooth boundary.

B1t—7 to 14 inches, dark-red (2.5YR 3/6) clay; moderate, medium, subangular blocky structure; friable when moist; many fine and medium roots; a few fragments of greenstone; clear, smooth boundary.

B21t—14 to 28 inches, dark-red (10R 3/6) clay; moderate, medium and fine, subangular blocky structure; firm when moist; hard when dry, sticky when wet; thin, continuous clay films; few medium roots; a few fragments of weathered greenstone; gradual, smooth boundary.

B22t—28 to 65 inches, dark-red (10R 3/6) clay; strong, medium and fine, subangular blocky structure; firm when moist, hard when dry, slightly sticky when wet; many prominent clay films; few coarse roots; a few fragments of weathered greenstone; gradual, smooth boundary.

B3t—65 to 87 inches, red (2.5YR 4/6) clay; weak, fine subangular blocky structure; friable when moist; thin, patchy clay films; fragments of weathered greenstone up to 6 inches in diameter scattered throughout the horizon; gradual, wavy boundary.

C—87 to 133 inches, red (2.5YR 4/6) silty clay loam from weathered greenstone; common, medium, distinct mottles of strong brown (7.5YR 5/8) and yellowish red (5YR 5/8); firm in place; few hard fragments of greenstone; black iron stains along the cracks in the rocks.

The A horizon ranges from 4 to 9 inches in thickness and from dark reddish brown to dark red in color. In severely eroded areas, the texture of the A horizon is clay. The B2t horizons in all areas are dark red and are more than 50 percent clay. Combined thickness of the B2t horizons is more than 30 inches. The C horizon consists of material weathered from greenstone. Depth to bedrock ranges from 6 to more than 20 feet.

The Davidson soils occur with Catoctin, Myersville, Dyke, Starr, Elbert, and Rabun soils. They have a more reddish color and a finer textured, thicker subsoil than the Catoctin and Myersville soils, and they have a finer textured surface layer and a somewhat higher content of clay in the subsoil than the Dyke soils. Davidson soils have a more strongly developed profile than the Starr soils and are redder and better drained than the Elbert soils. They have a thicker solum and are deeper over bedrock than the Rabun soils.

Davidson clay loam, 2 to 7 percent slopes, eroded (DaB2).—This soil has the profile described as representative of the series. It is one of the reddest soils in the county. In wooded areas the uppermost 1 to 2 inches of the surface layer is reddish black because of the large amount of organic material that has accumulated on the surface. Included with this soil in mapping were small areas of a Dyke clay loam and a few areas surrounding rock outcrops where the soil is shallower over bedrock than is typical for Davidson soils. Also included were small areas of a Starr silt loam, mainly near the heads of drainageways and along small drainageways.

About 55 percent of the acreage is in field crops, 30 percent is in pasture, and 15 percent is in forest. This soil is among those soils in the county that are best suited to crops. It is especially well suited to alfalfa, red clover, and bluegrass. (Capability unit IIe–1; woodland suitability group 6)

Davidson clay loam, 7 to 15 percent slopes, eroded (DaC2).—This soil is on ridgetops and on side slopes that extend downward from ridgetops. In wooded areas the surface layer is stained with organic matter to a depth of a few inches. Some areas contain shallow gullies, and the subsoil is exposed in many small areas. Included with this soil in mapping were small areas of a Starr silt loam, mainly at the bases of slopes and along narrow drainageways, and small areas of a Rabun clay loam that surrounds outcrops of greenstone.

About 48 percent of the acreage is in field crops, 40 percent is in pasture, and 12 percent is in forest. This soil is well suited to the commonly grown crops, but care is needed to prevent further erosion. (Capability unit IIIe–1; woodland suitability group 6)

Davidson clay loam, 15 to 25 percent slopes, eroded (DaD2).—This soil is on the side slopes of high upland ridges and on hillsides near drainageways. The profile is similar to the one described as representative of the series, except that the combined surface layer and subsoil are thinner. Most of the original surface layer has been lost through erosion, and the present surface layer is only 4 to 7 inches thick. In places the subsoil is exposed, and shallow gullies have formed in some places. The surface layer in wooded areas has been stained with organic matter and is darker than in cultivated areas. Included with this soil in mapping were small areas that have slopes steeper than 25 percent; small areas in which the surface layer is clay; and small areas of a Catoctin silt loam adjacent to outcrops of greenstone. The outcrops are indicated on the soil map by a symbol.

About 45 percent of the acreage is in pasture, 39 percent is in forest, and 16 percent is in field crops. This soil is better suited to permanent hay or pasture than to cultivated crops. It is well suited to alfalfa. (Capability unit IVe–1; woodland suitability group 6)

Davidson stony clay loam, 7 to 15 percent slopes (DcC).—This soil is on the sides and tops of ridges in the vicinity of Southwestern Mountain and Clark Mountain. The profile is similar to the one described as representative of the series, except that loose fragments of greenstone are strewn over the surface and are embedded in the profile. Stones are 2½ to 5 feet apart and cover about 3 to 15 percent of the surface. These stones hinder tillage. Included with this soil in mapping were areas that are moderately eroded, areas in which the slopes are less than 7 percent, and a few areas of Rabun soils.

About 90 percent of the acreage is in forest, and 10 percent is in pasture. This soil is suited to pasture. It is not suitable for cultivation, because of the stones. (Capability unit VIs–1; woodland suitability group 6)

Davidson stony clay loam, 15 to 25 percent slopes (DcD).—This soil is on the sides of hills near drainageways and mountains in the Southwestern Mountain and Clark Mountain range. Its solum is thinner than the one in the profile described as representative of the series, and this soil has fragments of greenstone strewn over the surface and embedded in the profile. Tillage is hindered by these fragments, which are 2½ to 5 feet apart and cover about 3 to 15 percent of the surface. Included with this soil in mapping were scattered areas of Catoctin and Rabun soils.

About 95 percent of the acreage is in forest, and 5 percent is in pasture. This soil is not suited to cultivation, but it is suitable for pasture or trees. (Capability unit VIIs–1; woodland suitability group 6)

Davidson stony clay loam, 25 to 45 percent slopes (DcE).—This steep soil is on hillsides and bluffs. The profile is similar to the one described as representative of the series, except that it is stony and is thinner over bedrock. Stones are strewn over the surface, and bedrock crops out in places. The stones are 2½ to 5 feet apart and cover about 20 percent of the surface. Included in mapping were areas of Catoctin soils around the rock outcrops, and small areas of Rabun soils.

Nearly all of the acreage is in forest, and it should remain in forest. This soil is not suited to cultivation. (Capability unit VIIs–1; woodland suitability group 6)

Davidson clay, 2 to 7 percent slopes, severely eroded (DdB3).—This soil has lost nearly all of its original surface layer through erosion. The present surface layer is dark red, except that it is dark reddish brown in wooded areas. Tillage is entirely within the clay subsoil. In winter, frost heaving occurs, and as a result, some plants are pushed out of the soil. During dry periods, cracks form in the surface layer. Small areas of a Dyke clay loam were included with this soil in mapping.

About 60 percent of the acreage is in field crops, 30 percent is in pasture, and 10 percent is in forest. This soil is somewhat difficult to cultivate and to keep in good tilth, but it is well suited to alfalfa. Because tillage is in the clay subsoil, a good seedbed is difficult to prepare. This soil can be cultivated only within a narrow range of moisture content. It should be kept in permanent hay or pasture. (Capability unit IIIe–1; woodland suitability group 7)

Davidson clay, 7 to 15 percent slopes, severely eroded (DdC3).—This soil is on ridgetops and on side slopes that extend downward from ridgetops. It has lost a large part, or all, of its original surface layer through erosion. The plow layer is dark reddish brown to dark red and consists mostly of clay from the subsoil. Most areas contain a few shallow gullies, and hard greenstone is exposed in places. Around the rock outcrops, the soil is shallower and more brownish than normal Davidson soils. Included with this soil in mapping were small areas of a Starr silt loam, mostly at the heads of drainageways, along small drainageways, and at the bases of slopes. Also included were small, scattered areas of Dyke soils.

About 50 percent of the acreage is in pasture, 35 percent is in field crops, and 15 percent is in forest. This soil is well suited to pasture and hay crops, especially alfalfa. If properly managed, it is also suited to small grains. (Capability unit IVe–1; woodland suitability group 7)

Davidson clay, 15 to 25 percent slopes, severely eroded (DdD3).—This soil is on high, narrow ridgetops and on hillsides near drainageways. It has lost all, or nearly all, of its original surface layer through erosion. The present plow layer is dark reddish brown to dark red and is mostly clay from the subsoil that has been mixed in tillage with the remaining original surface soil. The subsoil is dark-red, firm clay 24 to 60 inches thick. Most areas of this soil contain shallow, active gullies.

About 60 percent of the acreage is in pasture, 28 percent is in forest, and 12 percent is in field crops. This soil is not suited to cultivation, but it is suited to pasture and forest. (Capability unit VIe–1; woodland suitability group 7)

Dyke Series

In the Dyke series are deep, well-drained soils that are gently sloping or sloping. These soils occur in the part of the county underlain by greenstone. They have formed in very old colluvial material derived from greenstone. The native vegetation is white, red, scarlet, and black oaks, black walnut, black locust, yellow-poplar, dogwood, redbud, and hickory.

In a typical profile, the surface layer is dark reddish-brown loam about 7 inches thick. The subsoil is predominantly dark-red clay and silty clay, and it extends to a depth of several feet.

The Dyke soils are medium acid to strongly acid. They have a medium content of organic matter and are medium in natural fertility. The available moisture capacity is high. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil.

These soils are among those in the county that are best suited to crops.

Representative profile of a Dyke loam, 2 to 7 percent slopes, eroded, in a field of alfalfa and orchardgrass grown for hay, one-fourth mile west of Orange along U.S. Highway No. 15:

Ap—0 to 7 inches, dark reddish-brown (5YR 3/4) heavy loam; weak, fine, granular structure; friable when moist; many fine and medium roots; few quartz pebbles up to 2 inches in diameter; abrupt, smooth boundary.

B1t—7 to 15 inches, dark reddish-brown (5YR 3/4) clay loam; moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; many fine and medium roots; a few quartz pebbles; clear, smooth boundary.

B21t—15 to 29 inches, dark-red (2.5YR 3/6) clay; weak, medium and fine, subangular blocky structure; friable to firm when moist, hard when dry, sticky and plastic when wet; few, thin, patchy clay films; few black mineral concretions; gradual, smooth boundary.

B22t—29 to 40 inches, dark-red (10R 3/6) clay; weak, fine, subangular blocky structure; firm when moist, sticky and plastic when wet; few patchy clay films; many weathered, black mineral concretions; black streaks on cut surfaces; few quartz pebbles and fragments of weathered rock; gradual, wavy boundary.

B3t—40 to 58 inches, dark-red (10R 3/6) silty clay; common, medium, prominent mottles of reddish yellow (5YR 6/8); weak, fine, subangular blocky structure; friable when moist, plastic and sticky when wet; many weathered concretions and fragments of greenstone; common black streaks as a result of the mineral concretions; clear, wavy boundary.

C—58 to 64 inches, red (2.5YR 4/6) silty clay loam; common, medium, prominent mottles of strong brown (7.5YR 5/8) and reddish yellow (7.5YR 6/6); 40 percent of this horizon is black mineral concretions and gravel from weathered rock; gradual, wavy boundary.

Btb—64 inches +, red (10R 4/6) clay; few, medium, distinct mottles of strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; friable when moist; many continuous clay films.

The A horizon ranges from 4 to 8 inches in thickness and from reddish brown to dark reddish brown in color. The B2t horizons are dark-red clay or silty clay that is plastic and sticky when wet. The B horizons have many black mineral concretions throughout. The local alluvial material in which these soils formed was derived from dark-colored soils and rocks that are high in content of ferromagnesium. The solum ranges from 30 to 60 inches in thickness. Depth to hard rock ranges from 8 to 20 feet.

Dyke soils occur with Davidson, Starr, and Rabun soils. They have a slightly coarser textured surface layer, are more sticky and plastic when wet, and have a slightly lower content of clay than the Davidson soils. Dyke soils have a more clearly defined subsoil and a higher content of clay in the subsoil than the Starr soils. They are deeper than the Rabun soils and have a lithologic discontinuity in their profile that is lacking in the Rabun profile.

Dyke loam, 2 to 7 percent slopes, eroded (DkB2).—This soil has the profile described as typical for the series (fig. 3). Included in mapping were areas in which the surface layer is silt loam or silty clay loam. Also included were areas of an unidentified soil that has a red subsoil, and small areas of Davidson and Starr soils.

Nearly all of the acreage is in field crops and pasture. This soil is among those in the county that are best suited to crops. It is especially well suited to alfalfa and bluegrass. (Capability unit IIe–1; woodland suitability group 6)

Dyke loam, 7 to 15 percent slopes, eroded (DkC2).—This soil is on side slopes that extend downward from ridgetops. In many places it is eroded to the extent that

the subsoil is exposed, and some areas contain shallow gullies. Areas of Davidson and Starr soils were included with this soil in mapping. Also included were small, scattered areas of moderately steep Dyke soils.

Nearly all of the acreage is in field crops and pasture. This soil is well suited to all the crops commonly grown in the area, including alfalfa and bluegrass. (Capability unit IIIe-1; woodland suitability group 6)

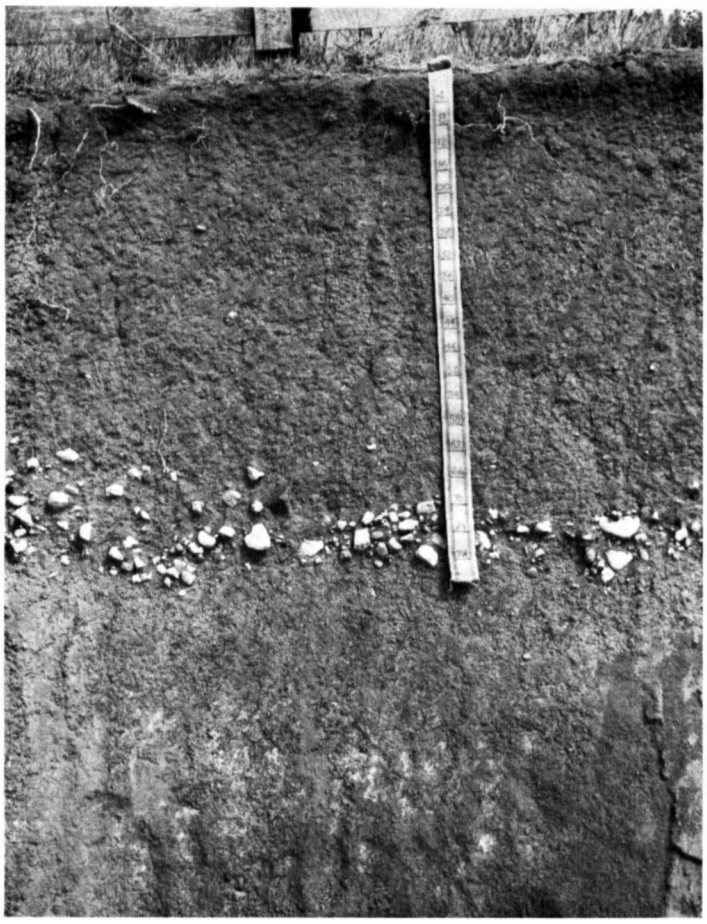

Figure 3.—**Gravel line underlying colluvial material in an area of Dyke loam, 2 to 7 percent slopes, eroded. The surface of an old buried soil is beneath the gravel line.**

Elbert Series

In the Elbert series are deep, poorly drained, nearly level soils of the Piedmont Plateau. These soils occur throughout the part of the county underlain by basic rocks and are most extensive in the vicinity of Wilderness and Lahore. They are on upland flats, in depressions, and along small drainageways, where they have formed in material weathered from dark-colored, basic greenstone, diorite, and hornblende gneiss. The native vegetation is pin oak, willow oak, swamp white oak, red maple, willow, alder, and other plants tolerant of restricted drainage.

In a typical profile, the surface layer is mottled, grayish-brown to light brownish-gray silt loam about 6 inches thick. The subsoil extends to a depth of about 48 inches. Most of the subsoil is distinctly mottled, light brownish-gray and olive-gray, plastic clay.

The Elbert soils are medium acid and are medium to high in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is high. These soils have a seasonal high water table. Water usually stands on the surface in winter and early in spring.

These soils are used mainly for forest and pasture.

Representative profile of Elbert silt loam in a hardwood forest, 2 miles north of Locustgrove, along Highway No. 614:

O2—1 inch to 0, black (10YR 2/1), partly decomposed forest litter; abrupt, smooth boundary.

A1—0 to 3 inches, grayish-brown (2.5Y 5/2) silt loam; few, fine, faint mottles of light olive brown (2.5Y 5/4); weak, fine, granular structure; very friable when moist; many fine roots; gradual, smooth boundary.

A2—3 to 6 inches, light brownish-gray (2.5Y 6/2) silt loam; common, medium, faint mottles of light olive brown (2.5Y 5/4); moderate, fine, granular structure; friable when moist, slightly sticky when wet; many fine roots; gradual, smooth boundary.

B1t—6 to 11 inches, light yellowish-brown (2.5Y 6/4) silty clay loam; common, medium, distinct mottles of light gray (10YR 7/1) and brownish yellow (10YR 6/6); weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few, thin, patchy clay films; few fine and medium roots; clear, smooth boundary.

B21tg—11 to 37 inches, light brownish-gray (2.5Y 6/2) clay; common, medium, faint mottles of gray (N 6/0), distinct mottles of yellowish brown (10YR 5/8), and faint mottles of light gray (2.5Y 7/0); massive when wet; coarse angular blocky structure when dry; firm when moist, very hard when dry, and very sticky and very plastic when wet; few, small, black mineral concretions; abrupt, smooth boundary.

B22tg—37 to 48 inches, olive-gray (5Y 5/2) clay; few, fine, distinct mottles of olive brown (2.5Y 4/4); massive when wet; coarse angular blocky structure when dry; very hard when dry, very sticky and very plastic when wet; few small quartz pebbles; clear, wavy boundary.

C—48 inches +, weathered basic rock that is yellow, brown, green, olive, and white; firm in place, but is friable sandy loam material if dug out; grades to hard rock below a depth of 50 inches.

The A horizon ranges from 6 to 12 inches in thickness. Color of the A horizon is generally dark grayish brown or grayish brown to light brownish gray. Where the surface is covered by a layer of overwash, however, the A horizon is more reddish than normal. Color of the B1t horizon ranges from pale brown to light yellowish brown mottled with gray. In some places the B1t horizon contains black mineral concretions throughout. More than 60 percent, by volume, of the B2tg horizons is clay, and the base saturation of those horizons is greater than 35 percent. The solum ranges from 30 to 50 inches in thickness. Depth to hard rock ranges from 3 to 8 feet.

Elbert soils occur with Davidson, Fluvanna, Lloyd, and Orange soils. Unlike those soils, they are poorly drained and they have gray mottling in their surface layer.

Elbert silt loam (0 to 2 percent slopes) (Eb).—This soil has the profile described as representative of the series. Included with it in mapping were a few areas in which the surface layer is silty clay loam; some areas where quartz pebbles are on the surface; and a few areas where bedrock crops out. Other inclusions consist of areas in which recently deposited soil material is on the surface, and in those areas the soil is deeper or the subsoil is less plastic than typical for Elbert soils.

About 60 percent of the acreage is in forest, 35 per-

cent is in pasture, and 5 percent is in field crops. This soil is not suited to cultivation, but it is suited to trees and to grasses and legumes grown for pasture. (Capability unit Vw–1; woodland suitability group 16)

Elbert silt loam, overwash (0 to 3 percent slopes) (Ee).—This soil has a profile that is more reddish in the upper part than the profile described as representative of the series. The surface layer is dark reddish brown to red. The upper part of the subsoil is reddish-brown or yellowish-red light silty clay loam, and the lower part is dark reddish-brown or red silty clay loam. The subsoil has developed in soil material that washed from Davidson soils, and it is weakly defined. Underlying the subsoil is the surface of an old buried soil that is highly mottled, is waterlogged, and consists of massive, plastic clay that has characteristics of the normal Elbert lower subsoil. Included in mapping were a few small spots of Starr soils at the heads of drainageways, and a few areas of wet Elbert soils that have a profile similar to the one described as typical for the series.

About 54 percent of the acreage is in pasture, 28 percent is in forest, and 18 percent is in field crops. Unless some kind of drainage is provided, this soil is not well suited to cultivation. It is better suited to pasture than to field crops. (Capability unit IVw–2; woodland suitability group 16)

Elioak Series

The Elioak series consists of deep, well-drained, gently sloping to moderately steep soils of Piedmont uplands. These soils occupy a large area in the western part of the county, where they have formed in material weathered from mica schist and gneiss. The native vegetation is red, white, scarlet, and black oaks, beech, blackgum, hickory, dogwood, pine, and mountain-laurel.

In a typical profile, the surface layer is dark grayish-brown and brown fine sandy loam about 8 inches thick. The subsoil, mainly red silty clay loam, extends to a depth of about 38 inches. It has many mica flakes in the lower part.

Elioak soils are very strongly acid, low in content of organic matter, and low in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is moderate to high.

Most of the acreage is in forest. A smaller acreage is in pasture and field crops.

Representative profile of Elioak fine sandy loam, 2 to 7 percent slopes, eroded, in a forest of mixed hardwoods on the south side of U.S. Highway No. 33 at Dickinsons Store:

O1—1½ inches to ½ inch, undecomposed forest litter.

O2—½ inch to 0, very dark gray (10YR 3/1), partly decomposed leaf litter; abrupt, wavy boundary.

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; few fragments of quartz; clear, smooth boundary.

A2—2 to 8 inches, brown (7.5YR 5/4) fine sandy loam; moderate, fine, granular structure; very friable when moist; many fine and medium roots; few fragments of quartz; few fine mica flakes; clear, wavy boundary.

B1t—8 to 13 inches, yellowish-red (5YR 4/6) silty clay loam; moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky when wet; few finely divided mica flakes; many fine pores; gradual, smooth boundary.

B2t—13 to 29 inches, red (2.5YR 4/6) heavy silty clay loam; strong, medium, subangular blocky structure; friable to firm when moist; distinct clay films on peds; common mica flakes that give a shiny appearance and a greasy feel to the soil material; few, soft, weathered fragments of schist; gradual, smooth boundary.

B3t—29 to 38 inches, red (2.5YR 5/6) silty clay loam; moderate, fine, subangular blocky structure; friable when moist; many mica flakes that give a greasy feel to the soil material; many weathered fragments of schist and some quartz pebbles; gradual, wavy boundary.

C—38 to 62 inches, yellowish-red (5YR 5/8), strongly weathered schist streaked and mingled with red (2.5YR 5/8), strong brown (7.5YR 5/6), and light reddish brown (5YR 6/4); can be dug out easily and readily crushed to soft, micaceous silt loam.

The A horizon ranges from 4 to 10 inches in thickness. In areas that are not severely eroded, the color of the A horizon ranges from dark grayish brown to yellowish brown or brown. In severely eroded areas, the plow layer is red or reddish brown to yellowish red and is mainly material from the B horizons. The B horizons are predominantly red, but the color ranges to yellowish red. In the B2t horizon, the texture ranges from heavy silty clay loam to clay and the content of clay ranges from 35 to 45 percent. Fine mica flakes are scattered throughout this horizon, and they generally give a greasy feel to the soil material. The solum ranges from 30 to 45 inches in thickness. Hard rock is at a depth of 6 to 20 or more feet.

Elioak soils occur with Glenelg, Manor, Hazel, and Worsham soils. They are more reddish than any of these soils, and they contain less mica than the Glenelg soils. They have a thicker solum, have a more distinct subsoil, and contain more clay than the Manor and Hazel soils. Elioak soils are better drained than the Worsham soils.

Elioak fine sandy loam, 2 to 7 percent slopes, eroded (ElB2).—This soil has the profile described as representative of the series. The surface layer is 6 to 10 inches thick. In wooded areas it is dark grayish brown, but the color ranges to yellowish brown in cultivated fields. The subsoil ranges from 28 to 42 inches in thickness. It is predominantly red, but the color ranges to yellowish red. The content of mica varies, but most profiles have a high content of mica in the lower part of the solum. The mica in the subsoil gives the soil material a greasy feel. The underlying parent rock is strongly weathered and is highly micaceous. Included with this soil in mapping were small areas in which the surface layer is loam, other small areas in which little or no erosion has taken place, and some small areas of Seneca soils. Other inclusions consist of small areas of Manor, Hazel, and Glenelg soils.

About 80 percent of the acreage is in forest, 15 percent is in pasture, and 5 percent is in cultivated crops (fig. 4). This soil is well suited to cultivation. (Capability unit IIe–3; woodland suitability group 8)

Elioak fine sandy loam, 7 to 15 percent slopes, eroded (ElC2).—This soil is on side slopes that extend downward from the crests of ridges. The surface layer is 4 to 8 inches thick. In wooded areas it is dark grayish brown, but the color ranges to yellowish brown in cultivated areas. In most places the lower part of the subsoil is high in content of mica, and this gives the soil material a greasy feel. Included with this soil in mapping were small areas in which the surface layer is loam, and other small areas of Manor, Hazel, and Glenelg soils. Small areas of Seneca soils around the bases of slopes were also included.

Figure 4.—**Crops grown in contour strips on Elioak fine sandy loam, 2 to 7 percent slopes, eroded.**

About 85 percent of the acreage is in forest, 12 percent is in pasture, and 3 percent is in field crops. All of this acreage is suited to cultivation, but practices are needed that will protect this soil from erosion. (Capability unit IIIe–3; woodland suitability group 8)

Elioak clay loam, 2 to 7 percent slopes, severely eroded (EmB3).—This soil is on ridgetops and ridge points. It has lost nearly all of the original surface layer through erosion. The present surface layer is largely material from the subsoil. It is red or yellowish red in cultivated areas but is reddish brown in some wooded areas. Small areas included in mapping have a surface layer of silty clay loam. The subsoil is red and is 26 to 38 inches thick. It is highly micaceous in the lower part, which gives it a greasy feel. Some areas, especially where the slope breaks, contain shallow, active gullies.

About 40 percent of the acreage is in forest, 40 percent is in pasture, and 20 percent is in field crops. These soils are suited to corn, small grains, and mixed hay. (Capability unit IIIe–3; woodland suitability group 9)

Elioak clay loam, 7 to 15 percent slopes, severely eroded (EmC3).—This soil is on side slopes that extend downward from the crests of ridges. It has lost all or nearly all of the original surface layer through erosion, and tillage is now largely in the subsoil. The present surface layer is red or yellowish-red clay loam up to 3 inches thick. A few active gullies have developed. Included in mapping were small, scattered areas where the slopes are steeper than 15 percent, and small areas in which the surface layer is silty clay loam.

About 75 percent of the acreage is in forest, 20 percent is in pasture, and 5 percent is in cultivated crops. This soil is well suited to pasture and hay crops. Good management is necessary, however, if a satisfactory stand is to be established. (Capability unit IVe–2; woodland suitability group 9)

Elsinboro Series

The Elsinboro series consists of deep, well-drained soils that are gently sloping and sloping. These soils are on terraces along the Rapidan River, Mountain Run, the North Anna River, and other large streams. They have formed in alluvium consisting of sand, silt, and clay that washed from soils of uplands on the Piedmont Plateau. The native vegetation is white, black, and red oaks, yellow-poplar, black walnut, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is brown to dark-brown loam about 6 inches thick. The subsoil extends to a depth of about 42 inches and is reddish brown and brown to dark-brown clay loam. Underlying the subsoil is strong-brown light silty clay loam.

Elsinboro soils are medium acid and are medium in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are suited to all the crops commonly grown in the county.

Representative profile of Elsinboro loam, 2 to 7 percent slopes, in a pasture of bluegrass and white clover, one-fourth mile east of Willis Bridge, just off Highway No. 647 along the Rapidan River:

Ap1—0 to 2 inches, dark-brown (7.5YR 3/2) loam; weak, fine and medium, granular structure; very friable when moist; abundant fine roots; few rounded quartz pebbles; clear, smooth boundary.

Ap2—2 to 6 inches, brown to dark-brown (7.5YR 4/4) loam; weak, fine and medium, granular structure; friable when moist; common fine roots; few fine pores; clear, smooth boundary.

B1t—6 to 10 inches, brown to dark-brown (7.5YR 4/4) light very fine sandy clay loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; few, thin, patchy clay films; common fine roots; few fine pores and root channels; clear, smooth boundary.

B21t—10 to 20 inches, reddish-brown (5YR 4/4) clay loam; moderate, medium, subangular blocky structure; friable when moist, slightly sticky when wet; thin, fairly continuous clay films; common fine roots; common fine pores and fine root channels; few, black, weathered mineral concretions (probably manganese); clear, smooth boundary.

B22t—20 to 36 inches, reddish-brown (5YR 4/4) clay loam; weak, medium and coarse, subangular blocky structure; friable when moist, slightly sticky when wet; thin, fairly continuous clay films; black stains from highly weathered mineral concretions; contains a few, black, soft mineral concretions; common fine pores and fine root channels; gradual, smooth boundary.

B3t—36 to 42 inches, brown to dark-brown (7.5YR 4/4) clay loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; thin, patchy clay films; streaks of black mineral stains and common spots of black mineral stains; common, soft, weathered, black mineral concretions; few fine pores and fine root channels; gradual, smooth boundary.

C1—42 to 78 inches, strong-brown (7.5YR 5/6) light silty clay loam soil material stained with black mineral material; friable when moist; few finely divided mica flakes.

IIC2—78 inches +, stream-deposited gravel.

The A horizon ranges from 4 to 12 inches in thickness and from brown to dark brown in color. The B horizons range from 18 to 60 inches in combined thickness, from sandy clay loam to clay loam in texture, and from reddish brown to brown or dark brown in color. In a few places, small brown or black concretions are scattered throughout the B horizon. Thickness of the solum ranges from 28 to more than 40 inches. Depth to hard rock ranges from 8 to 12 feet or more.

Elsinboro soils occur with Altavista, Augusta, and Roanoke soils. They are better drained and have a more brownish profile than any of these soils.

Elsinboro loam, 2 to 7 percent slopes (EsB).—This soil has the profile described as representative of the series. In some areas a few rounded quartz pebbles are on and in the surface layer. The subsoil contains small, rounded concretions in a few places. Included with this soil in mapping were small areas in which the surface layer is fine sandy loam, and other small areas of State and Altavista soils.

About 70 percent of the acreage is in field crops, 25 percent is in pasture, and 5 percent is in forest. This soil is well suited to corn, small grains, mixed hay, and alfalfa. (Capability unit IIe–2; woodland suitability group 8)

Elsinboro loam, 2 to 7 percent slopes, eroded (EsB2).—The surface layer of this soil is 4 to 9 inches thick. In some areas a few quartz pebbles are scattered over the surface and throughout the surface layer. Some areas in which the surface layer is fine sandy loam were included in mapping. Also included were small areas of an Altavista loam and about 15 acres of an Elsinboro clay loam that has lost all or nearly all of its original surface layer through erosion.

About 63 percent of the acreage is in field crops, 30 percent is in pasture, and 7 percent is in forest. If properly managed, this soil is well suited to corn, small grains, mixed hay, and alfalfa. (Capability unit IIe–2; woodland suitability group 8)

Elsinboro loam, 7 to 15 percent slopes, eroded (EsC2).—This soil has a thinner solum than the soil for which a profile is described as representative of the series. The surface layer is only 4 to 7 inches thick, and the subsoil is 18 to 36 inches thick. In a few areas, gravel is scattered over the surface and throughout the surface layer. In most places the profile contains a layer of gravel at a depth of 18 to 36 inches. A few areas in which the surface layer is fine sandy loam were included with this soil in mapping. About 3 acres in which the soil has been noticeably affected by erosion, and 43 acres of a severely eroded Elsinboro clay loam were also included.

About 48 percent of the acreage is in pasture, 37 percent is in field crops, and 15 percent is in forest. This soil is suited to all the crops commonly grown in the county. If properly managed, it is well suited to corn, small grains, mixed hay crops, and alfalfa. (Capability unit IIIe–2; woodland suitability group 8)

Fauquier Series

In the Fauquier series are deep, well-drained, gently sloping to moderately steep soils of Piedmont uplands. These soils occur in one small strip west of Old Somerset, where they have formed in material weathered from dark, basic greenstone, or metabasite. The native vegetation is white, red, scarlet, and black oaks, yellow-poplar, hickory, dogwood, redbud, black walnut, beech, black locust, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is reddish-brown silt loam about 5 inches thick. The subsoil is red to dark-red silty clay to clay and silty clay loam. This layer is mottled in the lower part. Mottled, red silt loam is at a depth of about 38 inches.

Fauquier soils are medium acid, medium to high in content of organic matter, and medium in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are used for general crops and pasture.

Representative profile of Fauquier silt loam, 2 to 7 percent slopes, eroded, in a forest of mixed hardwoods, 1 mile west of Old Somerset along Highway No. 20:

O1—¾ to ⅛ inch, undecomposed forest litter.

O2—⅛ inch to 0, dark reddish-brown (2.5YR 3/4), partly decomposed leaf litter; clear, smooth boundary.

A2—0 to 5 inches, reddish-brown (2.5YR 4/4) silt loam; strong, medium, granular structure; very friable when moist; many fine and medium roots; many fragments of greenstone less than one-half inch in diameter; gradual, smooth boundary.

B1t—5 to 14 inches, red (2.5YR 4/6) silty clay loam; moderate, fine and medium, subangular blocky structure; friable when moist; few thin clay films; medium and coarse roots; few, small, weathered fragments of greenstone; gradual, smooth boundary.

B2t—14 to 26 inches, red (2.5YR 4/6) silty clay to clay; moderate, medium, subangular blocky structure; friable to firm when moist, hard when dry, sticky and plastic when wet; common, distinct, continuous clay films; few, small, weathered fragments of greenstone; gradual, wavy boundary.

B3t—26 to 38 inches, dark-red (2.5YR 3/6) silty clay loam mottled with reddish yellow (7.5YR 6/8) and reddish brown (5YR 4/4); moderate, fine and medium, subangular blocky structure; friable when moist; few, thin, patchy clay films; many black streaks; many fragments of greenstone; clear, wavy boundary.

C—38 to 62 inches, red (2.5YR 5/6) silt loam mottled with yellowish red (5YR 4/8) and strong brown (7.5 YR 5/8); friable when moist; silty clay loam soil material between the cleavage planes of weathered greenstone.

The A horizon ranges from 4 to 9 inches in thickness. Color of the A horizon ranges from dark reddish brown and reddish brown to dark red in most areas, but the surface layer appears to be reddish black in wooded areas, where the soil material is stained by organic matter. In severely eroded areas, the B1t horizon of red silty clay loam is exposed. The B horizons range from silty clay loam to clay in texture and from red to dark red in color. The content of clay in the B horizons ranges from 35 to 50 percent. In the lower part of the profile, base saturation is greater than 35 percent. Thickness of the solum ranges from 28 to 40 inches. The parent material is generally weathered from chloritic greenstone schist. Depth to hard rock ranges from 8 feet to more than 20 feet.

The Fauquier soils occur with Myersville, Catoctin, and Starr soils. They have a higher content of clay and are more reddish than the Myersville and Catoctin soils, and they have more clearly defined horizons and contain more clay than the Starr soils.

Fauquier silt loam, 2 to 7 percent slopes, eroded (FaB2).—This soil has the profile described as representative of the series. The surface layer is 4 to 9 inches thick. The subsoil is red or dark red and is 28 to 48 inches thick. Small areas of Catoctin and Myersville soils, and small, scattered areas of an uneroded Fauquier soil, were included with this soil in mapping.

About 60 percent of the acreage is in field crops, 30 percent is in pasture, and 10 percent is in forest. This soil is suited to all the crops commonly grown in the county. (Capability unit IIe–1; woodland suitability group 6)

Fauquier silt loam, 7 to 15 percent slopes, eroded (FaC2).—This soil is on side slopes that extend downward from the crests of ridges. It has a surface layer 4 to 7 inches thick and a subsoil 24 to 42 inches thick. Included in mapping were small areas of Myersville and Catoctin soils; a few areas of severely eroded Fauquier soils; and a few rock outcrops, indicated on the soil map by an appropriate symbol.

About 45 percent of the acreage is in pasture, 38 percent is in cultivated crops, and 17 percent is in forest. This soil is well suited to all the crops commonly grown in the county, but careful management is necessary to prevent further serious erosion. (Capability unit IIIe–1; woodland suitability group 6)

Fauquier silty clay loam, 4 to 20 percent slopes, severely eroded (FcC3).—This soil is on sloping ridgetops and on side slopes that extend downward from ridge crests. It has lost all or nearly all of the original surface layer through erosion. The present surface layer is dark reddish brown to dark red and is up to 4 inches thick. The subsoil is 24 to 40 inches thick. Small spots of a Catoctin silt loam were included with this soil in mapping.

About 60 percent of the acreage is in pasture, 30 percent is in field crops, and 10 percent is in forest. This soil is better suited to pasture and hay crops than to cultivated crops. (Capability unit IVe–1; woodland suitability group 7)

Fluvanna Series

In the Fluvanna series are deep, well-drained, gently sloping and sloping soils of Piedmont uplands. These soils are near Wilderness and Lahore, where they have formed in material weathered from hornblende schist and gneiss. The native vegetation is red, white, and black oaks, hickory, dogwood, shortleaf pine, and Virginia pine.

In a typical profile, the surface is predominantly light yellowish-brown and strong-brown silt loam about 8 inches thick. The subsoil extends to a depth of about 39 inches. The major part of the subsoil is yellowish-red clay, but the soil material grades to mottled silty clay loam at a depth of about 29 inches.

Fluvanna soils are medium acid to strongly acid. They are medium in content of organic matter and low in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are used largely for pasture and forests.

Representative profile of Fluvanna silt loam, 2 to 7 percent slopes, in a forest of mixed pines and hardwoods, 1½ miles east of Verdiersville, along Highway No. 692:

O1—1¼ inches to ¼ inch, undecomposed forest litter, leaves, twigs, and sticks.

O2—¼ inch to 0, very dark brown (10YR 2/2), partly decomposed leaf litter; abrupt, clear boundary.

A1—0 to ¼ inch, grayish-brown (2.5Y 5/2) silt loam; weak, very fine, granular structure; very friable when moist; abrupt, smooth boundary.

A2—¼ inch to 5 inches, light yellowish-brown (10YR 6/4) silt loam; moderate, fine, granular structure; very friable when moist; many fine and medium roots; 5 to 10 percent of horizon is angular quartz pebbles; clear, smooth boundary.

A3—5 to 8 inches, strong-brown (7.5YR 5/6) silt loam; weak, fine, subangular blocky structure; friable when moist; many fine and medium roots; few quartz pebbles; gradual, smooth boundary.

B1t—8 to 11 inches, reddish-brown (5YR 5/4) clay loam; moderate, medium, subangular blocky structure; friable when moist, hard when dry; few, thin, discontinuous clay films; many fine and medium roots; few fine pores; few quartz pebbles; gradual, smooth boundary.

B21t—11 to 18 inches, yellowish-red (5YR 5/6) clay; strong, medium, subangular blocky structure; firm when moist, hard when dry, slightly sticky and slightly

plastic when wet; many, thin, continuous clay films; many large and medium roots; gradual, smooth boundary.

B22t—18 to 29 inches, yellowish-red (5YR 4/8) clay; strong, coarse and medium, subangular blocky structure; firm when moist, hard when dry, sticky and plastic when wet; many prominent clay films; some black streaks on cut surfaces; gradual, smooth boundary.

B3t—29 to 39 inches, yellowish-red (5YR 4/8) silty clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/6), red (2.5YR 4/8 and 10R 4/8), and reddish yellow (7.5YR 6/8); moderate, fine, subangular blocky structure; friable when moist; contains some black mineral concretions and many fragments of weathered basic rock; gradual, wavy boundary.

C—39 to 62 inches, brown (7.5YR 5/4) silty clay loam soil material mottled with yellowish brown (10YR 5/6) and yellowish red (5YR 4/6); slightly sticky and slightly plastic when wet; few pockets of clay; few clay films along cracks and in crevices; many fragments of weathered basic rock.

The A horizon ranges from 2 to 9 inches in thickness. Many areas have quartz pebbles scattered on and in the surface layer, but these pebbles are not numerous enough to interfere with tillage. The B2t horizons range from yellowish red to strong brown in color and from clay loam to clay in texture. Thickness of the solum ranges from 28 to 56 inches, but it is about 40 inches in most places. Depth to hard rock ranges from 5 to 8 feet.

Fluvanna soils occur with Lloyd, Orange, Elbert, and Bremo soils. They have a less reddish profile than the Lloyd soils and have a more reddish profile, are better drained, and are less plastic than the Orange and Elbert soils. Fluvanna soils are deeper, have a more reddish profile, contain much more clay, and have more clearly defined horizons than the Bremo soils.

Fluvanna silt loam, 2 to 7 percent slopes (FlB).—This soil has the profile described as representative of the series. Included in mapping were small areas of Lloyd, Orange, and Nason soils.

About 80 percent of the acreage is in forest, 15 percent is in cultivated crops, and 5 percent is in pasture. This soil is well suited to the crops commonly grown in the county. (Capability unit IIe-4; woodland suitability group 13)

Fluvanna silt loam, 2 to 7 percent slopes, eroded (FlB2).—This soil is on ridgetops. The surface layer, only 3 to 7 inches thick, is thinner than the one in the profile described as representative of the series. It is light yellowish brown or yellowish brown. Small areas of Lloyd, Orange, and Nason soils were included with this soil in mapping.

About 55 percent of the acreage is in cultivated crops, 25 percent is in pasture, and 20 percent is in forest. This soil is well suited to the crops commonly grown in the county. (Capability unit IIe-4; woodland suitability group 13)

Fluvanna silt loam, 7 to 15 percent slopes, eroded (FlC2).—This soil is on side slopes near the crests of ridges. The surface layer is light yellowish-brown or yellowish-brown silt loam 2 to 5 inches thick. Included with this soil in mapping were small areas of a Bremo silt loam and a few rock outcrops.

About 45 percent of the acreage is in pasture, 40 percent is in forest, and 15 percent is in cultivated crops. This soil is suited to the crops commonly grown in the county. (Capability unit IIIe-4; woodland suitability group 13)

378-847—71——3

Glenelg Series

The Glenelg series consists of deep, well-drained, gently sloping and sloping soils of Piedmont uplands in the western part of the county. These soils have formed in material weathered from fine-grained schist. The native vegetation is white, scarlet, red, and black oaks, hickory, beech, blackgum, mountain-laurel, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown to strong-brown loam about 7 inches thick. The subsoil is mainly strong-brown to yellowish-red silty clay loam, but it is yellowish-red silt loam between depths of 30 and 36 inches.

Glenelg soils are very strongly acid, low in content of organic matter, and medium to low in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is moderate to high.

These soils are used for field crops, pasture, and forests.

Representative profile of Glenelg loam, 2 to 7 percent slopes, eroded, in a forest of Virginia pine, 2 miles south of Scuffletown:

O1—1 to ½ inch, undecomposed pine needles.

O2—½ inch to 0, very dark grayish-brown (10YR 3/2), partly decomposed leaf litter; clear, smooth boundary.

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) loam; very fine granular structure; very friable when moist; many fine and medium roots; few fragments of quartz the size of pebbles; gradual, wavy boundary.

A2—2 to 4 inches, brown to dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable when moist; numerous roots; clear, smooth boundary.

A3—4 to 7 inches, strong-brown (7.5YR 5/6) loam; moderate, fine, granular structure; friable when moist; many fine and medium roots; few fine mica flakes; few small fragments of quartz; gradual, smooth boundary.

B1t—7 to 11 inches, strong-brown (7.5YR 5/6) silty clay loam; weak, fine, subangular blocky structure; friable when moist; few, thin, patchy clay films; few medium roots; few fine mica flakes; gradual, smooth boundary.

B21t—11 to 22 inches, yellowish-red (5YR 5/6) silty clay loam; few, fine, distinct mottles of strong brown (7.5YR 5/6); moderate, fine and medium, subangular blocky structure; friable when moist; few clay films; few medium roots; many fine mica flakes that give a greasy feel to the soil material; a few quartz pebbles; gradual, smooth boundary.

B22t—22 to 30 inches, yellowish-red (5YR 4/6) silty clay loam; some strong-brown (7.5YR 5/6) streaks; moderate, medium, subangular blocky structure; friable when moist; clay films on most of the peds; many fine mica flakes that give a shiny appearance and a greasy feel to the soil material; a few fragments of weathered schist; gradual, smooth boundary.

B3—30 to 36 inches, yellowish-red (5YR 4/6) heavy silt loam; few, fine, distinct mottles of red (2.5YR 4/6) and a few black mineral stains; weak, fine, subangular blocky structure; friable when moist; numerous fine mica flakes that give a shiny appearance and a greasy feel to the soil material; few fragments of quartz and many small fragments of weathered schist; gradual, smooth boundary.

C—36 to 62 inches, reddish-brown (5YR 5/3) and strong-brown (7.5YR 5/6), highly micaceous silt loam; weak platy structure similar to that in the underlying schist; very friable when moist; many fragments of schist and quartz.

The A horizon ranges from 5 to 10 inches in thickness. It is dark grayish brown, brown, strong brown, or yellowish

brown. The B1 and B2 horizons range from strong brown or yellowish brown to yellowish red in color and from 18 to 30 inches in combined thickness. The solum ranges from 28 to 42 inches in thickness. The underlying micaceous material is deeply weathered. Depth to hard rock ranges from 10 to 20 feet or more.

The Glenelg soils occur with Manor and Elioak soils. They have a higher content of clay and a more clearly defined subsoil than the Manor soils, and they have less reddish profile, less clay in the subsoil, and more mica flakes in the subsoil than the Elioak soils.

Glenelg loam, 2 to 7 percent slopes, eroded (GlB2).—This soil has the profile described as representative of the series. Included with it in mapping were small areas of Manor and Elioak soils, and small areas of Glenelg soils that have a surface layer of fine sandy loam or silt loam.

About 40 percent of the acreage is in pasture, 38 percent is in field crops, and 22 percent is in forest. This soil is well suited to the crops commonly grown in the area. (Capability unit IIe-3; woodland suitability group 10)

Glenelg loam, 7 to 15 percent slopes, eroded (GlC2).—This soil is on side slopes of smooth ridgetops. Except that it is eroded, it has a profile similar to the one described as representative of the series. Included in mapping were small areas of a Glenelg soil that has a surface layer of silt loam, and small areas of Elioak and Manor soils.

About 43 percent of the acreage is in pasture, 31 percent is in forest, and 26 percent is in field crops. This soil is suitable for cultivation. (Capability unit IIIe-3; woodland suitability group 10)

Grover Series

In the Grover series are deep, well-drained, gently sloping and sloping soils of Piedmont uplands. These soils occur only in the southern part of the county near Thornhill. They have formed in material weathered from coarse-grained granite gneiss. The native vegetation is red, white, and black oaks, hickory, persimmon, yellow-poplar, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown to brownish-yellow sandy loam about 6 inches thick. The subsoil is predominantly yellowish-red, micaceous sandy clay loam and clay loam. It is underlain by multicolored, soft, strongly weathered rock material at a depth of about 35 inches. The hardness of the material weathered from rock increases with increasing depth.

The Grover soils are very strongly acid and are low in content of organic matter and in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is moderate to high.

These soils are used for growing general crops.

Representative profile of Grover sandy loam, 2 to 7 percent slopes, eroded, in a pasture of mixed legumes and grasses, 2 miles southeast of Thornhill just off Highway No. 612:

Ap1—0 to 4 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, fine, granular structure; very friable when moist; many fine roots; clear, smooth boundary.

Ap2—4 to 6 inches, brownish-yellow (10YR 6/6) sandy loam; moderate, fine, granular structure; very friable when moist; many fine roots; gradual, wavy boundary.

B1t—6 to 11 inches, strong-brown (7.5YR 5/6) coarse sandy clay loam; weak, fine, subangular blocky structure; friable when moist; common fine roots; numerous fragments of quartz the size of coarse sand; few fine mica flakes; gradual, smooth boundary.

B21t—11 to 17 inches, yellowish-red (5YR 5/6) sandy clay loam; moderate, fine, subangular blocky structure; friable when moist; a few, thin, patchy clay films; many particles of sand and fine fragments of quartz the size of pebbles; common fine mica flakes; gradual, smooth boundary.

B22t—17 to 27 inches, yellowish-red (5YR 4/8) clay loam; moderate, medium to coarse, subangular blocky structure; friable when moist; few distinct clay films; many fine mica flakes that give a greasy feel to the soil material; gradual, smooth boundary.

B3—27 to 35 inches, yellowish-red (5YR 4/6) loam streaked with red (2.5YR 4/6); weak, fine, subangular blocky structure; friable when moist; many fragments of weathered granitic rock; numerous mica flakes that give a greasy feel to the soil material; gradual, smooth boundary.

C—35 to 75 inches, multicolored, soft, strongly weathered granite gneiss; sandy loam soil material; hardness increases with depth; many mica flakes.

In areas that are not severely eroded, the A horizon ranges from 4 to 12 inches in thickness and from dark grayish brown to light yellowish brown or brownish yellow in color. In severely eroded areas where the B horizon is exposed, the surface horizon is strong-brown or yellowish-red sandy clay loam or clay loam. The B2 horizons range from yellowish red to strong brown in color and from micaceous sandy clay loam to clay loam in texture. Thickness of the solum ranges from 20 to 40 inches. The C horizon is micaceous and is strongly weathered. Depth to hard rock ranges from 5 to more than 10 feet.

Grover soils occur with Louisburg, Madison, and Worsham soils. They are deeper over bedrock than the Louisburg soils, and their subsoil is more clearly defined, has a higher content of clay, and contains more mica than the subsoil of the Louisburg soils. The Grover soils are less reddish than the Madison soils, and they are much better drained than the Worsham soils.

Grover sandy loam, 2 to 7 percent slopes, eroded (GrB2).—This soil has the profile described as representative of the series. In most places it has a high content of mica, though the amount of mica varies from place to place. The mica gives the material in the subsoil a shiny appearance and a slick, greasy feel. Some areas in which the surface layer is fine sandy loam or loam were included in mapping. The texture of the subsoil is generally sandy clay loam, but areas in which it is light clay were also included. Other inclusions consist of small, scattered areas of Appling and Madison soils, and a small acreage of a Grover soil that is not eroded or is only slightly eroded.

About 35 percent of the acreage is in forest, another 35 percent is in cultivated crops, and 30 percent is in pasture. All of the acreage is suited to cultivated crops. (Capability unit IIe-3; woodland suitability group 10)

Grover sandy loam, 7 to 15 percent slopes, eroded (GrC2).—This soil is on sloping ridges and on side slopes near the tops of ridges. The surface layer is 4 to 8 inches thick. Small areas of a Grover loam and of a Grover fine sandy loam were included in mapping. Also included were areas in which a few shallow gullies occur, and a few areas where bedrock crops out at the surface and where quartz pebbles are strewn over the surface. Other inclusions consist of small areas of Appling soils.

About 56 percent of the acreage is in forest, 28 percent is in field crops, and 16 percent is in pasture. This soil is well suited to small grains and hay. (Capability unit IIIe-3; woodland suitability group 10)

Grover sandy clay loam, 7 to 15 percent slopes, severely eroded (GsC3).—This soil is on side slopes near drainageways. It has lost all, or nearly all, of the original surface layer through erosion. The present surface layer is yellowish red or reddish yellow to strong brown. In cultivated areas, the plow layer is 4 to 6 inches thick. The subsoil is 10 to 24 inches thick. It contains a large amount of mica and has a greasy feel. Areas of this soil contain shallow, active gullies that are easily seen. Included with this soil in mapping were small areas where the plow layer is clay loam, and small areas of Louisburg soils.

About 54 percent of the acreage is in forest, 38 percent is in pasture, and 8 percent is in field crops. This soil is better suited to pasture and trees than to field crops. It is not suited to cultivated crops. (Capability unit IVe–2; woodland suitability group 11)

Hazel Series

In the Hazel series are excessively drained, sloping to steep soils that are shallow to moderately deep over bedrock. These soils are on Piedmont uplands in the western part of the county. They have formed in material weathered from phyllite, sandstone, and schist. The native vegetation is white, black, red, and chestnut oaks, hickory, dogwood, blackgum, and Virginia pine.

In a typical profile, the surface layer is dark-brown and brown loam about 13 inches thick. The subsoil is brown to dark-brown very fine sandy loam that extends to a depth of about 20 inches. It is underlain by loamy soil material containing numerous fragments of rock. Hard sandstone is at a depth of about 30 inches.

The Hazel soils are strongly acid and are low in content of organic matter and in natural fertility. Infiltration and permeability are both moderately rapid. Leaching takes place at a rapid rate, and these soils do not retain added plant nutrients well. The available moisture capacity is moderate.

These soils are better suited to trees than to field crops or pasture. They are not suited to crops that require cultivation.

Representative profile of Hazel loam, 7 to 15 percent slopes, in a forest of mixed hardwoods 2½ miles west of Old Somerset and east of Highway No. 609:

O2—1 inch to 0, very dark brown (10YR 2/2), partly decomposed forest litter; abrupt, smooth boundary.

A1—0 to 4 inches, dark-brown (10YR 3/3) loam; weak, very fine, granular structure; very friable when moist; many fine and medium roots; abrupt, smooth boundary.

A2—4 to 13 inches, brown (10YR 5/3) loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; few fragments of quartz; gradual, smooth boundary.

B—13 to 20 inches, brown to dark-brown (7.5YR 4/4) very fine sandy loam; few, fine, faint mottles of yellowish red (5YR 5/6); weak, fine, granular structure; friable when moist; few roots; 15 percent of horizon is weathered fragments of sandstone; few fine mica flakes; some fragments of schist; few pockets of silt loam material; abrupt, wavy boundary.

C—20 to 30 inches, brown (10YR 5/3), weathered, loamy soil material; few pockets of red clay along crevices of rocks; about 40 percent of horizon is fragments of weathered rock up to 2 inches in diameter; structureless; few fine mica flakes; abrupt, wavy boundary.

R—30 inches +, hard sandstone.

The A horizon ranges from 6 to 15 inches in thickness and from dark brown to brown in color. The B horizon is weakly defined, is 6 to 8 inches thick, and generally contains less than 18 percent clay. It is generally brown or dark brown, but the color ranges to strong brown mottled with yellowish red. The texture of the B horizon normally ranges from very fine sandy loam to loam, but this horizon in some places contains thin lenses of light clay loam. As much as 40 percent of the C horizon is fragments of weathered schist and sandstone, but the rest of this horizon is material that weathered from these rocks. Hard rock is at a depth of 20 to 48 inches.

Hazel soils occur with Elioak, Glenelg, and Manor soils. They have a lower content of clay and are shallower over bedrock than the Elioak and Glenelg soils. They are coarser textured than the Manor soils and lack the high content of mica that is typical in the Manor soils.

Hazel loam, 7 to 15 percent slopes (HaC).—This soil has the profile described as representative of the series. It is on the tops of ridges and on side slopes near the tops of ridges. The surface layer is 8 to 15 inches thick. Some areas in which the surface layer is silt loam or fine sandy loam were included in mapping. Also included were small areas where the subsoil is yellowish-red or yellowish-brown silt loam or light clay loam. Other inclusions consist of small areas of Elioak and Manor soils.

About 77 percent of the acreage is in forest, 18 percent is in pasture, and 5 percent is in field crops. This soil is better suited to pasture and trees than to field crops. It is not suited to cultivated crops. (Capability unit IVe–3; woodland suitability group 4)

Hazel loam, 15 to 30 percent slopes (HaD).—This soil is along bluffs that border streams, and it is also near drainageways that lead from ridges. The surface layer is 6 to 10 inches thick. Scattered areas of a Hazel soil that has a surface layer of silt loam, and other areas of a Hazel soil that has a surface layer of fine sandy loam, were included in mapping. Also included were areas where a few fragments of quartz and schist are strewn over the surface; a few eroded areas; and areas of rock outcrops, which are indicated on the soil map by an appropriate symbol. Other inclusions consist of small areas in which the profile is less than 20 inches thick over bedrock; a few small areas of very severely eroded Elioak soils; and small areas of Manor soils.

About 77 percent of the acreage is in forest, and the rest is in pasture. This soil is better suited to pasture and trees than to field crops. It is not suited to cultivated crops. (Capability unit VIe–2; woodland suitability group 4)

Helena Series

The Helena series consists of deep, moderately well drained or somewhat poorly drained, gently sloping and sloping soils of Piedmont uplands. These soils occur in small areas near Locustgrove and Lahore, where they have formed in material weathered from mixed basic and acidic granite and diorite. The native vegetation is red, post, white, and black oaks, gum, redcedar, dogwood, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown and grayish-brown fine sandy loam about 8 inches thick. The subsoil extends to a depth of about 37 inches and consists of mottled, yellowish-brown and light olive-brown silty clay loam to clay. It is underlain by mottled, loamy material. Hard rock is at a depth of 58 inches.

The Helena soils are medium acid to very strongly acid and are low in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is moderate.

These soils are used mainly for pasture and forest.

Representative profile of Helena fine sandy loam, 2 to 7 percent slopes, in a forest of young pines on the east side of U.S. Highway No. 522; one-fourth mile south of the junction of Highways No. 650 and No. 522:

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, very fine, granular structure; very friable when moist; many fine and medium roots; 5 percent of horizon is quartz pebbles up to 3 inches in diameter; gradual, smooth boundary.

A2—5 to 8 inches, grayish-brown (10YR 5/2) fine sandy loam; moderate, fine, granular structure; friable when moist; many fine pores; few quartz pebbles; many grains of coarse sand; abrupt, smooth boundary.

B1t—8 to 16 inches, yellowish-brown (10YR 5/6) silty clay loam; few, fine, distinct mottles of strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and dark yellowish brown (10YR 4/4); moderate, medium, subangular blocky structure; firm when moist, hard when dry, slightly sticky and slightly plastic when wet; many clay films; few fine roots and common coarse and medium roots; common fine mica flakes; gradual, smooth boundary.

B2t—16 to 28 inches, light olive-brown (2.5Y 5/4) clay; common, medium, distinct mottles of dark yellowish brown (10YR 4/4), strong brown (7.5YR 5/6), and olive gray (5Y 5/2); massive to weak, coarse, prismatic structure; firm when moist, hard when dry, very plastic and sticky when wet; clay films in all the cracks and crevices; few mica flakes; gradual, smooth boundary.

B3t—28 to 37 inches, yellowish-brown (10YR 5/4) clay; common, medium, distinct mottles of olive (5Y 5/3), light olive gray (5Y 6/2), and strong brown (7.5YR 5/8); few black streaks; massive to weak, coarse, prismatic structure; firm when moist, hard when dry, plastic and sticky when wet; clay films along vertical cracks; about 40 percent of horizon is fragments of weathered rock; gradual, wavy boundary.

C—37 to 58 inches, light olive-brown (2.5Y 5/4) loamy soil material mottled with yellowish brown (10YR 5/4), strong brown (7.5YR 5/8), and olive gray (5Y 5/2); firm in place; hardness increases with depth; numerous fragments of diorite and granite.

R—58 inches +, hard rock.

The A horizon ranges from 2 to 10 inches in thickness. It is dark grayish brown or grayish brown in wooded areas, but the color ranges to light yellowish brown in cultivated fields. The B horizons are mottled yellowish brown, light olive brown, yellowish red, olive gray, and strong brown. The B2t horizon ranges from 12 to more than 30 inches in thickness. The solum is 20 to 60 inches thick. The material in the C horizon varies, but that horizon is predominantly material that weathered from basic and acidic rocks. Depth to hard rock ranges from 3 to 5½ feet.

The Helena soils occur with Cecil, Lloyd, and Wilkes soils. They are less reddish throughout and are less well drained than the Cecil and Lloyd soils. Helena soils are deeper over bedrock than the Wilkes soils, and they are not excessively drained like those soils. Also, their subsoil is more distinct and contains more clay than the subsoil of the Wilkes soils.

Helena fine sandy loam, 2 to 7 percent slopes (HeB).—This soil has the profile described as representative of the series. The surface layer is 6 to 10 inches thick. Small areas where the surface layer is loam, and other small areas where the surface layer is sandy loam were included in mapping. Also included were areas where a few angular quartz pebbles are scattered over the surface and throughout the solum, and small, scattered areas of Orange, Iredell, and Vance soils.

About 61 percent of the acreage is in forest, 24 percent is in pasture, and 15 percent is in field crops. This soil is not well suited to cultivated crops, but it is suited to small grains and to red clover and other hay crops, except alfalfa. (Capability unit IIIe–5; woodland suitability group 13)

Helena fine sandy loam, 2 to 10 percent slopes, eroded (HeC2).—This soil has lost a large part of its surface layer through erosion, and there are some shallow gullies. The present surface layer is only 2 to 6 inches thick. A few areas where the subsoil contains less clay and is less plastic when wet than the subsoil in the profile described as typical of the series were included in mapping. Also included were small areas where the surface layer is loam, sandy loam, or light clay loam, and a few areas of Vance, Orange, Iredell, and Wilkes soils.

About 67 percent of the acreage is in forest, 28 percent is in pasture, and 5 percent is in field crops. This soil is not well suited to cultivated crops. It is suitable for pasture, forest, small grains, or some kinds of grasses and legumes grown for hay, but it is not suited to alfalfa. (Capability unit IVe–4; woodland suitability group 13)

Hiwassee Series

In the Hiwassee series are deep, well-drained soils that are gently sloping or sloping. These soils are on high terraces along the Rapidan River, Mountain Run, Pamunkey Creek, and other large streams. They have formed in old alluvium consisting of sand, silt, clay, and cobblestones washed from soils of the Piedmont Plateau. The native vegetation is black, red, white, and scarlet oaks, black walnut, black locust, yellow-poplar, dogwood, hickory, redbud, and pine.

In a typical profile, the surface layer is dark reddish-brown loam to heavy silt loam about 9 inches thick. The subsoil is dark-red clay and silty clay loam, and it extends to a depth of several feet.

The Hiwassee soils are strongly acid to medium acid. They are fairly high in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are among the soils of the county that are the best suited to the commonly grown crops.

Representative profile of Hiwassee loam, 2 to 7 percent slopes, in a cultivated field along Highway No. 231, near Liberty Mills Bridge on the Rapidan River:

Ap—0 to 9 inches, dark reddish-brown (5YR 3/4) loam to heavy silt loam; moderate, fine, granular structure; friable when moist, slightly sticky and slightly plastic when wet; clear, abrupt boundary.

B1t—9 to 12 inches, dark reddish-brown (5YR 3/4) clay loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few black manganese concretions; clear, abrupt boundary.

B21t—12 to 30 inches, dark-red (10YR 3/6) clay; moderate, fine, subangular blocky structure; firm when moist, sticky and plastic when wet; thin, patchy clay films; few fine pores; common, small, black manganese concretions; few fragments of quartz; gradual, smooth boundary.

B22t—30 to 42 inches, dark-red (10YR 3/6 to 2.5YR 3/6) clay; moderate, fine and medium, subangular blocky struc-

ture; firm when moist, sticky and plastic when wet; thin, patchy clay films on the surfaces of most peds; few fine roots; few finely divided mica flakes; few rounded fragments of quartz the size of pebbles; common, small, black manganese concretions; common polished sand grains; gradual, smooth boundary.

B3t—42 to 60 inches, dark-red (2.5YR 3/6) silty clay loam; few, medium, distinct mottles of red (2.5YR 4/6) and reddish yellow (5YR 6/8); weak, fine, subangular blocky structure; friable when moist; thin, patchy clay films; a few fine roots; rounded and angular fragments of quartz the size of pebbles make up 2 percent, by volume, of this horizon; few to common, small, black manganese concretions; few finely divided mica flakes; strongly acid to medium acid; gradual, wavy boundary.

IIC—60 inches +, stone line consisting of rounded and angular quartz and quartzite pebbles and cobblestones, and a 5 percent admixture of mottled yellowish-red, yellowish-brown, strong-brown, and red, clayey soil material that grades, with depth, to beds of gravel consisting of quartz and quartzite.

The A horizon ranges from 4 to 12 inches in thickness. It is dark reddish brown, except in severely eroded areas, where the dark-red subsoil is exposed. In these severely eroded areas the texture ranges to clay loam. The B horizons range from 40 to more than 60 inches in combined thickness. In the B2t horizons, the content of clay ranges from 40 to 60 percent. In the B3t horizon, it ranges from 25 to 40 percent. Depth to hard rock ranges from 10 to more than 30 feet.

The Hiwassee soils occur with Masada and Turbeville soils. They have a more reddish surface layer and subsoil and a finer textured profile than the Masada soils, and they have a darker colored surface layer and upper subsoil than the Turbeville soils.

Hiwassee loam, 2 to 7 percent slopes (HsB).—This soil has the profile described as representative of the series. The surface layer is 8 to 12 inches thick. In a few places, waterworn pebbles are strewn over the surface, but these pebbles are not numerous enough to interfere with tillage. Included with this soil in mapping were small areas of Turbeville and Starr soils.

About 95 percent of the acreage is in field crops and pasture, and 5 percent is in forest. This soil is among those in the county that are best suited to crops, including alfalfa. (Capability unit IIe–1; woodland suitability group 6)

Hiwassee loam, 2 to 7 percent slopes, eroded (HsB2).—This soil has a profile similar to the one described as representative of the series, except that the surface layer is only 4 to 8 inches thick and is reddish brown in places. In a few places, waterworn pebbles are strewn over the surface, but the pebbles are not numerous enough to interfere with tillage. Small areas in which the surface layer is silt loam or clay loam, and small areas of Turbeville and Starr soils, were included in mapping.

About 95 percent of the acreage is in field crops and pasture, and 5 percent is in forest. This soil is among those in the county best suited to the commonly grown crops, including alfalfa. (Capability unit IIe–1; woodland suitability group 6)

Hiwassee loam, 7 to 15 percent slopes, eroded (HsC2).—This soil is on narrow ridgetops and on side slopes near drainageways that extend downward from the smooth crests of terraces. It has lost most of the original surface layer through erosion. The present surface layer is dark reddish brown and is only 4 to 8 inches thick. Some areas contain a few shallow gullies, and in places gravel is strewn over the surface. Small areas in which the surface layer is silt loam were included in mapping. Also included were small, scattered areas where little or no erosion has taken place, and a few areas where the slopes are steeper than 15 percent.

About 90 percent of the acreage is in field crops and pasture, and 10 percent is in forest. This soil is well suited to the commonly grown crops, especially to alfalfa and other hay crops. (Capability unit IIIe–1; woodland suitability group 6)

Hiwassee clay loam, 4 to 15 percent slopes, severely eroded (HwC3).—This soil has lost all or nearly all of its original surface layer through erosion. The present surface layer is no thicker than 4 inches, and it consists largely of material from the subsoil. Included in mapping were a few areas in which the surface layer is clay; small gullied spots; a few areas that are moderately steep; and small areas of severely eroded Turbeville soils.

About 60 percent of the acreage is in pasture, 30 percent is in field crops, and 10 percent is in forest. This soil is better suited to pasture and permanent hay than to crops that require cultivation. It is difficult to keep in good tilth and is subject to heaving in winter. (Capability unit IVe–1; woodland suitability group 7)

Iredell Series

The Iredell series consists of deep, moderately well drained, nearly level or gently sloping soils of the Piedmont Plateau. These soils are on upland flats near Lahore, where they have formed in material that weathered from basic diorite and hornblende gneiss. The native vegetation is red, black, white, pin, and willow oaks, redcedar, red maple, hickory, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil extends to a depth of about 41 inches. The major part of the subsoil is olive-brown and light olive-brown, plastic clay. The profile is distinctly mottled below a depth of about 37 inches.

Iredell soils are medium acid, medium in content of organic matter, and high in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is moderate.

Iredell soils were not mapped separately in this county. They were mapped only in complexes with the Orange soils. For descriptions of these complexes, see the Orange series.

Representative profile of Iredell silt loam, 0 to 2 percent slopes, in a field of orchardgrass grown for hay, one-fourth mile north of Lahore along Highway No. 669:

Ap—0 to 8 inches, dark grayish-brown (2.5Y 4/2) silt loam; weak, very fine, granular structure; very friable when moist; many fine roots; few black concretions; common grains of very fine sand; a few quartz pebbles up to 3 inches in diameter; clear, smooth boundary.

B1t—8 to 11 inches, light brownish-gray (2.5Y 6/2) sandy clay loam; light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; friable when moist; many fine and medium roots; few black mineral concretions; many grains of coarse sand; few quartz pebbles; abrupt, smooth boundary.

B2t—11 to 37 inches, olive-brown (2.5Y 4/4) clay; massive when wet, coarse angular blocky structure when dry; firm when moist, very hard when dry, plastic

and sticky when wet; many prominent clay films along all cracks and crevices; few quartz pebbles; gradual, smooth boundary.

B3t—37 to 41 inches, light olive-brown (2.5Y 5/4) clay; few, medium, distinct mottles of light brownish gray (2.5Y 6/2); massive; firm when moist, hard when dry, sticky and plastic when wet; common grains of feldspar; numerous grains of very coarse sand; gradual, smooth boundary.

C—41 to 52 inches, mottled light olive-brown, black, green, white, brown, and gray, sticky and plastic clay in uppermost 2 inches, and sandy loam material weathered from basic rocks in lower part; some mica flakes.

R—52 inches +, hornblende gneiss.

The A horizon ranges from dark grayish brown to yellowish brown in color and from 6 to 12 inches in thickness. In some areas quartz pebbles are on the surface. The B1t horizon is mottled with light olive-gray and white in many places, and it ranges from 2 to 5 inches in thickness. The B2t horizon has a uniform olive-brown color and ranges from 10 to 30 inches in thickness. The content of clay in the B2t horizon ranges from 60 to 80 percent. Base saturation in the lower part of that horizon is more than 35 percent. The C horizon is multicolored material weathered from basic rock. Depth to hard rock ranges from 3 to 5 feet.

Iredell soils occur with Bremo, Zion, Mecklenburg, and Orange soils. They are deeper over bedrock than the Bremo and Zion soils. Iredell soils have a thicker, more plastic subsoil than the Bremo, Zion, and Mecklenburg soils. They have a subsoil similar to that of the Orange soils, but they lack the gray mottling and gray color that are common in the Orange subsoil.

Klinesville Series

Soils that are excessively drained, moderately steep and steep, and shallow over shale make up the Klinesville series. These soils occupy small areas throughout the part of the county underlain by shale, and they have formed in material weathered from shale. The native vegetation is white, scarlet, black, and red oaks, beech, hickory, dogwood, redcedar, and Virginia pine.

In a typical profile, the surface layer is dark reddish-brown to dusky-red silt loam about 7 inches thick. The subsoil is reddish-brown very shaly silt loam about 5 inches thick. Hard red shale is at a depth of about 20 inches.

The Klinesville soils are highly susceptible to erosion and are very strongly acid. They are low in content of organic matter and in natural fertility. Runoff, the rate of infiltration, and permeability are all rapid. The available moisture capacity is low.

These soils are largely in forest and pasture.

Representative profile of Klinesville silt loam, 15 to 25 percent slopes, in a field of bluegrass used for pasture, south of Highway No. 20 near Somerset:

Ap—0 to 4 inches, dusky-red (2.5YR 3/2) silt loam; weak, fine, granular structure; very friable when moist; few fragments of red shale; many fine roots; clear, smooth boundary.

A2—4 to 7 inches, dark reddish-brown (2.5YR 3/4) shaly silt loam; moderate, medium, granular structure; friable when moist; common fine roots; 50 percent of horizon is fragments of red shale less than 3 inches in diameter; gradual, wavy boundary.

B—7 to 12 inches, reddish-brown (2.5YR 4/4) very shaly silt loam; weak, fine, subangular blocky structure; friable when moist; 60 percent of horizon is fragments of dusky-red shale; clear, irregular boundary.

C—12 to 20 inches, weak-red (10YR 4/3) very shaly silt loam; 75 percent of horizon is fragments of shale; gradual, wavy boundary.

R—20 inches +, hard, red shale.

The A horizon ranges from 4 to 12 inches in thickness and from reddish brown or dark reddish brown to dusky red in color. In places the profile lacks a B horizon, but where present, the B horizon is very shaly silt loam that ranges from 2 to 6 inches in thickness. The C horizon is mostly red shale or conglomerate. Depth to hard shale ranges from 12 to 20 inches or more.

Klinesville soils occur with Penn, Bucks, Rapidan, and Wadesboro soils. They are shallower over bedrock than those soils, and they also differ in having a weakly expressed subsoil, less clay in the profile, and a higher content of shale fragments.

Klinesville silt loam, 15 to 25 percent slopes (KlD).—This soil has the profile described as representative of the series. The surface layer is 4 to 12 inches thick. Some areas where the texture of the surface layer is loam, and some in which gravel and fragments of shale are strewn over the surface, were included with this soil in mapping. Also included were a few areas of Penn soils and a few rock outcrops that are shown on the soil map by a symbol.

About 52 percent of the acreage is in forest, and 48 percent is in pasture. This soil is better suited to pasture and forest than to field crops. It is not suited to crops that require cultivation. Grasses and legumes grow fairly well, but they can be damaged by lack of sufficient moisture during the growing season. (Capability unit VIe–2; woodland suitability group 4)

Klinesville silt loam, 25 to 45 percent slopes (KlE).—The surface layer of this soil is 4 to 10 inches thick. A few areas in which the surface layer is loam were included in mapping. Also included were a few rock outcrops and areas where loose rock and fragments of shale are on the surface.

Nearly all of the acreage is in forest, and this soil should remain in forest. (Capability unit VIIe–1; woodland suitability group 4)

Lignum Series

The Lignum series consists of deep, moderately well drained or somewhat poorly drained, gently sloping and sloping soils of uplands. These soils occur throughout the eastern part of the county, where they have formed in material weathered from sericitic schist. The native vegetation is white, black, red, and scarlet oaks, red maple, blackgum, dogwood, shortleaf pine, and scrub pine.

In a typical profile, the surface layer is grayish-brown silt loam about 4 inches thick. The subsoil, about 33 inches thick, is predominantly yellowish-brown silty clay loam mottled with strong brown and gray. Mottled, yellowish-brown sandy clay loam is below a depth of about 37 inches.

Lignum soils are very strongly acid throughout and are low in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is high. These soils can be satisfactorily tilled only within a narrow range of moisture content.

These soils are used mainly for forest and pasture.

Representative profile of Lignum silt loam, 2 to 7 percent slopes, in a field 1¾ miles east of Nasons along Highway No. 20:

Ap—0 to 4 inches, grayish-brown (10YR 5/2) silt loam; few, fine, faint mottles of light yellowish brown (10YR

6/4); weak, fine, granular structure; very friable when moist; many fine roots; clear, smooth boundary.

B1—4 to 7 inches, light yellowish-brown (2.5Y 6/4) silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/4); moderate, fine, medium, subangular blocky structure; friable when moist; many fine roots; gradual, smooth boundary.

B21t—7 to 14 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, distinct mottles of pale brown (10YR 6/3) and yellowish red (5YR 5/6); strong, coarse, subangular blocky structure; friable to firm when moist, hard when dry; common distinct clay films; few medium roots; abrupt, irregular boundary.

B22t—14 to 20 inches, yellowish-brown (10YR 5/4) silty clay loam; common, coarse, distinct mottles of light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6); strong, coarse, angular blocky structure; firm when moist, hard when dry, slightly sticky and slightly plastic when wet; common prominent clay films; few medium roots; few quartz pebbles; gradual, smooth boundary.

B23t—20 to 28 inches, light yellowish-brown (10YR 6/4) silty clay loam; common, coarse, prominent mottles of gray (5Y 6/1) and strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; firm when moist, hard when dry, slightly sticky and plastic when wet; many prominent clay films; few quartz pebbles; clear, irregular boundary.

B3t—28 to 37 inches, yellowish-brown (10YR 5/8) clay loam; common, coarse, prominent mottles of gray to light gray (5Y 6/1) and strong brown (7.5YR 5/6); moderate, fine, subangular blocky structure; friable when moist; few quartz pebbles; few fragments of schist; gradual, smooth boundary.

C1—37 to 51 inches, yellowish-brown (10YR 5/6) sandy clay loam; common, medium, distinct mottles of gray (N 5/0) to light gray (5Y 6/1) and strong brown (7.5YR 5/6); friable when moist; 15 percent of horizon is angular quartz pebbles up to 3 inches in diameter; common fragments of schist; gradual, wavy boundary.

C2g—51 to 87 inches, gray to light-gray (5Y 6/1) and yellowish-red (5YR 5/6) schist material of silt loam texture; firm in place but friable if dug out; many fragments of schist and quartz; gradual, wavy boundary.

R—87 inches +, firm to hard schist rock.

The A horizon ranges from 4 to 12 inches in thickness and from grayish brown to light yellowish brown in color. The B horizon ranges from silty clay loam or clay loam to silty clay in texture and from 24 to 36 inches in thickness. Depth to hard rock ranges from 4 to more than 10 feet.

Lignum soils occur with Nason, Tatum, Worsham, and York soils. In many places they are near and along small drainageways between the Nason and Worsham soils. Lignum soils are at a lower elevation than the Nason and Tatum soils, and they are less well drained than those soils. They are better drained and contain less gray mottling than the Worsham soils, and they are finer textured than the York soils.

Lignum silt loam, 2 to 7 percent slopes (LgB).—This is the only Lignum soil mapped in Orange County. It is in slight depressions, on toe slopes, at the heads of drainageways, and along small drainageways. Included in mapping were small areas in which the surface layer is loam, and other small areas in which pebbles, not numerous enough to interfere with tillage, are strewn over the surface. Also included were areas in which the subsoil contains a pan layer of clay or coarser textured material that is 4 to more than 12 inches thick and is generally at a depth of 15 to 24 inches. Other inclusions consist of small areas of Worsham and Seneca soils along drainageways, and small areas of a Lignum soil that has slopes of 7 to 15 percent.

About 80 percent of the acreage is in forest, 15 percent is in pasture, and 5 percent is in field crops. This soil is better suited to clover, lespedeza, and grasses than to crops that require cultivation. It is not suited to alfalfa. (Capability unit IIIw-2; woodland suitability group 15)

Lloyd Series

The Lloyd series consists of deep, well-drained, gently sloping to moderately steep soils of Piedmont uplands. These soils occur throughout the community of Lahore. They have formed in mixed material weathered from basic and acidic rocks and hornblende gneiss. The native vegetation is white, red, black, and scarlet oaks, black walnut, yellow-poplar, hickory, dogwood, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is very dark grayish-brown and brown to dark-brown loam about 6 inches thick. The subsoil, which extends to a depth of about 49 inches, is mainly red to dark-red clay and clay loam.

The Lloyd soils are medium acid to strongly acid and are medium in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high. These soils retain added plant nutrients well.

These soils are well suited to the crops commonly grown in the county. They are used mainly for field crops and pasture.

Representative profile of Lloyd loam, 2 to 7 percent slopes, eroded, in a hardwood forest, 1½ miles south of Lahore on the east side of Highway No. 669:

O1—2¼ inches to ¼ inch, undecomposed forest litter of sticks, twigs, and leaves.

O2—¼ inch to 0, black (10YR 2/1), partly decomposed duff; clear, smooth boundary.

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) loam; weak, very fine, granular structure; very friable when moist; many fine and medium roots; abrupt, smooth boundary.

A2—2 to 6 inches, brown to dark-brown (10YR 4/3 to 3/3) loam; weak, fine, granular structure; friable when moist; many fine and medium roots; some quartz pebbles up to 3 inches in diameter; clear, smooth boundary.

B1t—6 to 11 inches, yellowish-red (5YR 4/6) clay loam; moderate, medium, subangular blocky structure; friable when moist; few coarse and many fine roots; many quartz pebbles up to 3 inches in diameter; gradual, smooth boundary.

B21t—11 to 17 inches, red (2.5YR 4/6) clay; strong, fine and medium, subangular blocky structure; friable to firm when moist, slightly sticky and slightly plastic when wet; few, patchy, thin clay films; gradual, smooth boundary.

B22t—17 to 32 inches, dark-red (2.5YR 3/6) clay; strong, medium and coarse, subangular blocky structure; firm when moist, hard when dry, slightly sticky and slightly plastic when wet; many clay films; gradual, smooth boundary.

B3t—32 to 49 inches, dark-red (2.5YR 3/6) clay loam; few, medium, distinct mottles of red (2.5YR 4/6) and yellowish red (5YR 5/6); moderate, fine, subangular blocky structure; friable when moist; few thin clay films; few fine mica flakes; a few fragments of weathered basic rock; gradual, smooth boundary.

C—49 to 62 inches, red (2.5YR 5/6) clay loam soil material mottled with yellowish red (5YR 5/8), strong brown (7.5YR 5/8), and very pale brown (10YR 7/3); firm

in place, friable if removed; few mica flakes; many fragments of weathered basic rocks; black streaks along weathered surfaces of rocks.

The A horizon ranges from 4 to 8 inches in thickness. In areas that are not severely eroded, the color of the A horizon ranges from very dark grayish brown to brown. In severely eroded areas, where material from the subsoil has been brought up through tillage, the color of the A horizon is reddish brown, yellowish red, or red. The texture of the A horizon is mainly loam, but it ranges to clay loam or silty clay loam in severely eroded areas. The upper B horizons are yellowish red to red, and the lower ones are dark red. The B2 horizons range from clay to silty clay in texture and from 20 to 35 inches in combined thickness. The solum ranges from 40 to 60 inches in thickness. The underlying material is deeply weathered. Depth to hard rock ranges from 5 to more than 10 feet.

Lloyd soils occur with Fluvanna, Bremo, and Orange soils, and they occur in some places with Wilkes, Cecil, and Tatum soils. The Lloyd soils are more reddish than any of these soils. They are deeper, contain more clay, and have a more clearly defined subsoil than the Wilkes and Bremo soils, and they are less plastic and are better drained than the Orange soils.

Lloyd loam, 2 to 7 percent slopes, eroded (LlB2).—This soil has the profile described as representative of the series. The surface layer is 4 to 8 inches thick. Included in mapping were a few areas of a Lloyd soil that has a surface layer of silt loam, and 59 acres of a noneroded or only slightly eroded Lloyd soil that has a surface layer of more than 8 inches thick. Also included were areas that have a small amount of gravel on the surface. Other inclusions were small areas of Fluvanna soils near Lahore; spots of Davidson soils where the area underlain by greenstone joins that underlain by schist; and small areas of Turbeville soils along the border of the area underlain by limestone.

About 53 percent of the acreage is in field crops, 35 percent is in pasture, and 12 percent is in forest. This soil is well suited to the crops commonly grown in the county. It is especially well suited to corn, alfalfa, small grains, hay, pasture, and some vegetables. (Capability unit IIe–1; woodland suitability group 6)

Lloyd loam, 7 to 15 percent slopes, eroded (LlC2).—This soil is on rolling ridges and on side slopes near the tops of ridges. A few areas of a severely eroded soil that has a surface layer of silty clay loam were included in mapping. Also included were areas where pebbles numerous enough to interfere with tillage are strewn over the surface, and some rock outcrops that are indicated on the soil map by an appropriate symbol. Other inclusions consist of small areas of Davidson soils along the boundary between areas underlain by Catoctin greenstone and those underlain by sericitic schist, and a few small areas of Turbeville and Starr soils.

About 48 percent of the acreage is in field crops, 29 percent is in pasture, and 23 percent is in forest. The crops most commonly grown are alfalfa, corn, small grains, and hay. (Capability unit IIIe–1; woodland suitability group 6)

Lloyd clay loam, 2 to 7 percent slopes, severely eroded (LmB3).—Erosion has removed all or nearly all of the original surface layer of this soil. The present surface layer is about 4 inches thick. It ranges from reddish brown to yellowish red or red in color. In a few areas, shallow gullies have formed. The plow layer is almost entirely in the clayey subsoil. As a result, cracks form in the surface soil during dry periods. In winter, frost causes heaving and some crops are pushed out of the soil. Included in mapping were areas where the surface layer is silty clay loam; a few small areas of Davidson soils; small areas of eroded Hiwassee soils; and some areas of severely eroded Turbeville soils.

About 60 percent of the acreage is in field crops, 30 percent is in pasture, and 10 percent is in forest. Because tillage is within the clayey subsoil, a good seedbed is difficult to prepare and this soil can be tilled satisfactorily only within a narrow range of moisture content. This soil is better suited to small grains and hay than to cultivated crops. (Capability unit IIIe–1; woodland suitability group 7)

Lloyd clay loam, 7 to 15 percent slopes, severely eroded (LmC3).—This soil is on side slopes that border drainageways. It has lost most or all of its original surface layer through erosion. The present surface layer is reddish-brown, yellowish-red, or red clay loam about 4 inches thick. In many places shallow gullies have formed. The plow layer is almost entirely in the subsoil. Small areas of Davidson, Hiwassee, and Cecil soils, and small areas of Starr soils along small drainageways and on toe slopes, were included with this soil in mapping.

About 48 percent of the acreage is in pasture, 30 percent is in forest, and 22 percent is in field crops. This soil is not well suited to cultivated crops, but it is suited to pasture plants, alfalfa, and small grains. (Capability unit IVe–1; woodland suitability group 7)

Lloyd clay loam, 15 to 25 percent slopes, severely eroded (LmD3).—This soil is on hillsides near drainageways. It has lost most or all of the original surface layer through erosion. The present surface layer is about 4 inches thick and is red or reddish brown. Some shallow, active gullies have been formed, and gall spots are apparent. Some rock outcrops, indicated on the soil map by an appropriate symbol, were included in mapping. Also included were a few areas of a Wilkes soil.

About 49 percent of the acreage is in pasture, another 49 percent is in forest, and 2 percent is in field crops. This soil is better suited to forest than to pasture or field crops. (Capability unit VIe–1; woodland suitability group 7)

Louisburg Series

In the Louisburg series are moderately deep or deep, excessively drained, gently sloping to steep soils of Piedmont uplands. These soils occur near Thornhill in the western part of the county and in parts of the county underlain by granite. They have formed in material that weathered from granite, gneiss, arkosic sandstone, quartzite, and phyllite. Where these soils are underlain by granite, they are deeper than where they are underlain by sandstone. The native vegetation is white, red, black, scarlet, and chestnut oaks, maple, hickory, dogwood, beech, ash, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown sandy loam about 9 inches thick. The subsoil, also about 9 inches thick, is yellowish-brown sandy loam. The subsoil is underlain by loamy soil material and by highly weathered granite. Hard rock is at a depth of about 30 inches.

The Louisburg soils are very strongly acid throughout and are low in content of organic matter and in natural

fertility. Infiltration is rapid in the surface layer, and permeability is rapid in the subsoil. The available moisture capacity is low to moderate.

These soils are fairly easy to work and conserve, but they are not well suited to crops. They are mainly in forest, but some areas are in pasture.

Representative profile of Louisburg sandy loam, 5 to 15 percent slopes, in a hardwood forest 1 mile southeast of Thornhill, just off Highway No. 612:

O2—1 inch to 0, very dark gray (10YR 3/1), partly decomposed forest litter; abrupt, smooth boundary.

A1—0 to 9 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, fine, granular structure; very friable when moist; few quartz pebbles and fine mica flakes; gradual, smooth boundary.

B—9 to 18 inches, yellowish-brown (10YR 5/6) sandy loam; weak, fine, granular structure; very friable when moist; few fine mica flakes; 10 percent of horizon is fragments of weathered quartz and granite; gradual, wavy boundary.

C—18 to 30 inches, white, brown, yellow, and some black, loamy soil material and highly weathered granite; firm in place, friable if removed; many fine mica flakes.

R—30 inches +, hard granite rock.

The A horizon ranges from 4 to 16 inches in thickness and from grayish brown or dark grayish brown to brownish yellow or brown in color. Some areas contain outcrops of granite, sandstone, and quartz. The B horizon ranges from 8 to 16 inches in thickness. Depth to hard rock ranges from 2 to as much as 4 feet.

Louisburg soils occur with Madison, Grover, Cecil, and Appling soils. They have a less reddish color and are shallower over bedrock than those soils. They also have a moderately coarse textured subsoil that is less clearly defined than that in any of the associated soils.

Louisburg sandy loam, 5 to 15 percent slopes (LoC).—This soil has the profile described as representative of the series. The surface layer is 6 to 16 inches thick and ranges from dark grayish brown to yellowish brown in color. Included in mapping were small areas where the surface layer is fine sandy loam and other areas where it is coarse sandy loam. Also included were rock outcrops; a few eroded areas; small areas of severely eroded Appling and Grover soils; and small areas of Seneca soils along small drainageways.

About 75 percent of the acreage is in forest, 15 percent is in pasture, and 10 percent is in field crops. This soil is more suitable for forest than for pasture or field crops. Under intensive management, however, it may be used for pasture. (Capability unit IVe–3; woodland suitability group 4)

Louisburg sandy loam, 7 to 15 percent slopes, eroded (LoC2).—This soil has lost nearly all of its original surface layer through erosion. The plow layer is about 4 inches thick. Little or no development of a subsoil has taken place, and weathered granite is exposed in many places. Small areas in which the surface layer is coarse sandy loam were included in mapping. Also included were small areas of severely eroded Grover and Appling soils.

About 47 percent of the acreage is in forest, 43 percent is in pasture, and 10 percent is in field crops. This soil is suitable for forest, but it is too droughty for cultivated crops or pasture. (Capability unit VIe–2; woodland suitability group 5)

Louisburg sandy loam, 15 to 25 percent slopes (LoD).—This soil is on side slopes near the tops of ridges and on the sides of bluffs along streams. In a few places, fragments of quartz are strewn over the surface, and there are a few rock outcrops. Scattered small areas of Appling, Grover, and Seneca soils were included in mapping.

About 91 percent of the acreage is in forest, 7 percent is in pasture, and 2 percent is in field crops. This soil is suitable for trees, but it is not well suited to farming. (Capability unit VIe–2; woodland suitability group 4)

Louisburg sandy loam, 15 to 25 percent slopes, eroded (LoD2).—This soil is on the sides of hills and on the sides of bluffs along streams. It has lost nearly all of the original surface layer through erosion, and the remaining surface layer is about 4 inches thick. Included in mapping were small areas of a Louisburg soil that has a surface layer of coarse sandy loam; many areas of an unidentified soil in which the surface layer is directly underlain by the substratum; a few rock outcrops; and areas that contain a few active gullies. Also included was a small acreage of a steeper Louisburg soil.

About 54 percent of the acreage is in forest, and 46 percent is in pasture. This soil is suitable for forest, but it is not suited to cultivated crops or pasture. (Capability unit VIIe–1; woodland suitability group 5)

Madison Series

The Madison series consists of deep, well-drained, gently sloping and sloping soils of Piedmont uplands. These soils occur in one large strip near Thornhill, where they have formed in material weathered from granite gneiss. The native vegetation is white, scarlet, red, chestnut, and black oaks, hickory, yellow-poplar, redcedar, dogwood, sassafras, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is yellowish-brown and reddish-brown sandy loam about 8 inches thick. The subsoil extends to a depth of about 49 inches and is yellowish red and red silty clay loam to clay. It is underlain by highly micaceous sandy loam.

The Madison soils are strongly acid and are medium to low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are used largely for field crops and forests.

Representative profile of Madison sandy loam, 2 to 7 percent slopes, eroded, in a forest of mixed hardwoods, 1 mile southwest of Thornhill along Highway No. 651:

O2—1 inch to 0, very dark gray (5YR 3/1), partly decomposed forest litter; abrupt, smooth boundary.

A1—0 to 3 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; few quartz pebbles up to 3 inches in diameter; few mica flakes; gradual, smooth boundary.

A2—3 to 8 inches, reddish-brown (5YR 5/4) sandy loam; weak, medium, granular structure; friable when moist; many fine and medium roots; a few quartz pebbles; common mica flakes; gradual, smooth boundary.

B1t—8 to 14 inches, yellowish-red (5YR 4/6) silty clay loam; weak, fine and medium, subangular blocky structure; friable when moist; many small and medium roots; few faint clay films; a few quartz pebbles; many fine mica flakes; gradual, smooth boundary.

B2t—14 to 26 inches, red (2.5YR 4/6) light clay; moderate, medium, subangular blocky structure; friable when moist; many medium roots; common distinct clay

films around roots and soil peds; many mica flakes that give a greasy feel to the soil material; gradual, wavy boundary.

B3t—26 to 49 inches, red (2.5YR 4/6) silty clay loam streaked with yellowish red (5YR 5/6); weak, fine, subangular blocky structure; friable when moist; few coarse roots; few faint clay films around the roots; numerous mica flakes; about 40 percent of horizon is material weathered from granite gneiss; gradual, wavy boundary.

C—49 to 97 inches, very micaceous, soft, highly weathered material from granite gneiss; hardness increases with depth; multicolored.

The A horizon ranges from 4 to 12 inches in thickness. In areas that are not severely eroded, the color of the A horizon ranges from dark grayish brown to yellowish brown or reddish brown. In severely eroded areas, the A horizon is yellowish-red to red clay loam and consists mainly of material from the subsoil. Texture of the B2t horizon ranges from heavy silty clay loam to light clay. The B horizon is highly micaceous and has a greasy feel. Combined thickness of the B horizons ranges from 20 to more than 30 inches. The underlying material is micaceous and is strongly weathered to a great depth. Hard rock is at a depth of 5 to more than 10 feet.

The Madison soils occur with Cecil, Grover, Louisburg, and Appling soils. They have a slightly coarser texture and are more micaceous than the Cecil soils, and they are more reddish throughout than the Appling and Grover soils. Madison soils are deeper, are more reddish, and have a higher content of clay than the Louisburg soils, and they have a well-defined profile, in contrast to the Louisburg soils.

Madison sandy loam, 2 to 7 percent slopes, eroded (MaB2).—This soil has the profile described as representative of the series. The surface layer is grayish brown in wooded areas, but it is yellowish brown in cultivated fields. The subsoil is 24 to 40 inches thick. Included in mapping were a few rock outcrops, indicated on the soil map by a symbol; areas in which the surface layer is loam; and some areas in which enough quartz pebbles are on the surface to interfere with tillage. Also included were some slightly eroded areas and small areas of Grover and Cecil soils.

About 52 percent of the acreage is in forest, 30 percent is in field crops, and 18 percent is in pasture. This soil is well suited to cultivated crops. (Capability unit IIe–2; woodland suitability group 8)

Madison sandy loam, 7 to 15 percent slopes, eroded (MaC2).—In most places this soil has a surface layer 4 to 8 inches thick and a subsoil 20 to 30 inches thick. Rock outcrops are common and are indicated on the map by a symbol. A few shallow gullies have formed, and the subsoil is exposed in places. This soil contains many mica flakes that give it a greasy feel. Included with it in mapping were small areas of Cecil and Grover soils.

About 50 percent of the acreage is in field crops, 30 percent in forest, and the rest is in pasture. This soil is suited to alfalfa and other hay crops. It is also suited to cultivation if erosion is controlled. (Capability unit IIIe–2; woodland suitability group 8)

Madison clay loam, 7 to 15 percent slopes, severely eroded (MdC3).—This soil has lost most of its original surface layer through erosion. The present surface layer is yellowish-red or red clay loam consisting mainly of material from the subsoil. A few gullies have formed in places. The subsoil is generally about 20 to 28 inches thick, but areas of an unidentified soil that has a subsoil about 10 inches thick were included in mapping. Also included was a small acreage where the slopes range from 2 to 7 percent, and small areas of Louisburg and Grover soils.

About 38 percent of the acreage is in forest, 34 percent is in pasture, and 28 percent is in field crops. This soil is betted suited to hay, small grains, and pasture than to row crops. (Capability unit IVe–2; woodland suitability group 9)

Manassas Series

In the Manassas series are deep, well-drained soils that are gently sloping. These soils are at the bases of slopes and in depressions near the heads and upper courses of drainageways. They have formed in recent colluvium from soils of uplands derived from the underlying rocks. The native vegetation is white, red, black, and scarlet oaks, black walnut, yellow-poplar, and shortleaf pine.

In a typical profile, the surface layer is dark reddish-brown silt loam about 14 inches thick. The subsoil, about 35 inches thick, is dark reddish-brown to reddish-brown silty clay loam.

The Manassas soils are medium acid and are high in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high. Water that seeps from the slopes keeps this soil fairly moist, even when surrounding soils are dry.

These soils are used largely for field crops and pasture.

Representative profile of Manassas silt loam, 2 to 7 percent slopes, in a pasture 2 miles northeast of True Blue and west of Highway No. 620:

Ap—0 to 14 inches, dark reddish-brown (5YR 3/3) silt loam; moderate, fine, granular structure; very friable when moist, slightly sticky and slightly plastic when wet; many fine roots; few subrounded grains of quartz; few dark-colored mineral concretions; common subangular particles of quartz one-half inch in diameter; few fine and medium pores; gradual, smooth boundary.

B1t—14 to 20 inches, dark reddish-brown (5YR 3/4) silty clay loam; reddish brown (5YR 4/4) if crushed; weak, fine and medium, subangular blocky structure; friable when moist, slightly sticky and plastic when wet; few, thin, patchy clay films; few pores and root channels; gradual, smooth boundary.

B2t—20 to 32 inches, reddish-brown (5YR 4/4) silty clay loam; weak, medium, subangular blocky structure; friable when moist, sticky and plastic when wet; few, thin, continuous clay films; few fine pores and roots; few dark-colored mineral concretions; gradual, smooth boundary.

B3t—32 to 49 inches, reddish-brown (5YR 4/4) light silty clay loam; few, fine, faint mottles of dark reddish brown (5YR 3/4); weak, fine and very fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; thin, patchy clay films; common black mineral concretions; many fragments of strongly weathered shale and conglomerate rock; gradual, smooth boundary.

C—49 to 70 inches +, strong-brown (7.5YR 5/8) and reddish-brown (5YR 4/3) silt loam soil material; few, fine, faint mottles of weak red (10R 5/4); friable when moist; strongly weathered rock material; few black mineral concretions.

The A horizon ranges from 10 to 20 inches in thickness and from brown or reddish brown to dark reddish brown in color. The B horizons range from dark reddish brown to red in color and from heavy silt loam to silty clay loam in texture. In places, especially at the heads of draws, the profile lacks clearly defined horizons. In most areas, however, the

horizons are clearly defined and differences in color and texture occur below a depth of about 20 inches. These soils are fairly free of low chroma mottlings, but grayish mottlings are below a depth of about 30 inches in some places. In the lower part of the profile, base saturation is more than 35 percent. Depth to fairly hard rock ranges from 4 to more than 10 feet, but hard rock is generally at a depth of less than 7 feet.

Manassas soils occur with Bucks, Rapidan, and Penn soils. They contain less clay and have less clearly defined horizons than the Bucks and Rapidan soils. They are deeper over bedrock, have a somewhat higher content of clay, contain fewer coarse fragments, and have a thicker subsoil than the Penn soils.

Manassas silt loam, 2 to 7 percent slopes (MnB).—This is the only soil of the Manassas series mapped in Orange County. Included in mapping were a few areas in which the surface layer is loam. Also, a few areas in which the surface layer is fine sandy loam were included near Haudricks Mountain, where the source of soil material is mainly sandstone. Other inclusions were a few, small, nearly level spots and a few areas of an unidentified soil that has a silty clay subsoil. The silty clay subsoil generally occurs where the colluvium was derived from basic rocks.

About 60 percent of the acreage is in field crops, 35 percent is in pasture, and 5 percent is in forest. This soil is well suited to corn, hay, pasture plants, and home gardens. It is not well suited to alfalfa and small grains. (Capability unit I–1; woodland suitability group 1)

Manor Series

Deep, somewhat excessively drained, sloping to steep soils that are highly micaceous make up the Manor series. These soils occur only on Piedmont uplands in the western part of the county. They have formed in material weathered from mica schist and phyllite. The native vegetation is red, white, black, and chestnut oaks, hickory, dogwood, shortleaf pine, and scrub pine.

In a typical profile, the surface layer is dark grayish-brown to dark yellowish-brown silt loam about 8 inches thick. The subsoil is weakly expressed and consists of brown, very micaceous silt loam about 8 inches thick. Yellowish-brown loamy material (soft weathered rock) is at a depth of about 16 inches.

Manor soils are strongly acid to very strongly acid. They are low in content of organic matter and in natural fertility. Infiltration and permeability are both rapid, and the available moisture capacity is moderate to high. The soils do not retain added plant nutrients well. They are highly susceptible to erosion.

These soils are used largely for pasture.

Representative profile of Manor silt loam, 10 to 25 percent slopes, in a native pasture, one-half mile south of the junction of Highways No. 609 and No. 644 on the east side of Highway No. 644.

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very fine, granular structure; very friable when moist; many fine roots; few fine mica flakes; abrupt, smooth boundary.

A2—4 to 8 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure; friable when moist; many roots; common fine mica flakes; gradual, smooth boundary.

B2—8 to 16 inches, brown (7.5YR 4/4) silt loam; weak, fine, subangular blocky structure; friable when moist; few fine roots; very micaceous and has a greasy feel; few quartz pebbles; many fine fragments of weathered schist; gradual, smooth boundary.

C1—16 to 26 inches, yellowish-brown (10YR 5/4), soft, weathered rock; structureless; very friable silt loam that has a floury feel when dug out; very micaceous; gradual, smooth boundary.

C2—26 to 60 inches +, yellowish-brown (10YR 5/4), strongly weathered loamy soil material mottled with brownish yellow (10YR 6/6), strong brown (7.5YR 5/6), and light olive brown (2.5Y 5/4); if dug out, soil material is soft and very friable; numerous mica flakes; has a greasy feel; few black streaks.

The A horizon ranges from 6 to 16 inches in thickness and from dark grayish brown to yellowish brown in color. The B horizon is weakly expressed and ranges from brown to yellowish brown in color. It contains no significantly greater amount of clay than the A horizon. The texture of the B horizon is considered to be silt loam, but it is loam in places because of the high content of mica. The C horizon is deeply weathered, is highly micaceous, and has a greasy feel. The solum ranges from 15 to 25 inches in thickness. In general, depth to hard rock ranges from 6 to more than 40 feet.

Manor soils occur with Watt, Hazel, Elioak, and Glenelg soils. They have more mica throughout than the Watt and Hazel soils, and they are much lighter colored than the Watt soils. Their subsoil is not clearly defined, and it contains less clay than those of the Elioak and Glenelg soils. It is less reddish and contains more mica than the subsoil of the Elioak soils.

Manor silt loam, 10 to 25 percent slopes (MoD).—This soil is on the side slopes of ridges in the uplands and on hillsides near drainageways. It is the only Manor soil mapped in Orange County. Small areas of Glenelg and Hazel soils were included in mapping.

About 60 percent of the acreage is in forest, and 40 percent is in pasture. This soil is better suited to forest than to pasture or field crops. (Capability unit VIe–2; woodland suitability group 4)

Manteo Series

The Manteo series consists of excessively drained, gently sloping to steep soils that are shallow over bedrock. These soils are on Piedmont uplands in the eastern part of the county, in the area underlain by sericite-schist. They have formed in material weathered mostly from sericite-schist. The native vegetation is red, white, scarlet, black, and chestnut oaks, dogwood, scrub pine, hickory, beech, and mountain-laurel.

In a typical profile, the surface layer is very dark grayish-brown to brown or yellowish-brown silt loam about 6 inches thick. The subsoil, about 9 inches thick, is weakly defined and consists of yellowish-brown very shaly silt loam. Schist rock is at a depth of about 15 inches.

Manteo soils are extremely acid and are low in content of organic matter and in natural fertility. Infiltration is rapid in the surface layer, and permeability is rapid in the subsoil. The available moisture capacity is low.

These soils are mainly in forest, but some areas are in pasture.

Representative profile of Manteo silt loam, 15 to 25 percent slopes, in a forest of mixed hardwoods 100 yards south of the junction of Highways No. 612 and No. 631 and west of the Church Run Bridge:

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable

when moist; stains of organic matter; many fine roots; gradual, smooth boundary.

A2—1 to 6 inches, brown (10YR 5/3) to yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; very friable when moist; many fine roots; many small fragments of schist; gradual, wavy boundary.

B—6 to 15 inches, yellowish-brown (10YR 5/4) very shaly silt loam; weak, fine, subangular blocky structure; friable when moist; few fine and medium roots; many partly weathered, small, platy fragments of schist; clear, smooth boundary.

R—15 inches +, firm to rather hard schist rock.

The A horizon ranges from 4 to 12 inches in thickness and from very dark grayish brown to yellowish brown in color. In many places quartz pebbles and fragments of schist are strewn over the surface. The B horizon is 2 to 9 inches thick, and from 50 to 80 percent of it is coarse fragments. The solum ranges from 12 to 20 inches in thickness. Depth to hard rock and the amount of schist throughout the profile vary from place to place, but hard rock is typically at a depth of 15 to 20 inches.

Manteo soils occur with Nason and Tatum soils. They are much shallower over bedrock than the Nason and Tatum soils. Also, their subsoil is only weakly expressed and contains a greater number of coarse fragments and much less clay than the subsoil of those soils.

Manteo silt loam, 2 to 7 percent slopes (MrB).—This soil occurs in small, scattered areas on narrow ridges throughout the eastern part of the county. Its surface layer is 6 to 12 inches thick. The subsoil is more clearly defined than the one in the profile described as representative of the series, and depth to hard rock is greater, or 2 to 3 feet. Included in mapping were a few areas in which the surface layer is loam, and small areas of an unidentified soil that has a subsoil of light silty clay loam that ranges to yellowish red in color. Other inclusions consist of small areas of Nason and Seneca soils, and areas that have a small amount of quartz gravel on the surface but that are normally free of rock outcrops.

About 60 percent of the acreage is in forest, 25 percent is in pasture, and 15 percent is in field crops. Because of the low available moisture capacity, low natural fertility, and bedrock near the surface, this soil is poorly suited to most crops. It is suited to pasture and forests. (Capability unit IIIe-6; woodland suitability group 4)

Manteo silt loam, 7 to 15 percent slopes (MrC).—This soil is on hillsides and on side slopes that extend downward from ridgetops. The surface layer is 4 to 8 inches thick. Except in a few places, the subsoil is only 2 to 4 inches thick. Included in mapping were a few areas that have a thin subsoil composed of yellowish-red, platy silty clay loam. Also included were rock outcrops, indicated on the soil map by an appropriate symbol; areas in which quartz pebbles and fragments of schist are strewn over the surface; and a few eroded areas containing gullies.

About 85 percent of the acreage is in forest, 12 percent is in pasture, and 3 percent is in field crops. This soil is not suited to tilled crops and is only fairly suitable for pasture. Forested areas should remain in that use. (Capability unit IVe-3; woodland suitability group 4)

Manteo silt loam, 15 to 25 percent slopes (MrD).—This soil has the profile described as representative of the series. In wooded areas the surface layer is dark grayish brown, but the color ranges to brown or yellowish brown in areas that have been cleared. Included in mapping were a few areas in which the surface layer is loam. Also included were small areas of very severely eroded Nason and Tatum soils that are also shallow over schist but that are more reddish and contain more clay and fewer coarse fragments than this soil. In many places quartz pebbles and fragments of schist are strewn over the surface, and there are some areas in which outcrops of quartz and schist were included.

About 90 percent of the acreage is in forest, less than 1 percent is in field crops, and the rest is in pasture. This soil is not suited to field crops, and it is more suitable for forest than for pasture. (Capability unit VIe-2; woodland suitability group 4)

Manteo silt loam, 25 to 45 percent slopes (MrE).—This steep soil is on side slopes along drainageways and on bluffs along rivers. In most places it is shallower over bedrock than the soil for which a profile is described as representative of the series; hard rock is generally within 18 inches of the surface. The surface layer is 4 to 6 inches thick. Included with this soil in mapping were areas of a soil that has no subsoil horizon. Also included and indicated on the soil map by appropriate symbols were rock outcrops and areas where quartz pebbles and fragments of schist are on the surface. Other inclusions consist of areas where hard rock is at a depth of only 4 to 6 inches.

About 90 percent of the acreage is in forest, and 10 percent is in pasture. Because of the steep slopes, bedrock near the surface, droughtiness, and inaccessibility, this soil is considered better suited to forest than to pasture or other uses. (Capability unit VIIe-1; woodland suitability group 4)

Masada Series

In the Masada series are deep, well-drained, gently sloping to moderately steep soils on high terraces along Mountain Run and the Rapidan River. The two largest areas are in the communities of True Blue and Flatrun. The native vegetation is white, black, red, and post oaks, hickory, dogwood, blackgum, redcedar, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is about 10 inches of loam that is dark grayish brown in the upper part and yellowish brown in the lower part. The subsoil extends to a depth of about 48 inches. It consists of yellowish-brown to yellowish-red clay loam.

The Masada soils are strongly acid and are low to medium in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are used largely for field crops and pasture.

Representative profile of Masada loam, 2 to 7 percent slopes, in a forest of mixed hardwoods, 1½ miles northeast of True Blue and west of Road No. 620:

O1—3 inches to 1 inch, loose leaves and twigs of deciduous trees.

O2—1 inch to 0, very dark brown (10YR 2/2), partly decomposed forest litter; loose.

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) loam; weak, very fine, granular structure; very friable when moist; many fine roots; clear, smooth boundary.

A2—3 to 10 inches, yellowish-brown (10YR 5/4) loam; weak, very fine and fine, granular structure; friable when

moist, slightly sticky when wet; common fine and medium roots; a few rounded quartz pebbles ½ to 1 inch in diameter; few fine pores; smooth boundary.

B1t—10 to 17 inches, yellowish-brown (10YR 5/6) light clay loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; few, thin, patchy clay films; common fine and medium roots; few fine pores; few polished sand grains; clear, smooth boundary.

B21t—17 to 24 inches, yellowish-brown (10YR 5/8) clay loam, strong brown (7.5YR 5/6) if crushed; weak, medium and fine, subangular blocky structure; friable when moist, slightly sticky when wet; few, thin, patchy clay films; few root channels; common grains of sand; gradual, smooth boundary.

B22t—24 to 38 inches, yellowish-red (5YR 4/6) clay loam; few, fine, faint mottlings of strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; friable when moist; thin, patchy to common, district clay films; few medium roots; common sand grains; gradual, smooth boundary.

B3t—38 to 48 inches, yellowish-red (5YR 5/8) clay loam; many, medium distinct mottles of yellowish brown (10YR 5/8); weak, fine, subangular blocky structure; friable when moist; thin, patchy clay films; few root channels; few rounded quartz pebbles 1 inch in diameter; few rounded sand grains; gradual, wavy boundary.

C1—48 to 68 inches, strong-brown (7.5YR 5/6) sandy clay loam soil material; common, medium, distinct mottles of yellowish red (5YR 5/6) and yellowish brown (10YR 5/6); weak, fine, angular blocky structure; friable when moist; few patchy clay films; few rounded quartz pebbles; gradual, wavy boundary.

C2—68 to 90 inches, strong-brown, light brownish-gray, and light olive-brown, highly weathered rock material and sandy clay soil material; high in content of rounded quartz pebbles. Stone line at a depth of 90 inches.

The A horizon ranges from loam to sandy clay loam in texture. In uneroded areas it ranges from 8 to 14 inches in thickness and from brown to dark grayish brown or yellowish brown in color. In severely eroded areas, where material from the B horizon has been brought up through tillage, the A horizon is only 4 inches thick in places and the color ranges to yellowish red. The B horizons are clay loam to sandy clay loam and are mainly yellowish brown and yellowish red, but they are strong brown in places. The solum is 32 to 54 inches thick. Thickness of the alluvial material ranges from a few feet to more than 10 feet, but it is about 6 feet in most places. In most places the underlying rock is schist.

Masada soils occur with Hiwassee and Turbeville soils. They have less clay throughout the profile and are less reddish than those soils.

Masada loam, 2 to 7 percent slopes (MsB).—This soil has the profile described as representative of the series. In wooded areas the surface layer is dark grayish brown and yellowish brown, but the color of the plow layer ranges to yellowish brown in cultivated areas. The subsoil ranges from 24 to more than 40 inches in thickness. In places along the North Anna River, spots where the surface layer is fine sandy loam were included in mapping. In places near Mountain Run, spots where the surface layer is silt loam were also included. Other inclusions are areas in which the subsoil is clay; small areas of Nason, Altavista, and Turbeville soils; and a few acres of a nearly level Masada soil.

About 48 percent of the acreage is in field crops, 28 percent is in forest, and 24 percent is in pasture. Corn, small grains, and hay, including alfalfa, are the crops most commonly grown. (Capability unit IIe–3; woodland suitability group 10)

Masada loam, 2 to 7 percent slopes, eroded (MsB2).—In nearly all areas of this soil, sheet erosion has removed part of the original surface layer, and the present surface layer is only 4 to 8 inches thick. Included in mapping were areas along the Rapidan River in which the surface layer is loam; some areas along Mountain Run where the surface layer is silt loam; and a few areas along the North Anna River where the surface layer is fine sandy loam. Also included were gravelly areas, indicated on the soil map by an appropriate symbol; areas containing a few shallow gullies; small, scattered areas of severely eroded soils that have a sandy clay loam surface layer; and small scattered areas of Nason soils.

About 50 percent of the acreage is in field crops, 28 percent in pasture, and the rest is in forest. All the acreage is well suited to cultivation. (Capability unit IIe–3; woodland suitability group 10)

Masada loam, 7 to 15 percent slopes, eroded (MsC2).—This soil has a profile similar to the one described as representative of the series, except that the surface layer is thinner. The soil occupies terrace slopes that extend toward drainageways. Most areas have been affected by sheet erosion. As a result, the surface layer is now only 4 to 8 inches thick. It is loam in most places, but small areas of silt loam or fine sandy loam were included in mapping. Also included were places in which rounded pebbles and other pebbles strewn on the surface are numerous enough to interfere with tillage, and these places are indicated by an appropriate symbol on the soil map. Other inclusions consist of areas containing a few shallow gullies; a few small areas of Nason soils; and spots where the surface layer is thicker than typical for this Masada soil. The subsoil in most places is 20 to 34 inches of yellowish-red or brownish-yellow clay loam, but in some places the subsoil is sandy clay loam.

About 42 percent of the acreage is in forest, 32 percent is in field crops, and 26 percent is in pasture. This soil is well suited to crops. (Capability unit IIIe–3; woodland suitability group 10)

Masada sandy clay loam, 7 to 15 percent slopes, severely eroded (MtC3).—This soil is on high terraces that extend from hilltops near drainageways. It has a profile similar to the one described as representative of the series, except that it has lost all or nearly all of the original surface layer through erosion. The present surface layer is yellowish-red to reddish-brown sandy clay loam. Tillage is entirely within the subsoil, and the plow layer is only about 4 inches thick. The subsoil is clay loam and is 20 to 34 inches thick. There are a few active, shallow gullies. Included in mapping were small, scattered areas where the slopes are steeper than 15 percent; areas in which the surface layer is clay loam; and small areas of Turbeville and Nason soils.

About 42 percent of the acreage is in forest, 32 percent is in field crops, and 26 percent is in pasture. This soil is not well suited to cultivated crops, but it is suited to hay and pasture. (Capability unit IVe–2; woodland suitability group 11)

Mayodan Series

The Mayodan series consists of deep, well-drained, gently sloping and sloping soils that formed in material weathered from sandstone, shale, and sandstone conglomerate of Triassic age. The largest area of these soils is north of Barboursville near Haudricks Mountain. The

native vegetation is red, black, white, and chestnut oaks, hickory, dogwood, yellow-poplar, redcedar, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown and yellowish-brown fine sandy loam about 8 inches thick. The upper part of the subsoil is brown sandy clay loam. The major part is yellowish-red and reddish-brown clay and silty clay loam. Mottled, weathered rock is below a depth of about 39 inches.

The Mayodan soils are strongly acid. They are medium to low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

Representative profile of Mayodan fine sandy loam, 2 to 7 percent slopes, in a forest of mixed hardwoods, 2 miles west of Barboursville at the end of Road No. 659:

O1—1 to ¼ inch, undecomposed forest litter.

O2—¼ inch to 0, very dark brown (10YR 4/2) material from partly decomposed leaves; abrupt, smooth boundary.

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

A2—2 to 8 inches, yellowish-brown (10YR 5/4) fine sandy loam; moderate, fine, granular structure; friable when moist; many fine and medium roots; few small quartz pebbles; gradual, smooth boundary.

B1t—8 to 18 inches, brown (7.5YR 5/4) sandy clay loam; weak, fine and medium, subangular blocky structure; friable when moist, slightly sticky when wet; thin, patchy clay films; few medium and coarse roots; few small quartz pebbles; gradual, smooth boundary.

B21t—18 to 25 inches, yellowish-red (5YR 4/6) light clay; few, medium, distinct mottles of weak red (10R 5/4) and red (2.5YR 4/6); moderate, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few, thin, continuous clay films; few coarse and medium roots; few small fragments of shale and sandstone; gradual, smooth boundary.

B22t—25 to 32 inches, reddish-brown (2.5YR 4/4) light clay; common, medium, distinct mottles of reddish yellow (7.5YR 6/6) and weak red (10R 5/4); moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common, thin, continuous clay films; few coarse roots; many small fragments of weathered shale and a few fragments of sandstone up to 6 inches in diameter; gradual, smooth boundary.

B3t—32 to 39 inches, yellowish-red (5YR 4/6) silty clay loam; many, medium, distinct mottles of strong brown (7.5YR 5/6) and red (2.5YR 4/8); weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; 25 percent of horizon is fragments of weathered shale and sandstone; a few fragments of hard sandstone and quartz up to 6 inches in diameter; a few thin clay films on surfaces of fragments; gradual, wavy boundary.

C—39 to 56 inches, predominantly reddish-brown (5YR 5/3), weathered, brown and gray sandstone cemented in red shale, with some strong-brown (7.5YR 5/6), yellowish-red (5YR 5/6), weak-red (10R 5/2), and pinkish-gray (5YR 6/1) colors; firm in place, but digs out as friable, loamy soil material.

The A horizon ranges from dark grayish brown to yellowish brown in color and from 4 to 12 inches in thickness. The B1t horizon is brown to strong brown and is 4 to 10 inches thick. The B2t horizons range from yellowish red to reddish brown in color, from heavy silty clay loam to light clay in texture, and from 12 to 18 inches in combined thickness. The content of clay in these horizons ranges from 35 to 45 percent. Thickness of the solum ranges from 30 to 60 inches. The C horizon is mottled brown, yellow, red, and gray weathered sandstone, shale, and conglomerate. Depth to hard rock ranges from 6 to 12 feet or more.

Mayodan soils occur with Wadesboro, Pinkston, and Calverton soils. They are less reddish than the Wadesboro soils; are deeper and have a higher content of clay than the Pinkston soils; and are better drained than the Calverton soils. Also, they lack the fragipan that is typical of the Calverton soils.

Mayodan fine sandy loam, 2 to 7 percent slopes (MuB).—The profile of this soil is the one described as representative of the series. The surface layer is 8 to 11 inches thick. Included in mapping were some areas in which the surface layer is loam, and small spots of Wadesboro and Calverton soils.

This soil is suited to most of the crops commonly grown in the area. About 85 percent of the acreage is in forest, 12 percent is in pasture, and 3 percent is in field crops. (Capability unit IIe-3; woodland suitability group 10)

Mayodan fine sandy loam, 2 to 7 percent slopes, eroded (MuB2).—The profile of this soil is similar to the one described as representative of the series, except that much of the original surface layer has been removed by erosion. The present surface layer is only 4 to 8 inches thick. Some areas in which the surface layer is loam were included in mapping. Also included were some areas in which quartz pebbles are strewn over the surface and are embedded in the profile. Other inclusions consist of small areas of Wadesboro and Calverton soils.

About 42 percent of the acreage is in forest, 31 percent is in pasture, and 27 percent is idle or in field crops. This soil is better suited to corn, small grains, and mixed hay than to other crops. (Capability unit IIe-3; woodland suitability group 10)

Mayodan fine sandy loam, 7 to 15 percent slopes, eroded (MuC2).—This soil has a profile similar to the one described as representative of the series, except for erosion. Included in mapping were areas in which the surface layer is loam, areas that are only slightly eroded, and small areas of Wadesboro and Pinkston soils.

About 46 percent of the acreage is in forest, 31 percent is in pasture, and 23 percent is idle or in field crops. This soil is better suited to small grains and mixed hay than to other crops commonly grown in the area. (Capability unit IIIe-3; woodland suitability group 10)

Mecklenburg Series

In the Mecklenburg series are deep, well-drained, gently sloping and sloping soils of Piedmont uplands. These soils occur in small areas throughout the community of Lahore. They have formed in material weathered from quartz diorite and other basic rocks. The native vegetation is red, white, post, and scarlet oaks, hickory, redcedar, dogwood, redbud, and scrub pine.

In a typical profile, the surface layer is reddish-brown silt loam about 8 inches thick. The subsoil is predominantly yellowish-red clay, and it is mottled in the lower part. Mottled material that weathered from the underlying rock is at a depth of about 33 inches.

The Mecklenburg soils are strongly acid to medium acid. They are medium in content of organic matter and in natural fertility. Infiltration is moderate in the sur-

face layer, and permeability is moderately slow in the subsoil. The available moisture capacity is high.

These soils are used largely for pasture and field crops.

Representative profile of Mecklenburg silt loam, 2 to 7 percent slopes, eroded, in a field of red clover and orchardgrass grown for hay, 1 mile northeast of Monrovia along Highway No. 669:

Ap—0 to 8 inches, reddish-brown (5YR 4/4) silt loam; moderate, medium, granular structure; friable when moist; many fine and medium roots; few rose-colored quartz pebbles up to 3 inches in diameter; few black mineral concretions; abrupt, smooth boundary.

B21t—8 to 16 inches, yellowish-red (5YR 4/8) clay; moderate, medium and fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common clay films; common black mineral concretions; few quartz pebbles; gradual, smooth boundary.

B22t—16 to 26 inches, yellowish-red (5YR 4/6) clay; common, fine, and medium mottles of reddish yellow (7.5YR 6/8) and strong brown (7.5YR 5/6), as well as black streaks; coarse angular blocky structure; firm when moist, sticky and plastic when wet; common prominent clay films; common black mineral concretions; few weathered fragments of basic rock; gradual, smooth boundary.

B3t—26 to 33 inches, clay loam, with common, coarse, distinct mottles of yellowish red (5YR 5/8), red (2.5YR 4/6), strong brown (7.5YR 5/6), black, and green; weak, fine, subangular blocky structure; friable when moist, sticky and plastic when wet; few clay films; few fine mica flakes; clear, smooth boundary.

C1—33 to 38 inches, weathered basic rock and sandy clay loam prominently mottled with yellow, brown, olive gray, black, and green; massive; sticky and plastic when wet; abrupt, smooth boundary.

C2—38 to 64 inches, brown, green, yellow, black, and white, strongly weathered basic rocks; firm in place, but material is friable sandy loam if dug out; hardness increases with depth.

The A horizon ranges from 4 to 10 inches in thickness and from brown to reddish brown in color. In many places brown or black mineral concretions are throughout the profile. The B2 horizons range from clay to silty clay in texture, from 12 to 34 inches in combined thickness, and from yellowish red to strong brown or reddish brown in color. They are generally plastic and sticky when wet. The C1 horizon is 3 to 8 inches thick and is very plastic in some places. Base saturation is greater than 35 percent at a depth of 50 inches below the top of the B21t horizon. Depth to hard rock ranges from 4 to 8 feet or more.

Mecklenburg soils occur with Bremo, Zion, Iredell, and Lloyd soils. They are deeper and have a more clearly defined subsoil than the Bremo and Zion soils; they contain somewhat less clay and are less plastic than the Iredell soils; and they are less deep and less reddish than the Lloyd soils.

Mecklenburg silt loam, 2 to 7 percent slopes, eroded (MvB2).—This soil has the profile described as representative of the series. In most places the profile has red quartz pebbles throughout. Included with this soil in mapping were some areas in which the surface layer is loam; scattered areas that are not eroded; and small areas of Zion and Iredell soils.

About 50 percent of the acreage is in pasture, 40 percent is in field crops, and 10 percent is in forest. This soil is better suited to lespedeza, clover, grasses, and small grains than to cultivated crops. It is not well suited to alfalfa. (Capability unit IIe–4; woodland suitability group 13)

Mecklenburg silt loam, 7 to 15 percent slopes, eroded (MvC2).—This soil occurs on side slopes of drainageways and ridges. The surface layer is 4 to 8 inches thick, and the subsoil is 12 to 38 inches thick. Included in mapping were a few rock outcrops; some areas in which the surface layer is loam; and areas where a thin layer of very plastic soil material is immediately above the C horizon. Also included were small areas of Bremo and Zion soils.

About 57 percent of the acreage is in pasture, 31 percent is in forest, and 12 percent is in field crops. This soil is better suited to lespedeza, clover, grasses, and small grains than to cultivated crops. It is excellent for bluegrass pasture. (Capability unit IIIe–4; woodland suitability group 13)

Mixed Alluvial Land

Mixed alluvial land (0 to 2 percent slopes) (Mx) is a moderately deep or deep miscellaneous land type. It consists of soil material that was washed from many different kinds of soils on uplands and was deposited on first bottoms near or adjacent to most of the streams throughout the county. No definite profile has developed, but the material near the surface is mottled gray and brown and has a texture of silt loam to sand. The underlying material is stratified sand, silt, and clay. In most places drainage is somewhat poor, but it ranges from poor to good. Flooding occurs very frequently, and this land type receives new deposits of soil material each time it is flooded. It ranges from 2 to 10 feet in thickness but is generally about 5 feet thick. Included with it in mapping were small areas of Wehadkee, Chewacla, Worsham, and Seneca soils.

About 80 percent of the acreage is in trees that are tolerant of restricted drainage, 17 percent is in pasture, and 3 percent is in field crops. The predominantly somewhat poor drainage and the hazard of flooding make this land type unsuitable for cultivated crops unless it is drained and protected from flooding. Areas that have not been drained and protected from flooding are suitable for forest or pasture. (Capability unit IIIw–1; woodland suitability group 3)

Myersville Series

The Myersville series consists of deep, well-drained, gently sloping and sloping soils of Piedmont uplands. These soils occur in small areas that are underlain by greenstone. They have formed in material weathered from dark-colored, basic rocks, such as Catoctin greenstone. The native vegetation is red, white, black, and scarlet oaks, black locust, redbud, dogwood, hickory, yellow-poplar, and black walnut.

In a typical profile, the surface layer is brown to dark-brown silt loam about 8 inches thick. The subsoil, which extends to a depth of about 38 inches, is strong-brown and yellowish-red silty clay loam. The subsoil is underlain by mottled silt loam.

Myersville soils are medium acid to strongly acid. They are medium in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The soils have high available moisture capacity, and they retain added plant nutrients well.

These soils are used mainly for pasture, but they are suited to most crops generally grown in the county.

Representative profile of Myersville silt loam, 2 to 7 percent slopes, eroded, in a bluegrass pasture, 2 miles west of Orange along Highway No. 633:

Ap—0 to 8 inches, brown to dark-brown, (10YR 4/3) silt loam; strong, fine, granular structure; very friable when moist; many fine and medium roots; many fine and medium pores; few fragments of greenstone; clear, smooth boundary.

B1t—8 to 12 inches, strong-brown (7.5YR 5/6) light silty clay loam; moderate, fine and medium, subangular blocky structure; friable when moist; thin, patchy clay films; common fine and medium roots; many fine and medium pores; few, small, angular fragments of rock; gradual, smooth boundary.

B2t—12 to 28 inches, yellowish-red (5YR 4/6) light silty clay loam; strong, medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common, prominent, thin, continuous clay films; few black mineral films and coatings; few fragments of greenstone; few streaks of yellow along cut surfaces; gradual, smooth boundary.

B3t—28 to 38 inches, yellowish-red (5YR 4/8) light silty clay loam; common, medium, distinct mottles of strong brown (7.5YR 5/6), yellowish brown (10YR 5/6), and olive yellow (2.5Y 6/8); weak, fine, subangular blocky structure; friable when moist; few, thin, patchy clay films; few fragments of weathered greenstone; common black streaks, gradual, smooth boundary

C1—38 to 58 inches, mottled red (2.5YR 5/8), strong-brown (7.5YR 5/6), yellowish-red (5YR 4/8), and yellowish-brown (10YR 5/6) silt loam soil material; friable when moist; black streaks along vertical cracks; abrupt, smooth boundary.

C2—58 to 70 inches, mottled strong-brown (7.5YR 5/6), yellowish-red (5YR 5/6), olive-brown (2.5Y 4/4), green, and black material weathered from greenstone; hardness increases with depth; friable silt loam if dug out.

R—70 inches +, hard greenstone.

The A horizon ranges from 4 to 10 inches in thickness. In cultivated areas the A horizon is brown to yellowish brown, but it is dark brown in old pastures and woodlands. The B horizons range from 14 to 32 inches in combined thickness. The B2t horizon has a clay content that ranges from 18 to 35 percent. The color of the B2t horizon ranges to strong brown in some places. Base saturation is greater than 35 percent in the lower part of the profile. Depth to hard rock is generally about 5 feet or more.

Myersville soils occur with Catoctin, Davidson, and Fauquier soils. They are deeper over bedrock and have a more clearly defined subsoil than the Catoctin soils, and they are less reddish and have less clay throughout the profile than the Davidson and Fauquier soils.

Myersville silt loam, 2 to 7 percent slopes, eroded (MyB2).—This soil has the profile described as representative of the series. The surface layer is 6 to 10 inches thick, and the subsoil is 20 to 32 inches thick. Included in mapping were small, severely eroded areas in which the surface layer is light silty clay loam and a few other areas, shown on the soil map by an appropriate symbol, where fragments of greenstone are on the surface. Also included were a few areas in which the subsoil is clay; small areas of Fauquier and Rabun soils; and a few places in the community of Somerset where a horizon of plastic material, about 3 inches thick, underlies the B3 horizon.

About 63 percent of the acreage is in pasture, 23 percent is in forest, and 14 percent is in field crops. This soil is suited to most of the crops commonly grown in the county. (Capability unit IIe–2; woodland suitability group 10)

Myersville silt loam, 7 to 15 percent slopes, eroded (MyC2).—This soil is on side slopes that extend downward from hilltops. It has a surface layer 4 to 8 inches thick and a subsoil 18 to 30 inches thick. Outcrops of rock occur in some places, and loose fragments of greenstone are strewn over the surface in others. Included in mapping were a few areas of a soil that has a clay subsoil but that otherwise is similar to this soil. Also included were small areas of Catoctin soils and a few areas of Fauquier and Davidson soils.

About 48 percent of the acreage is in forest, 34 percent is in pasture, and 18 percent is in field crops. This soil is well suited to small grains and hay, and it is also suited to cultivated crops. (Capability unit IIIe–2; woodland suitability group 10)

Nason Series

In the Nason series are deep, well-drained, gently sloping to moderately steep soils of Piedmont uplands. These soils occur where the underlying rock is sericite-schist, mainly in the eastern part of the county. They have formed in material that weathered from very fine grained sericite-schist. The native vegetation is white, chestnut, scarlet, post, and black oaks, shortleaf pine, white pine, Virginia pine, redcedar, hickory, holly, blackgum, dogwood, beech, and mountain-laurel.

In a typical profile, the surface layer is grayish-brown and yellowish-brown silt loam about 9 inches thick. The subsoil is chiefly strong-brown and yellowish-red silty clay loam. Mottled, yellowish-brown material weathered from the underlying rock is at a depth of about 38 inches.

The Nason soils are extremely acid and are low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is moderate to high.

These soils are mainly in forest. They are only fairly well suited to field crops.

Representative profile of Nason silt loam, 2 to 7 percent slopes, in a forest of mixed hardwoods 2 miles north of Rhoadesville along Highway No. 621:

O2—1 inch to 0, dark-gray (10YR 4/1), partly decomposed forest litter; abrupt, smooth boundary.

A1—0 to 1 inch, grayish-brown (10YR 5/2) silt loam; weak, fine, granular structure; very friable when moist; many fine roots; clear, smooth boundary.

A2—1 to 9 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; few quartz pebbles up to 3 inches in diameter; gradual, smooth boundary.

B1t—9 to 15 inches, yellowish-brown (10YR 5/6) heavy silt loam; weak, fine, subangular blocky structure; friable when moist; many fine and medium roots; a few quartz pebbles; gradual, smooth boundary.

B21t—15 to 20 inches, strong-brown (7.5YR 5/6) heavy silty clay loam; moderate, fine, subangular blocky structure; friable when moist; few, thin, patchy clay films; common medium-sized roots; a few quartz pebbles; gradual, smooth boundary.

B22t—20 to 28 inches, yellowish-red (5YR 5/8) heavy silty clay loam; moderate, medium, subangular blocky structure; friable when moist; common thin clay films on the surfaces of most peds; few coarse roots; few fragments of weathered schist; a few quartz pebbles; gradual, smooth boundary.

B3t—28 to 38 inches, yellowish-red (5YR 4/6) light silty clay loam; few, medium, distinct mottles of strong brown (7.5YR 5/6) and reddish yellow (7.5YR 6/6); weak, fine, subangular blocky structure; friable when moist; few coarse roots; 20 percent of horizon is weathered fragments of schist; few thin clay films around the fragments of schist; irregular, wavy boundary.

C—38 to 50 inches, yellowish-brown (10YR 5/6) material weathered from schist; red (2.5YR 4/6) and strong-brown (7.5YR 5/6) mottles; firm in place, but is easily dug out and crushed to friable silt loam soil material.

R—50 inches +, fairly hard schist rock.

The A horizon is loam in places, and it ranges from grayish brown to yellowish brown in color. The A horizon normally is 8 to 12 inches thick, but it is as thin as 3 inches in the more eroded areas. The combined thickness of the B horizons ranges from 15 to 30 inches. The B2 horizons range from yellowish red to strong brown in color and from heavy silty clay loam to heavy clay loam in texture. Normally, depth from the surface to the bottom of the B22t horizon is less than 30 inches. The solum is 30 to 60 inches thick. Depth to hard rock ranges from 4 to as much as 10 feet or more.

Nason soils occur with Manteo, Lignum, York, and Tatum soils. They are deeper over bedrock and have a better developed profile than the Manteo soils; are better drained than the Lignum and York soils; and contain less clay and are less reddish than the Tatum soils.

Nason loam, 2 to 7 percent slopes, eroded (NaB2).—This soil has a profile similar to the one described as representative of the series, except that the surface layer is loam 4 to 8 inches thick. The subsoil is 26 to 45 inches thick. Small areas in which the surface layer is fine sandy loam, and other small areas in which the surface layer is silt loam, were included with this soil in mapping. Also included were small areas of a Tatum loam and a few areas that are not eroded or that are only slightly eroded. The number of fragments of schist in the subsoil increases with depth, and there are a few quartz pebbles throughout the subsoil.

About 74 percent of the acreage is in forest, 16 percent is in cultivated crops, and 10 percent is in pasture. This soil is better suited to small grains and mixed hay than to cultivated crops. It is especially well suited to wheat. (Capability unit IIe-3; woodland suitability group 10)

Nason loam, 7 to 15 percent slopes, eroded (NaC2).—This soil is on the side slopes of ridges and drainageways. It has a surface layer 4 to 8 inches thick. Included in mapping were small areas in which the surface layer is fine sandy loam; a few small areas of a soil that has a subsoil of silty clay but that otherwise is similar to this soil; scattered, moderately steep areas of other Nason soils; and a few small areas of Tatum and Manteo soils. Also included were some rock outcrops and a few small areas where quartz pebbles are numerous enough to interfere with tillage. The rock outcrops and the gravelly areas are indicated on the soil map by appropriate symbols.

About 81 percent of the acreage is in forest, 14 percent is in pasture, and 5 percent is in cultivated crops. This soil is fairly well suited to small grains and red clover. (Capability unit IIIe-3; woodland suitability group 10)

Nason silt loam, 2 to 7 percent slopes (NsB).—This soil has the profile described as representative of the series. It has a surface layer 8 to 12 inches thick. Included in mapping were small areas of Tatum soils and a few small areas of York, Lignum, and Seneca soils. Also included were a few areas containing intrusive basic dikes, where the subsoil is clay and the soil profile is more brownish than normal. Other inclusions consist of areas of fine sandy loam or very fine sandy loam that have enough gravel on the surface in places to interfere with tillage. These gravelly areas are indicated on the soil map by an appropriate symbol.

About 95 percent of the acreage is in forest, and 5 percent is in pasture. Corn, small grains, and hay are the most frequently grown crops. This is an excellent soil for wheat. (Capability unit IIe-3; woodland suitability group 10)

Nason silt loam, 2 to 7 percent slopes, eroded (NsB2).—This soil is on flat, undissected ridgetops in the uplands. Its surface layer is only 4 to 8 inches thick. Quartz pebbles, on and in the surface layer, are numerous enough in a few places to interfere with tillage. These pebbly areas are shown on the soil map by an appropriate symbol. Included in mapping were areas of loam and other areas in which the subsoil is clay because of the influence of basic dikes. Other inclusions consist of small areas where little or no erosion has taken place; a few small areas of Seneca soils in drainageways; and a few small areas of Tatum and Lignum soils.

About 80 percent of the acreage is in forest; 10 percent is in field crops; and another 10 percent is in pasture. This soil is better suited to pasture and to red clover and small grains than to row crops. (Capability unit IIe-3; woodland suitability group 10)

Nason silt loam, 7 to 15 percent slopes (NsC).—This soil is on the side slopes of ridges and drainageways. It has a surface layer 8 to 10 inches thick. In wooded areas the surface layer is more grayish than typical for Nason soils because it is stained with organic matter. All areas of this soil have quartz pebbles on the surface. Where the pebbles are numerous enough that they interfere with tillage, the surface layer is generally fine sandy loam. Such pebbly areas were mapped as inclusions and are indicated on the soil map by an appropriate symbol. Other inclusions are areas of soils that are similar to this soil but that have a clay subsoil as the result of the influence of basic dikes that have intruded into the parent rock. Also included were small areas of Seneca and Tatum soils and a few outcrops of quartz bedrock. The outcrops, like the pebbly areas, are indicated on the soil map by an appropriate symbol.

About 95 percent of the acreage is in forest, and 5 percent is in field crops and pasture. Where this soil has been cleared, it is better suited to small grains, mixed hay crops, and grasses and legumes grown for pasture than to row crops. (Capability unit IIIe-3; woodland suitability group 10)

Nason silt loam, 7 to 15 percent slopes, eroded (NsC2).—This soil is on the side slopes of ridges and drainageways. The surface layer generally is only 4 to 8 inches thick. The subsoil contains varying amounts of fragments of weathered schist, and the number of fragments increases with depth. The profile has some quartz pebbles throughout. Included in mapping were areas in which the surface layer is loam; severely eroded areas having a plow layer of silty clay loam; and areas of a soil that is similar to this soil but that has a clay subsoil because of the influence of basic dikes. Also included were small areas in which shallow gullies have formed, and a few small areas of Tatum and Manteo soils.

About 65 percent of the acreage is in forest, 20 percent is idle or in pasture, and 15 percent is in field crops. Areas that have been cleared are generally used for pasture, small grains, and mixed hay. (Capability unit IIIe-3; woodland suitability group 10)

Nason silt loam, 15 to 25 percent slopes, eroded (NsD2).—This soil is on the side slopes of ridges and drainageways. It has a profile similar to the one described as representative of the series, except that in places the surface layer is only 3 to 6 inches thick. In some places gravel is on and in the surface layer. In areas where the gravel is abundant, the texture of the surface layer generally is fine sandy loam, and these areas were included in mapping. Also included were small areas where the surface layer is loam; small areas of Manteo soils; and a few rock outcrops. The outcrops are indicated on the soil map by an appropriate symbol.

About 90 percent of the acreage is in forest, and 10 percent is in pasture. This soil is better suited to native pasture or trees than to improved pasture or field crops. (Capability unit IVe-2; woodland suitability group 10)

Nason silty clay loam, 5 to 15 percent slopes, severely eroded (NtC3).—This soil has lost all, or nearly all, of its original surface layer through erosion. The present surface layer of silty clay loam is no thicker than 4 inches, and it ranges from strong brown to yellowish red in color. The surface layer contains schist and quartz pebbles. Included in mapping were spots in which the surface layer is silt loam, and areas of a soil that is similar to this soil but that has a clay subsoil because of the influence of basic dikes. Also included were areas where the slopes are steeper than 15 percent, and other small areas of Manteo soils.

About 52 percent of the acreage is in field crops, 26 percent is idle or in pasture, and 22 percent is in forest. This soil is poorly suited to field crops, but it is fairly well suited to pasture. (Capability unit IVe-2; woodland suitability group 11)

Orange Series

The Orange series consists of deep, moderately well drained, nearly level to sloping soils of the uplands. These soils occur near Wilderness and Lahore. They have formed in material that weathered from quartz monzonite, quartz diorite, and hornblende gneiss. The native vegetation is maple, gum, redcedar, Virginia pine, and white, red, black, pin, blackjack, and willow oaks.

In a typical profile, the surface layer is about 16 inches thick and consists of silt loam that is grayish brown in the upper part and light olive brown in the lower part. The subsoil extends to a depth of 45 inches. The uppermost layer in the subsoil, between depths of about 16 and 23 inches, is mottled yellowish-brown clay loam. The rest of the subsoil is mottled olive-gray to light olive-brown, very plastic clay.

Orange soils are medium acid to strongly acid. They are low to medium in content of organic matter and medium in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is low to moderate.

These soils are easy to conserve but are difficult to work. They are better suited to trees than to pasture or field crops.

Representative profile of an Orange silt loam having slopes of 0 to 2 percent, in a field of lespedeza hay, 3 miles south of Unionville and west along U.S. Highway No. 522:

Ap—0 to 9 inches, grayish-brown (2.5Y 5/2) silt loam; weak, fine, granular structure; friable when moist; many fine roots; few grains of sand; gradual, smooth boundary.

A2—9 to 16 inches, light olive-brown (2.5Y 5/4) silt loam; few, fine, faint mottles of yellowish brown (10YR 5/6); weak, fine, granular structure; friable when moist; many fine roots; many fine pores; few black mineral streaks on cut faces; clear, smooth boundary.

B1t—16 to 23 inches, yellowish-brown (10YR 5/6) clay loam; many, medium, distinct mottles of grayish brown 2.5Y 5/2) and strong brown (7.5YR 5/6); strong, fine and medium, subangular blocky structure; friable when moist; common fragments of quartz the size of pebbles; abrupt, smooth boundary.

B21tg—23 to 36 inches, olive-gray (5Y 5/2) clay; common, medium, distinct mottles of light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6); massive when wet; coarse angular blocky structure when dry; plastic and sticky when wet; common continuous clay films; few quartz pebbles as much as 1 inch in diameter; some white particles of feldspar; gradual, smooth boundary.

B22t—36 to 41 inches, light olive-brown (2.5Y 5/4) clay; common, medium, distinct mottles of light brownish gray (2.5Y 6/2), olive gray (5Y 5/2), and yellowish brown (10YR 5/6); massive when wet; coarse angular blocky structure when dry; plastic and sticky when wet; common, thin, continuous clay films; common particles of white feldspar; clear, wavy boundary.

B3t—41 to 45 inches, light olive-brown (2.5Y 5/4) clay; many, fine to coarse, distinct mottles of gray (5Y 5/1), yellowish brown (10YR 5/6), and greenish gray (5G 6/1); massive when wet; weak, coarse, angular blocky structure when dry; plastic and sticky when wet; many weathered fragments of basic rocks; many particles of white feldspar; clear, wavy boundary.

C—45 to 58 inches, multicolored (green, olive, white, brown, yellow, and gray) material weathered from rock; firm in place, but crushes to coarse sandy loam; uppermost 3 inches plastic and sticky when wet; clear, wavy boundary.

R—58 inches +, hard hornblende gneiss.

The A horizons range from 4 to 16 inches in combined thickness and from light yellowish brown or grayish brown to light olive brown in color. Mottling in the B1t horizon ranges from grayish brown or strong brown to gray, and thickness of that horizon ranges from 5 to 12 inches. The combined thickness of the B2 horizons ranges from 12 to 24 inches, and mottling in those horizons ranges from brownish or yellowish colors to gray. The thickness of the solum ranges from 30 to 55 inches. In the lower part of the B horizon, the clay content is more than 60 percent. In the lower part of the profile, base saturation is greater than 35 percent. Depth to hard rock ranges from 3 to 6 feet or more.

Orange soils occur with Bremo, Lloyd, Fluvanna, and Iredell soils. They have a thicker profile and more distinct horizons than the Bremo soils and have a less reddish profile and are less well drained than the Lloyd and Fluvanna soils. Their profile resembles that of the Iredell soils, but they have thicker loamy horizons over their subsoil of plastic clay.

Orange-Iredell silt loams, 0 to 2 percent slopes (OrA).—About 70 percent of this soil complex is Orange soils, and the rest is Iredell soils. The soils are on large upland flats. They have the profiles described as typical of their respective series. The surface layer of the Orange soils is 10 to 16 inches thick, and the surface layer of the Iredell soils is 6 to 10 inches thick. Included with these soils in mapping were scattered areas in which the surface layer is loam; a few wet spots consisting of Elbert

soils; and small areas of an unidentified soil that has in its subsoil thin layers of concretionary material.

About 58 percent of the acreage is in pasture, 22 percent is in forest, and 20 percent is in field crops. The soils are not well suited to cultivation, but they are suited to bluegrass and white clover grown for pasture. (Capability unit IVw–1; woodland suitability group 14)

Orange-Iredell silt loams, 2 to 7 percent slopes (OrB).—Soils of this complex are on smooth, undissected uplands near Lahore. Orange soils make up about 60 percent of the acreage, and Iredell soils make up the rest. Both the Orange and Iredell soils have a surface layer about 6 to 10 inches thick. Included with these soils in mapping were small areas of Zion and Mecklenburg soils. Also included were small spots where the surface layer is loam.

About 44 percent of the acreage is in pasture, 32 percent is in field crops, and 24 percent is in forest. The soils are suited to small grains and grasses. (Capability unit IIIe–5; woodland suitability group 14)

Orange-Iredell silt loams, 2 to 7 percent slopes, eroded (OrB2).—Orange soils make up about 60 percent of this soil complex, and Iredell soils make up the rest. The soils occupy small areas on ridges. They have lost much of their original surface layer through erosion, and the present surface layer is only 4 to 8 inches thick. Included with these soils in mapping were areas where erosion has been so severe that the present plow layer is firm clay loam; some areas that contain a few shallow gullies; and areas where the slopes are steeper than 7 percent. Also included were small areas of Bremo and Zion soils.

About 53 percent of the acreage is in pasture, 43 percent is in forest, and 4 percent is in field crops. The soils are better suited to pasture or trees than to field crops. (Capability unit IVe–4; woodland suitability group 14)

Orange Series, Concretionary Variant

Soils of the Orange series, concretionary variant, resemble normal Orange soils, except that their subsoil contains a horizon that is 30 to 60 percent black mineral concretions and small quartz pebbles. Thickness of this horizon ranges from only a few inches to more than 12 inches.

In a typical profile, the surface layer is chiefly light yellowish-brown and is silt loam about 13 inches thick. Beneath the surface layer is a layer of olive-yellow light silty clay loam that is about 4 inches thick and contains a few faint mottles. A compact, weakly cemented layer of mottled, yellowish-brown gravelly silty clay loam, about 7 inches thick, is at a depth of about 17 inches. Below this layer is yellowish-brown clay.

Representative profile of Orange silt loam, concretionary variant, 0 to 2 percent slopes, in a forest of pines and hardwoods 1¼ miles north of Locustgrove along Virginia Highway No. 614:

O2—1 inch to 0, dark-gray (10YR 4/1), partly decomposed forest litter; loose.

A1—0 to 1 inch, grayish-brown (2.5Y 5/2) silt loam; weak, fine, granular structure; very friable when moist; many fine roots; many small quartz pebbles; clear, smooth boundary.

A2—1 to 13 inches, light yellowish-brown (2.5Y 6/4) silt loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; few small quartz pebbles as much as 1½ inches in diameter; gradual, smooth boundary.

B1—13 to 17 inches, olive-yellow (2.5Y 6/6) light silty clay loam; few, fine, faint mottles of pale olive (5Y 6/4); weak, fine, subangular blocky structure; friable when moist; common fine and medium roots; few quartz pebbles; clear, wavy boundary.

B21cn—17 to 24 inches, yellowish-brown (10YR 5/6) gravelly silty clay loam; common, medium, distinct mottles of pale olive (5Y 6/4) and light olive brown (2.5Y 5/6); moderate, medium, subangular blocky structure; hard when dry, slightly sticky and slightly plastic when wet; compact and weakly cemented; about 60 percent of this horizon is small quartz pebbles and black iron and manganese concretions; gradual, wavy boundary.

B22t—24 to 27 inches, yellowish-brown (10YR 5/6) clay; common, medium, distinct mottles of light yellowish brown (10YR 6/4) and light olive brown (2.5Y 5/4); massive when wet; strong subangular blocky structure when dry; very firm when moist, very hard and tends to crack when dry, very plastic and sticky when wet; few thin clay films; gradual, smooth boundary.

B23t—27 to 36 inches, yellowish-brown (10YR 5/6) clay; common, medium, prominent mottles of light brownish gray (2.5Y 6/2) and olive yellow (2.5Y 6/6); coarse, angular, blocky structure; very firm when moist, very plastic and sticky when wet; many, distinct, continuous clay films; gradual, wavy boundary.

C—36 to 44 inches, multicolored (green, gray, white, and black), highly weathered material from basic rocks; firm in place but has a texture of coarse sandy loam if crushed; diffuse, irregular boundary.

R—44 inches +, hard diorite rock.

The A horizons range from 3 to 16 inches in combined thickness and from light yellowish brown or grayish brown to olive brown in color. The B1 horizon ranges from 3 to 8 inches in thickness. In places mottles in that horizon are olive yellow. The B21cn horizon ranges from only a few inches to more than 12 inches in thickness. The content of gravel and concretions in that horizon ranges from 30 to 60 percent. The B22t and B23t horizons range from 12 to 24 inches in combined thickness. Base saturation is greater than 35 percent in the lower part of the profile. Depth to hard rock ranges from 3 to 5 feet or more.

Orange silt loam, concretionary variant, 0 to 2 percent slopes (OgA).—This soil is on broad upland flats near Locustgrove and Wilderness. It has the profile described as representative of the Orange series, concretionary variant. The surface layer is 8 to 16 inches thick. Included with this soil in mapping were some areas where small amounts of gravel are strewn over the surface; a few spots where the surface layer is loam; and small spots of Elbert soils.

About 84 percent of the acreage is in forest, 12 percent is in pasture, and 4 percent is in field crops. This soil is not well suited to cultivated crops, for it is difficult to keep in good tilth and remains wet for long periods of time. It is suitable for pasture and trees. (Capability unit IVw–1; woodland suitability group 14)

Orange silt loam, concretionary variant, 2 to 7 percent slopes (OgB).—This soil is on upland flats and ridgetops. It has a surface layer 8 to 14 inches thick. Included with it in mapping were small spots where the surface layer is loam; small spots occupied by Fluvanna and Nason soils; and areas that have enough quartz pebbles on the surface to interfere with cultivation.

About 84 percent of the acreage is in forest, 10 percent is in pasture, and 6 percent is in field crops. This soil is not well suited to cultivation, but it is suited to red clover, small grains, and pasture crops. (Capability unit IIIe–5; woodland suitability group 14)

Orange silt loam, concretionary variant, 2 to 7 percent slopes, eroded (OgB2).—This soil has lost part of its surface layer through sheet erosion, and the present surface layer is only 3 to 6 inches thick. There are a few shallow gullies near drainageways, and some rock outcrops. In some areas quartz pebbles are on the surface. Concretions are mixed with the material in the B1 horizon in places. Included with this soil in mapping were spots in which the surface layer is silty clay loam, and a few small, scattered areas that lack a concretionary horizon.

About 76 percent of the acreage is in forest, 15 percent is in pasture, and 9 percent is in field crops. This soil is not suited to cultivation, but it is suited to clover and grasses grown for hay or pasture. (Capability unit IVe–4; woodland suitability group 14)

Orange silt loam, concretionary variant, 7 to 15 percent slopes, eroded (OgC2).—This sloping soil occurs in narrow strips along drainageways. Most areas have been affected by erosion. As a result, the present surface layer is yellowish brown and is only 3 to 6 inches thick. The subsoil is mottled and ranges from 6 to 18 inches in thickness. The B1 horizon is absent in places, and the concretionary layer is only 1 to 6 inches thick. Included with this soil in mapping were spots in which the surface layer is silty clay loam; some areas where bedrock crops out; gullied areas; and scattered areas of Bremo soils.

Nearly all of the acreage is in forest, and this soil should remain in trees. (Capability unit VIe–3; woodland suitability group 14)

Penn Series

Soils of the Penn series are moderately deep, well drained, and gently sloping or sloping. They are on uplands throughout the area that extends from Barboursville in a northeasterly direction to Raccoon Ford. The material in which these soils formed has weathered from shale, sandstone, and conglomerates. The native vegetation is white, scarlet, black, and red oaks, hickory, dogwood, redcedar, and Virginia pine.

In a typical profile, the surface layer is dark reddish-brown to dusky-red silt loam about 11 inches thick. The subsoil is weak-red shaly silt loam that extends to a depth of about 24 inches. It is underlain by weak-red material weathered from shale. Hard shale is at a depth of about 28 inches.

Penn soils are very strongly acid. They are low in content of organic matter and in natural fertility. Infiltration and permeability are moderately rapid. The available moisture capacity is moderate, and these soils are somewhat droughty.

These soils are mostly in forest. Small acreages are in pasture and field crops.

Representative profile of Penn silt loam, 2 to 7 percent slopes, in a pasture one-fourth mile west of Somerset and north of Highway No. 655:

A1—0 to 3 inches, dusky-red (10R 3/3) silt loam; moderate, fine, granular structure; very friable when moist; many fine roots; few fragments of shale up to one-fourth inch in diameter; clear, smooth boundary.

A2—3 to 11 inches, dark reddish-brown (2.5YR 3/4) shaly silt loam; moderate, fine, granular structure; friable when moist; common fine roots; 20 percent of horizon is fragments of shale up to one-half inch in diameter; gradual, wavy boundary.

Bt—11 to 24 inches, weak-red (10R 4/4) shaly silt loam; weak, fine, subangular blocky structure; friable when moist; approximately 35 percent of this horizon is fragments of dusky-red shale; few thin clay films on the fragments of shale; few roots; gradual, wavy boundary.

C—24 to 28 inches, weak-red (10R 4/3), weathered shale material that is firm in places; breaks down to very shaly silt loam soil material if dug out; gradual, wavy boundary.

R—28 inches +, hard, dusky-red shale.

The A horizon ranges from 8 to 12 inches in thickness and from dark reddish brown or reddish brown to dusky red in color. The Bt horizon ranges from 8 to 16 inches in thickness and from dark reddish brown to weak red in color. The content of clay in the Bt horizon is 18 to 25 percent. The base saturation in the lower part of the profile is greater than 35 percent. Thickness of the solum ranges from 20 to 34 inches. The content of coarse fragments in the solum is greater than 20 percent. Depth to hard rock ranges from 22 to 40 inches.

Penn soils occur with Klinesville, Rapidan, Bucks, Wadesboro, and Mayodan soils. They are deeper and contain fewer coarse fragments than the Klinesville soils, and they contain somewhat more clay than the Klinesville soils. They are shallower over bedrock (fig. 5) and contain less clay than any of the associated soils.

Penn silt loam, 2 to 7 percent slopes (PeB).—This soil has the profile described as representative of the series. Included with it in mapping, however, were some cultivated areas where the surface layer is yellowish red. Also included were areas of loam; a few areas where fragments of shale are strewn over the surface; and areas of a soil that has a light silty clay loam surface layer and a dark-red subsoil. Other inclusions consist of small areas of Bucks and Rapidan soils.

About 41 percent of the acreage is in forest, 35 percent is in field crops, and 24 percent is in pasture. This soil is better suited to small grains and hay than to cultivated crops. (Capability unit IIIe–6; woodland suitability group 4)

Penn silt loam, 7 to 15 percent slopes (PeC).—This soil is on side slopes near the tops of ridges. The surface layer is 8 to 10 inches thick. The plow layer is yellowish red in some cultivated fields. A few shallow gullies have formed in some areas. Small areas of Bucks, Klinesville, and Wadesboro soils were included with this soil in mapping. Also included were a few areas where the surface layer is loam; some outcrops of rock; and other areas where fragments of shale and conglomerate are strewn over the surface. The rock outcrops and areas where shale and conglomerate are on the surface are indicated on the soil map by appropriate symbols.

About 46 percent of the acreage is in pasture, 42 percent is in forest, and 12 percent is in field crops. This soil is better suited to pasture and trees than to field crops. It is not well suited to cultivated crops. (Capability unit IVe–3; woodland suitability group 4)

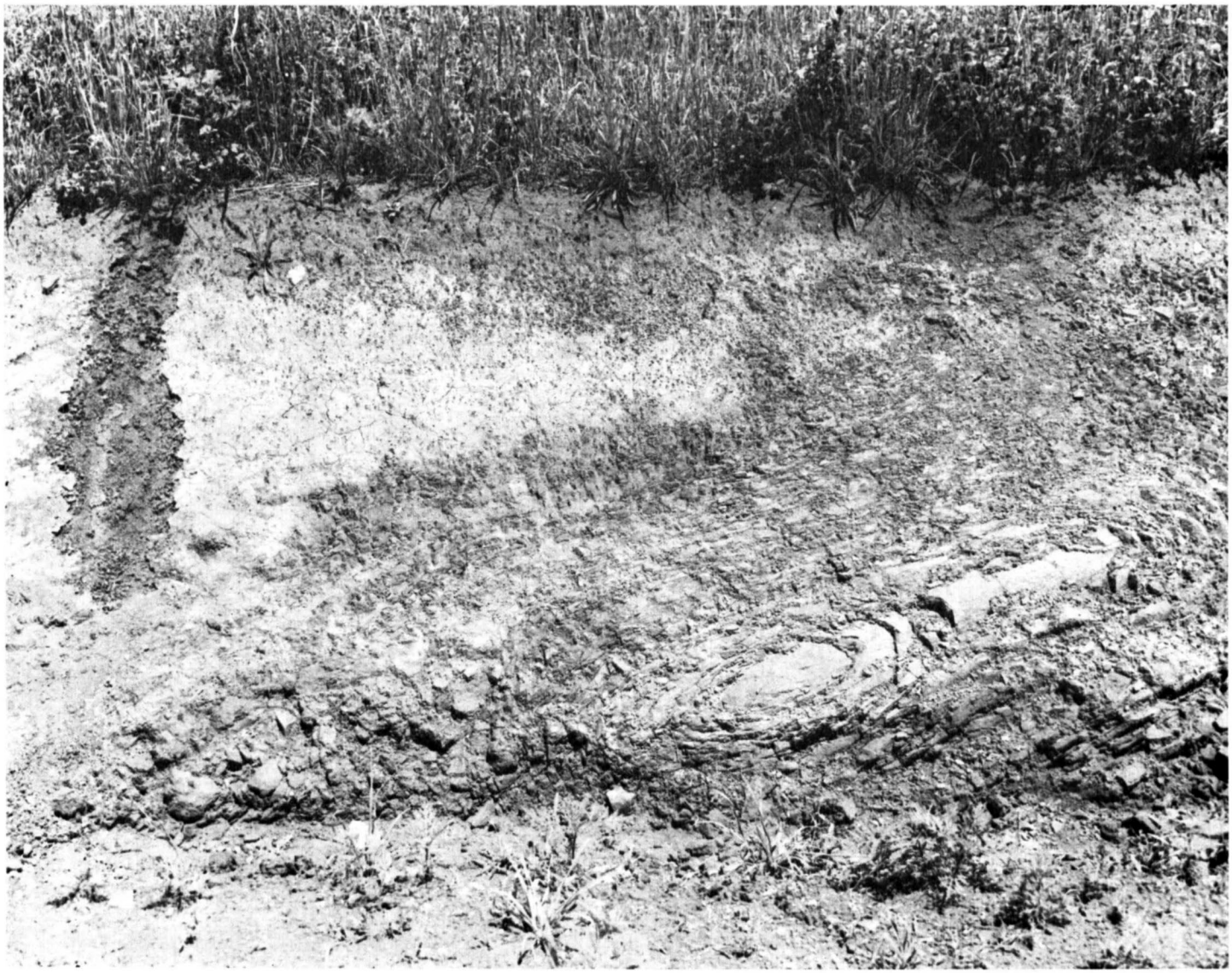

Figure 5.—**Area of Penn and Bucks silt loams. Red shale is nearer the surface in the Penn soil, on the right, than in the Bucks soil, on the left.**

Pinkston Series

The Pinkston series consists of moderately deep or deep, well-drained or somewhat excessively drained soils that occupy uplands west and southwest of Barboursville. These soils have formed in material weathered from sandstone conglomerate of Triassic age. The native vegetation is white, scarlet, black, and red oaks, hickory, dogwood, redcedar, and Virginia pine.

In typical profile, the surface layer is brown to dark-brown and reddish-brown fine sandy loam about 8 inches thick. The subsoil is reddish-brown sandy loam, and it extends to a depth of about 18 inches. Underlying the subsoil is mottled, yellowish-red material from strongly weathered rocks.

Pinkston soils are very strongly acid. They are low in content of organic matter and in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderately rapid in the subsoil. The available moisture capacity is low to moderate.

These soils are in forest or pasture.

Representative profile of Pinkston fine sandy loam, 7 to 15 percent slopes, in a cutover pine forest 1 mile southwest of Barboursville and west of Highway No. 20:

A1—0 to 3 inches, brown to dark-brown (7.5YR 4/2) fine sandy loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; few quartz pebbles; clear, smooth boundary.

A2—3 to 8 inches, reddish-brown (5YR 5/4) fine sandy loam; weak, fine, granular structure; very friable when moist; many roots; few fragments of quartz and sandstone; gradual, smooth boundary.

B—8 to 18 inches, reddish-brown (5YR 4/4) sandy loam; weak, very fine, subangular blocky structure; friable when moist; contains lenses and irregular masses of light sandy clay loam; few fine and medium roots;

many fragments of sandstone and some red shale that together make up to 20 percent of horizon, by volume; numerous coarse sand grains; gradual, smooth boundary.

C—18 to 35 inches, yellowish-red (5YR 4/6), strongly weathered sandstone conglomerate mottled with strong brown (7.5YR 5/6) and red (2.5YR 4/6); easily crushed to sandy loam soil material; firm in place; loose if dug out; gradual, smooth boundary.

C&R—35 inches +, strong-brown, weak-red, red, yellow, and gray weathered sandstone conglomerate; firm to hard in place; loose and very friable if dug out; contains pockets of silt loam material between the cracks.

The A horizon ranges from 7 to 14 inches in thickness and from brown or dark brown to reddish brown in color. The B horizon is weakly expressed and ranges from 6 to 12 inches in thickness. The color of the B horizon ranges from reddish brown to weak red. The texture is generally sandy loam, but this horizon contains lenses and pockets of light sandy clay loam. Thickness of the solum ranges from 12 to 20 inches. Approximately 20 percent, by volume, of the C&R horizon is fragments of rock. Depth to hard rock ranges from 3½ to more than 6 feet.

Pinkston soils occur with Mayodan, Wadesboro, and Calverton soils. They have a less clearly defined subsoil, and they contain more sand and much less clay, than the Mayodan and Wadesboro soils. Pinkston soils are better drained and contain less clay than the Calverton soils, and they lack the fragipan that is typical in the profile of the Calverton soils.

Pinkston fine sandy loam, 7 to 15 percent slopes (PkC).—This soil is on side slopes near the tops of ridges. It has the profile described as representative of the series. Some areas of loam or sandy loam were included in mapping. Also included were a few outcrops of rock and areas where a few loose pebbles of sandstone and quartz are on the surface. Other inclusions consist of a few small areas of Mayodan and Wadesboro soils and 29 acres of Pinkston soils that have slopes of less than 7 percent.

About 68 percent of the acreage is in forest, 20 percent is in pasture, and 12 percent is in field crops. This soil is better suited to pasture or trees than to field crops. It is not well suited to cultivated crops. (Capability unit IVe–3; woodland suitability group 4)

Pinkston fine sandy loam, 15 to 25 percent slopes (PkD).—This soil is on abruptly breaking side slopes near streams. Some areas where the surface layer is loam or sandy loam were included in mapping. Also included were some rock outcrops and a few areas that have been affected by erosion. Other inclusions consist of small areas of Mayodan soils and 47 acres of Pinkston soils that have slopes steeper than 25 percent.

About 80 percent of the acreage is in forest, and 20 percent is in pasture. This soil is better suited to pasture and trees than to field crops. It is not suited to crops that require cultivation. (Capability unit VIe–2; woodland suitability group 4)

Rabun Series

Deep, well-drained, gently sloping to steep soils of Piedmont uplands are in the Rabun series. These soils occur throughout the part of the county underlain by greenstone, and they have formed in material weathered from greenstone. The native vegetation is red, white, black, and scarlet oaks, black locust, redbud, dogwood, hickory, yellow-poplar, and black walnut.

In a typical profile, the surface layer is dark reddish-brown to dark-red clay loam about 7 inches thick. The subsoil is dark-red clay to silty clay loam. It extends to a depth of about 32 inches and is underlain by yellowish-red material weathered from greenstone.

Rabun soils are medium acid. They have a medium to high content of organic matter and are medium to high in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are mainly in forest and pasture.

Representative profile of Rabun clay loam, 7 to 15 percent slopes, eroded, on the west side of Clark Mountain, in a hardwood forest along Highway No. 697:

O1—1 to ¼ inch, undecomposed forest litter of twigs, sticks, and leaves.

O2—¼ inch to 0, dark reddish-brown (5YR 3/3), partly decomposed duff; clear, smooth boundary.

A1—0 to 1 inch, dark reddish-brown (2.5YR 3/4) clay loam; moderate, fine, granular structure; very friable when moist; many fine and medium roots; few fragments of greenstone; clear, smooth boundary.

A3—1 to 7 inches, dark-red (2.5YR 3/6) clay loam; moderate, medium, granular structure; friable when moist; many fine and medium roots; few fragments of greenstone; gradual, smooth boundary.

B2t—7 to 20 inches, dark-red (10R 3/6) clay; strong, fine and medium, subangular blocky structure; firm when moist; many, thin, continuous clay films; coarse and medium roots; clear, wavy boundary.

B3t—20 to 32 inches, dark-red (2.5YR 3/6) silty clay loam; few, fine, distinct mottles of reddish yellow (7.5YR 6/6); moderate, fine, subangular blocky structure; friable when moist; few patchy clay films; few medium and coarse roots; many fragments of weathered greenstone; clear, wavy boundary.

C—32 to 45 inches +, yellowish-red (5YR 5/8) material from greenstone; material becomes harder with increasing depth; reddish-yellow (7.5YR 6/8) and red (2.5YR 4/8) mottles; firm in place; crushes to friable silt loam if dug out; few black streaks along surfaces of peds.

The A horizons range from 4 to 10 inches in combined thickness and from dark reddish brown to dark red in color. In places their texture is clay. The B horizons range from clay to silty clay loam in texture and from 24 to 40 inches in combined thickness. The B2t horizon is 8 to 24 inches thick. The content of clay in the B horizons ranges from 35 to 50 percent. The solum is 30 to 60 inches thick. Depth to hard rock ranges from 4 to more than 10 feet, but it is about 6 feet in most places.

Rabun soils occur with Davidson and Catoctin soils. They have a thinner B2t horizon than the Davidson soils. Rabun soils are deeper, have a more distinct subsoil, contain more clay, and are more reddish than the Catoctin soils.

Rabun clay loam, 2 to 7 percent slopes, eroded (RaB2).—This soil has a surface layer that is 5 to 9 inches thick. Included in mapping were some areas of silt loam and small areas of Starr and Davidson soils. Also included were outcrops of rock and areas where fragments of greenstone are strewn over the surface. The soils surrounding the outcrops of rock are shallower over bedrock than normal for this Rabun soil.

About 62 percent of the acreage is in forest, 22 percent is in pasture, and 16 percent is in field crops. This soil is well suited to all the commonly grown crops, but it is better suited to corn, small grains, and alfalfa than to other crops. (Capability unit IIe–1; woodland suitability group 6)

Rabun clay loam, 7 to 15 percent slopes, eroded (RaC2).—This soil has the profile described as representative of the series. The surface layer is 4 to 8 inches thick.

In some wooded areas, a large amount of organic matter from decayed leaves has accumulated to a depth of about 1 inch, and this organic matter gives the soil material a reddish-black color. A few shallow gullies have formed in places. Included with this soil in mapping were areas where the surface layer is silt loam; some areas where greenstone pebbles are strewn over the surface; scattered areas where little or no erosion has taken place; and some severely eroded areas. Also included were outcrops of rock, shown on the soil map by an appropriate symbol, and areas of Starr soils along small drainageways.

About 58 percent of the acreage is in forest, 28 percent is in pasture, and 14 percent is in field crops. The crops most commonly grown are corn, small grains, and hay, including alfalfa. (Capability unit IIIe–1; woodland suitability group 6)

Rabun clay loam, 15 to 25 percent slopes, eroded (RaD2).—This soil is on side slopes near the tops of ridges, and it is also on the sides of hills near drainageways. The surface layer is 4 to 8 inches thick. Included in mapping were areas of silt loam; areas where loose greenstone pebbles are on the surface; and small areas where little or no erosion has occurred. Also included were outcrops of rock and small areas of Catoctin and Davidson soils. The soils surrounding the rock outcrops are shallower over bedrock than normal for this Rabun soil.

About 63 percent of the acreage is in forest, 25 percent is in pasture, and 12 percent is in field crops. This soil is better suited to pasture and trees than to field crops. It is well suited to alfalfa, but it is not well suited to cultivated crops. (Capability unit IVe–1; woodland suitability group 6)

Rabun clay loam, 25 to 45 percent slopes, eroded (RaE2).—This soil is on hillsides and bluffs adjacent to streams. It has a surface layer 4 to 8 inches thick. Included in mapping were outcrops of rock, places where small fragments of greenstone are strewn over the surface, and scattered severely eroded areas where the surface layer is clay.

About 54 percent of the acreage is in forest, and 46 percent is in pasture. This soil is better suited to trees and pasture than to field crops. (Capability unit VIe–1; woodland suitability group 6)

Rabun clay, 15 to 25 percent slopes, severely eroded (RcD3).—This soil is on hillsides near drainageways. All, or nearly all, of the original surface layer has been lost through erosion. The present surface layer is about 4 inches thick and consists mainly of dark-red to dark reddish-brown material from the subsoil. Some areas of this soil contain shallow, active gullies, and there are outcrops of bedrock in some places. Small areas of Davidson soils were included in mapping.

About 60 percent of the acreage is in pasture, 28 percent is in forest, and 12 percent is in field crops. This soil is better suited to pasture or trees than to field crops. It is not suitable for cultivation. (Capability unit VIe–1; woodland suitability group 7)

Rapidan Series

The Rapidan series consist of deep, well-drained soils that are gently sloping to moderately steep. These soils occur in a narrow strip of uplands, on the west side of the area underlain by Catoctin greenstone. They have formed in material weathered from trap conglomerate of Triassic age. The native vegetation is red, white, black, and scarlet oaks, dogwood, redbud, black walnut, hickory, yellow-poplar, redcedar, and black locust.

In a typical profile, the surface layer is dark reddish-brown silt loam about 9 inches thick. The subsoil extends to a depth of about 48 inches and is dark-red to dark reddish-brown silty clay loam to clay. It is underlain by red, highly weathered material containing fragments of greenstone, conglomerate, and shale.

The Rapidan soils are medium acid to very strongly acid, and they are medium to high in content of organic matter and in natural fertility. Their capacity for absorbing, storing, and supplying moisture for plants is high. These soils are in only fair tilth, and the range of moisture content within which they can be tilled and still retain desirable tilth is narrow.

These soils are among those soils of the county that are best suited to crops. They are used mainly for field crops.

Representative profile of Rapidan silt loam, 2 to 7 percent slopes, eroded, in a field of alfalfa 2 miles west of Orange along Highway No. 633:

Ap—0 to 9 inches, dark reddish-brown (2.5YR 3/4) silt loam; moderate, fine, granular structure; very friable when moist; many fine roots; few small quartz pebbles; few small fragments of greenstone; gradual, smooth boundary.

B21t—9 to 18 inches, dark reddish-brown (2.5YR 3/4) silty clay loam; moderate, fine and medium, subangular blocky structure; friable when moist; few, thin, patchy clay films; common roots; few spots of yellow around fragments of weathered greenstone; a few fragments of conglomerate and shale; common fine pores; gradual, smooth boundary.

B22t—18 to 38 inches, dark-red (2.5YR 3/6) clay; strong, medium and some fine, subangular blocky structure; firm when moist, hard when dry, sticky and slightly plastic when wet; many continuous clay films; few alfalfa roots; few weathered fragments of greenstone and conglomerate; few black and yellow streaks; few coarse sand grains; gradual, smooth boundary.

B3t—38 to 48 inches, dark-red (2.5YR 3/6) silty clay loam; common, medium, distinct mottles of red (2.5YR 5/8) and weak red (10R 5/3); moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common thin clay films; 25 to 35 percent of horizon, by volume, is fragments of weathered greenstone and conglomerate; few coarse sand grains; few streaks of black and yellow around fragments of rock; gradual, wavy boundary.

C—48 to 70 inches, red (2.5YR 5/6), highly weathered silty clay loam soil material mottled and streaked with strong brown (7.5YR 5/6), yellowish red (5YR 4/6), reddish brown (2.5YR 5/4), and yellowish brown (10YR 5/4); firm in place, friable if dug out; numerous fragments of greenstone, conglomerate, and shale.

R—70 inches +, hard, conglomerate rock.

The A horizon ranges from 4 to 12 inches in thickness. Color of the B2 horizons ranges from dark red to dark reddish brown. The B22t horizon has a clay content of 40 to 50 percent. The solum ranges from 30 to 60 inches in thickness, but it is about 48 inches thick in most places. The C horizon consists of material weathered from trap conglomerate. Depth to hard rock ranges from 4 to as much as 12 feet.

Rapidan soils occur with Bucks and Penn soils and, to a lesser extent, with Davidson soils. They are more reddish and

have a higher content of clay throughout the profile than the Bucks soils, and they contain more clay and have a deeper, more clearly defined profile than the Penn soils. Rapidan soils have a somewhat lower content of clay and a higher content of silt than the Davidson soils.

Rapidan silt loam, 2 to 7 percent slopes, eroded (RdB2).—This soil has the profile described as representative of the series. The surface layer is 4 to 12 inches thick. A few areas contain shallow gullies, and the subsoil is dark reddish-brown in some places. Small fragments of greenstone are on the surface in many places, but they are not numerous enough to interfere with tillage. Included with this soil in mapping were areas in which the surface layer is silty clay loam; small areas of Davidson and Bucks soils; and small areas of Starr and Manassas soils along small drainageways and in depressions.

About 65 percent of the acreage is in field crops, 23 percent is in pasture, and 12 percent is in forest. This soil is among the soils best suited to crops commonly grown in this county. (Capability unit IIe-1; woodland suitability group 6)

Rapidan silt loam, 7 to 15 percent slopes, eroded (RdC2).—This soil is on the tops of ridges and on side slopes near the tops of ridges. The surface layer is 4 to 8 inches thick. A few shallow gullies have formed in places, and the subsoil is exposed in many small areas. Included in mapping were areas of Davidson and Bucks soils. Also included were outcrops of rock that are shown on the soil map by an appropriate symbol. The soils surrounding these outcrops are browner and shallower over bedrock than normal for Rapidan soils.

About 45 percent of the acreage is in field crops, 43 percent is in pasture, and 12 percent is in forest. This soil is well suited to all the commonly grown crops. It is especially well suited to alfalfa, red clover, and bluegrass grown for pasture. (Capability unit IIIe-1; woodland suitability group 6)

Rapidan silty clay loam, 7 to 15 percent slopes, severely eroded (ReC3).—This soil has a profile similar to the one described as representative of the series, except that erosion has removed much of the original surface layer. The present surface layer is dark reddish-brown to dark-red silty clay loam, and it is only about 4 inches thick. A few shallow, active gullies have formed. Included in mapping were small areas in which the surface layer is clay; small, scattered areas where the slopes are less than 7 percent; and a few areas where the slopes are steeper than 15 percent. Also included were small areas of Davidson soils.

About 50 percent of the acreage is in pasture, 30 percent is in field crops, and 20 percent is in forest. This soil is better suited to pasture and hay crops, especially alfalfa, than to cultivated crops. (Capability unit IVe-1; woodland suitability group 7)

Roanoke Series

In the Roanoke series are deep, poorly drained soils that are level or nearly level. These soils are on low terraces along the Rapidan River, the North Anna River, Mountain Run, and other large streams. They have formed in old alluvium of sand, silt, and clay that washed from soils of the Piedmont Plateau. The native vegetation is sycamore, willow, red maple, river birch, elm, and white, scarlet, pin, and willow oaks.

In a typical profile, the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsoil extends to a depth of about 81 inches, and it consists mostly of highly mottled, grayish and brownish clay. The subsoil is underlain by light brownish-gray sandy clay loam that contains numerous river pebbles.

The Roanoke soils are strongly acid and are low in content of organic matter and in natural fertility. Infiltration is moderately slow in the surface layer, and permeability is slow in the subsoil. Runoff is very slow, and water tends to pond on the surface for long periods of time. These soils have a seasonal high water table and are subject to infrequent flooding. Their available moisture capacity is moderate to high.

Roanoke soils are used mainly for pasture. They are poorly suited to crops that require cultivation.

Representative profile of Roanoke silt loam in a forest of cedar, swamp maple, pin oak, and willow oak along Highway No. 636, 1 mile west of the junction of Highways No. 636 and No. 626 along the Rapidan River:

Apg—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine, distinct mottles of light brownish gray (10YR 6/2) and yellowish brown (10YR 5/4); weak, fine, granular structure; very friable when moist; many fine roots; gradual, smooth boundary.

B1tg—7 to 12 inches, grayish-brown (10YR 5/2) silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, fine, subangular blocky structure; friable when moist; many fine and medium roots; few pockets of clay; clear, smooth boundary.

B21tg—12 to 23 inches, dark grayish-brown (2.5Y 4/2) clay; many, coarse, prominent mottles of light olive brown (2.5Y 5/6); moderate, medium, angular blocky structure; sticky and plastic when wet; few medium and coarse roots; common distinct clay films; gradual, smooth boundary.

B22tg—23 to 51 inches, dark-gray (N 4/0) clay; few, medium, distinct mottles of grayish brown (2.5Y 5/2); massive when wet, coarse angular blocky structure when dry; sticky and plastic when wet; few medium and coarse roots; many distinct clay films; few rounded quartz pebbles; gradual, smooth boundary.

B23tg—51 to 75 inches, light brownish-gray (10YR 6/2) clay; many, coarse, prominent mottles of grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4); massive when wet, coarse angular blocky structure when dry; sticky and plastic when wet; common distinct clay films; few rounded quartz pebbles and few rounded river pebbles; gradual, smooth boundary.

B3tg—75 to 81 inches, light brownish-gray (2.5Y 6/2) clay loam; many, medium, distinct mottles of pale yellow (2.5Y 7/4), dark gray (N 4/0), and yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; slightly sticky and slightly plastic when wet; few rounded river stones up to 3½ inches in diameter; few pockets of sand; gradual, smooth boundary.

C—81 to 90 inches +, light brownish-gray (2.5Y 6/2) sandy clay loam and numerous river pebbles; common, medium, distinct mottles of light gray (2.5Y 7/2) and yellowish brown (10YR 5/4); firm in place, but friable if disturbed.

The A horizon ranges from 6 to 12 inches in thickness and from gray or dark gray to dark grayish brown in color. In places it is mottled with yellowish red, as well as with light brownish gray and yellowish brown. Contrast of the mottles ranges from faint to distinct in the A horizon. Texture of the B horizons ranges from sandy clay loam to clay. The B2 horizons are predominantly

grayish, but they are highly mottled with various shades of olive, brown, and yellow. Depth to the underlying stratified sandy and clayey material is variable, but generally it is more than 4 feet. Depth to hard rock ranges from 5 to more than 10 feet.

Roanoke soils occur with Elsinboro, Altavista, and Augusta soils, which are also on stream terraces. Unlike these associated soils, they are poorly drained. Also, they occur at a lower elevation and have a higher content of clay than any of these soils.

Roanoke silt loam (0 to 2 percent slopes) (Rk).—This is the only soil of the Roanoke series mapped in Orange County. Most areas have been bedded during farming operations. As a result, the surface layer varies in thickness and color. Included with this soil in mapping were areas of Augusta and Worsham soils.

About 45 percent of the acreage is in pasture, 35 percent is in forest, and 20 percent is in field crops. This soil is too wet for tilled crops, and drainage outlets are difficult to obtain. Its usefulness for growing field crops or trees is limited, but pasture is a suitable use. (Capability unit Vw–1; woodland suitability group 3)

Rock Land

Rock land is made up of areas where rock outcrops and loose stones occupy 25 to 50 percent of the surface. These land types are not suitable for cultivation, and the use of machinery is impractical.

Rock land, acidic, sloping (RnC) consists of gently sloping and sloping areas that contain outcrops of granite, schist, quartz, and sandstone. The outcrops are roughly 10 to 30 feet apart and cover 25 to 50 percent of the surface. Thickness of the soil material between the outcrops ranges from a few inches to several feet. This land type occurs in small areas throughout the county, with Louisburg, Appling, Manteo, Nason, and Hazel soils.

In the soil material between the rocks, the rates of infiltration and permeability range from rapid to moderately slow. Runoff is medium to rapid, and reaction is medium acid to extremely acid. The supply of organic matter and the natural fertility range from low to medium.

About 80 percent of the acreage is in forest, and the rest is in pasture. This land type is better suited to trees than to pasture, but some areas can be used for pasture if they are well managed. (Capability unit VIs–1; woodland suitability group 17)

Rock land, acidic, moderately steep (RnD) occupies deeply dissected uplands, mainly along drainageways and stream bluffs near areas of Hazel, Manteo, and Louisburg soils. Rock outcrops are 10 to 30 feet apart and cover 25 to 50 percent of the surface. The soil material between the outcrops is shallow.

Infiltration and permeability are rapid in the soil material between the rock outcrops. Runoff is rapid or very rapid, and internal drainage is excessive. The supply of organic matter and the natural fertility are low or moderately low.

About 95 percent of the acreage is in forest, and 5 percent is in pasture. This land type is better suited to trees than to pasture or other uses. (Capability unit VIIs–1; woodland suitability group 17)

Rock land, basic, sloping (RoC) consists of rock outcrops and of areas where loose stones are on the surface. The outcrops are 10 to 30 feet apart and cover 25 to 50 percent of the surface. The soil material between the outcrops ranges from only a few inches to more than 4 feet in thickness. This land type is sloping or gently sloping. It occurs mainly on Clark Mountain and throughout the Southwestern Mountain range. Near Lahore, small areas of this land type are mostly diorite or basic dikes of diabase. In the mountainous areas, the bedrock is predominantly Catoctin greenstone. Areas of this land type occur with Davidson, Catoctin, Bremo, Zion, Iredell, Orange, and Lloyd soils.

This land type is medium acid to strongly acid. Infiltration ranges from rapid to slow, and permeability ranges from slow to very rapid. The content of organic matter and the natural fertility are medium, and runoff is slow to medium. Available moisture capacity ranges from low to high. The effects of sheet erosion have been only slight in most areas.

About 70 percent of the acreage is in forest, and 30 percent is in pasture. This land type is better suited to forest than to pasture or other uses. Under good management, however, it is well suited to native bluegrass pasture. Rock outcrops prevent the use of machinery. (Capability unit VIs–1; woodland suitability group 17)

Rock land, basic, steep (RoE) occupies deeply dissected uplands, mountainsides, and stream bluffs near or adjacent to areas of Catoctin, Davidson, Bremo, and Wilkes soils. It is moderately steep and steep, and it consists of rock outcrops and of places where loose stones are on the surface. Rock outcrops are 10 to 30 feet apart and cover 25 to 50 percent of the surface. The soil material between the outcrops is shallow to moderately deep over bedrock.

Infiltration and permeability are rapid. Runoff is rapid or very rapid, and the content of organic matter and natural fertility are medium.

This land type is not well suited to pasture. Nearly all of the acreage is in forest and should remain in forest. (Capability unit VIIs–1; woodland suitability group 17)

Rowland Series

Moderately well drained, nearly level soils on flood plains along Blue Run are in the Rowland series. These soils have formed in fairly recent deposits of fine-textured material washed chiefly from soils of lowlands in the county. They are subject to frequent flooding. The native vegetation is willow, sycamore, elm, red birch, boxelder, willow oak, white oak, alder, beech, and red maple.

In a typical profile, the surface layer is reddish-brown silt loam about 11 inches thick. The subsoil consists of mottled, brown and strong-brown to yellowish-red silty clay loam to sandy clay loam, and it extends to a depth of about 38 inches.

The Rowland soils are medium acid to strongly acid. They are medium in content of organic matter and in natural fertility, and they have a seasonal high water table. Infiltration is rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is moderate to high.

These soils are used largely for pasture or forests.

Representative profile of Rowland silt loam in a brushland pasture, 1½ miles southwest of Somerset along Blue Run:

A1—0 to 11 inches, reddish-brown (5YR 4/4) silt loam; weak, fine, granular structure; very friable when moist, slightly sticky when wet; many fine and medium roots; many fine pores; clear, wavy boundary.

B1—11 to 18 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/8) and pinkish gray (5YR 6/2); weak, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few fine roots; gradual, smooth boundary.

B21t—18 to 30 inches, strong-brown (7.5YR 5/6) clay loam; common, medium, distinct mottles of yellowish red (5YR 5/6) and light gray (7.5YR 6/2); moderate; fine and medium, subangular blocky structure; slightly sticky and slightly plastic when wet; few fine roots; clear, smooth boundary.

B22t—30 to 38 inches, yellowish-red (5YR 5/8) sandy clay loam; many, coarse, prominent mottles of strong brown (7.5YR 5/8), light reddish-brown (5YR 6/4), light gray (5YR 6/1), and weak red (10R 5/2); moderate, fine, subangular blocky structure; slightly plastic and slightly sticky when wet; many quartz and sandstone pebbles; few shale fragments; few pockets of clay; clear, smooth boundary.

IICg—38 to 62 inches +, pinkish-gray (7.5YR 6/2), weathered conglomerate of gravel and silt stratified with sand; prominent mottles of yellowish brown (10YR 5/4) and weak red (2.5YR 5/2).

The A horizon ranges from reddish brown to dark reddish brown in color and from 8 to 14 inches in thickness. Texture of the B horizons ranges from sandy clay loam to silty clay loam. In most places mottling is at depths of 8 to 16 inches, but it begins at a depth below 20 inches in some places. The B horizons are free of stones, but sand, silt, and pebbles of quartz, sandstone, greenstone, and red shale are at depths ranging from 38 to 42 inches. Depth to hard rock ranges from 4 to about 10 feet.

Rowland soils occur with Bermudian and Bowmansville soils. They are better drained and are less grayish than the Bowmansville soils, and they are less well drained than the Bermudian soils.

Rowland silt loam (0 to 2 percent slopes) (Rw).—This is the only soil of the Rowland series mapped in Orange County. Some wet areas of Bowmansville soils were included in mapping. Also included were a few areas where the surface layer is loam.

About 48 percent of the acreage is in pasture, 31 percent is in field crops, and 21 percent is in forest. The main crops are corn and hay. This soil is not suited to alfalfa. (Capability unit IIIw-1; woodland suitability group 2)

Seneca Series

The Seneca series consists of deep, well-drained, gently sloping soils of the Piedmont Plateau. These soils are at the bases of slopes, in depressions, and along small drainageways throughout the part of the county underlain by granite. They have formed in colluvium that washed or rolled from soils underlain by granitic rocks. The native vegetation is red maple, blackgum, yellow-poplar, white oak, black walnut, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown and brown fine sandy loam about 14 inches thick. The subsoil is yellowish-brown sandy clay loam that grades to mottled strong-brown clay loam at a depth of about 36 inches. The subsoil is underlain by mottled, strongly weathered granite at a depth of about 45 inches.

The Seneca soils are very strongly acid and are low to medium in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

Representative profile of Seneca fine sandy loam, 2 to 7 percent slopes, in a hardwood forest, 1½ miles south of Locustgrove near the end of Highway No. 605:

O2—¼ inch to 0, very dark grayish-brown (10YR 3/2), partly decomposed leaf litter; abrupt, smooth boundary.

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable when moist; many fine roots; few small quartz pebbles; gradual, smooth boundary.

A2—3 to 14 inches, brown (10YR 5/3) fine sandy loam; moderate, fine, granular structure; friable when moist; many fine and medium roots; few small quartz pebbles up to 2 inches in diameter; gradual, smooth boundary.

B1t—14 to 19 inches, yellowish-brown (10YR 5/4) light sandy clay loam; weak, fine, subangular blocky structure; friable when moist; many fine and medium roots; few fine mica flakes; few small quartz pebbles up to 3 inches in diameter; gradual, smooth boundary.

B2t—19 to 36 inches, yellowish-brown (10YR 5/8) sandy clay loam; moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few, thin, patchy clay films; many medium roots; few fine mica flakes; 5 to 10 percent of horizon is angular quartz pebbles; contains evidence of a thin stone line; abrupt, smooth boundary.

IIB3t—36 to 45 inches, strong-brown (7.5YR 5/6) clay loam; common, medium, distinct mottles of brown (7.5YR 5/4), yellowish brown (10YR 5/6), and light brownish gray (10YR 6/2); moderate, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few, thin, patchy clay films; 15 to 25 percent of horizon is fragments of quartz and granite up to 3 inches in diameter; common fine mica flakes; abrupt, wavy boundary.

C—45 inches +, mottled yellow, brown, gray, white, and black, strongly weathered granite; firm in place; hardness increases with depth; material is soft, micaceous, and loamy if dug out.

The A horizons range from 10 to 20 inches in combined thickness and from very dark grayish brown to yellowish brown in color. The B horizons range from 15 to more than 30 inches in combined thickness, from sandy clay loam to clay loam in texture, and from yellowish brown to strong brown in color. The content of clay in the B horizons ranges from 18 to 35 percent. Depth to the IIB3t horizon ranges from 36 to 50 inches, and depth to hard rock ranges from 4 to 10 feet.

Seneca soils occur with Appling, Colfax, and Worsham soils. They lack the yellowish-red colors of the Appling soils, and they have a lower content of clay than those soils. The Seneca soils are better drained than the Colfax and Worsham soils. They lack the fragipan that is typical in the profile of the Colfax soils, and they lack the gray colors that are typical of the Worsham soils.

Seneca fine sandy loam, 2 to 7 percent slopes (SeB).—This is the only soil of the Seneca series mapped in Orange County. It occurs in the part of the county underlain by granite. Included in mapping were small areas of an unidentified soil in the schist belt that has a loam or silt loam surface layer and a silty clay subsoil. Also included were areas of a soil that is similar to this soil but that has gray mottling, caused by poor drainage, at a depth of 24 to 36 inches. Other inclusions are small areas of Lignum and Colfax soils.

About 62 percent of the acreage is in forest, 23 percent is in field crops, and 15 percent is in pasture. This soil is used mainly for corn and for grasses and legumes grown for hay. It is not generally used for pasture and alfalfa. (Capability unit IIe-3; woodland suitability group 2)

Starr Series

Deep, well-drained, gently sloping soils are in the Starr series. These soils are in small drainageways, in depressions, and at the bases of slopes in the part of the county underlain by greenstone. They have formed in colluvium that washed or rolled from dark-red, basic soils on uplands of the Piedmont Plateau. The native vegetation is white, red, black, and scarlet oaks, black walnut, yellow-poplar, hickory, and shortleaf pine.

In a typical profile, the surface layer is dark reddish-brown silt loam about 18 inches thick. The subsoil is dark reddish-brown silty clay loam and dark-red clay loam to a depth of about 38 inches, and it is red silty clay loam at depths between 38 and about 60 inches.

The Starr soils are medium acid and are high in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high. Erosion is not a hazard, but these soils receive extra moisture in seepage and runoff from higher lying areas.

Representative profile of Starr silt loam, 2 to 10 percent slopes, in a cornfield, one-fourth mile southeast of the junction of Highways No. 615 and No. 627:

Ap—0 to 18 inches, dark reddish-brown (2.5YR 3/4) silt loam; weak, medium to coarse, granular structure; very friable when moist; many fine roots; many fine and medium pores; few fragments of greenstone about 1 inch in diameter; gradual, smooth boundary.

B1t—18 to 25 inches, dark reddish-brown (2.5YR 3/4) silty clay loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few, thin, patchy clay films; few weathered fragments of greenstone about 1 inch in diameter; gradual, smooth boundary.

B2t—25 to 38 inches, dark-red (2.5YR 3/6) clay loam; moderate, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common clay films; few, yellow, weathered fragments of greenstone; few black mineral concretions; thin stone and gravel line along the lower boundary; clear, wavy boundary.

IIB3t—38 to 60 inches, red (2.5YR 4/8) silty clay loam; few, fine, faint mottles of yellowish red (5YR 5/6) and strong brown (7.5YR 5/6); weak, fine, subangular blocky structure; friable when moist; few, thin, patchy clay films; some fragments of greenstone up to 2 inches in diameter.

The A horizon ranges from 10 to 20 inches in thickness and from dark reddish brown to dusky red in color. The B horizons range from dark reddish brown to dark red or red in color and from clay loam to silty clay loam in texture. A thin stone line, which indicates a buried land surface, is apparent in most places below a depth of 36 inches. Depth to hard rock ranges from 4 to more than 10 feet.

Starr soils occur with Davidson, Dyke, and Hiwassee soils. They contain less clay than those soils, and they lack the clearly defined horizons that are typical of those soils.

Starr silt loam, 2 to 10 percent slopes (SrC).—This is the only soil of the Starr series mapped in Orange County. Included with it in mapping were small areas where the surface layer is silty clay loam, and some areas that have low chroma mottling below a depth of 36 inches. Also included were areas, mainly along the larger drainageways, where the subsoil is only weakly defined. Other inclusions consist of small areas of Elbert soils that have a layer of overwash on the surface.

About 67 percent of the acreage is in cultivated crops, 22 percent is in pasture (fig. 6), and 11 percent is in forest. This soil is well suited to all the general crops commonly grown, except alfalfa and small grains. (Capability unit I-1; woodland suitability group 1)

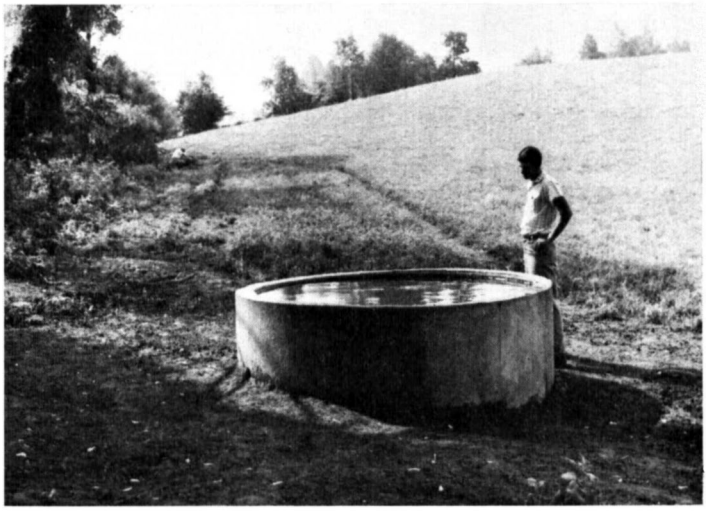

Figure 6.—**Tank for watering livestock. Starr silt loam, 2 to 10 percent slopes, is in the foreground, and a Davidson soil occupies the grassed side slope in the background. Water is supplied by a spring.**

State Series

The State series consists of deep, well-drained, nearly level or gently sloping soils on low terraces along the Rapidan River. These soils have formed in stream alluvium that has washed from soils of the uplands. The native vegetation consists of white and red oaks, black walnut, yellow-poplar, hackberry, and sycamore.

In a typical profile, the surface layer is about 18 inches thick and is brown to dark-brown loam in the upper part and yellowish-brown fine sandy loam in the lower part. The subsoil extends to a depth of more than 60 inches and consists of brown or dark-brown to reddish-brown fine sandy loam to silty clay loam.

State soils are medium acid to strongly acid, have fairly high natural fertility, and have a fairly high content of organic matter. Infiltration is rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are in excellent tilth. They are well suited to most of the crops commonly grown in the county.

Representative profile of State loam, 0 to 4 percent slopes, in a cultivated field 1½ miles west of U.S. Highway No. 522, near the Rapidan River along Virginia Highway No. 636:

Ap—0 to 10 inches, brown to dark-brown (10YR 4/3) loam; weak, fine, granular structure; very friable when moist; common fine roots; a few rounded cobble-

stones and a few quartz pebbles; few mica flakes; few fine pores; clear, smooth boundary.

A2—10 to 18 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; very friable when moist; few fine and medium roots; few rounded quartz pebbles; clear, smooth boundary.

B1t—18 to 21 inches, brown to dark-brown (7.5YR 4/4) light fine sandy clay loam; weak, fine, subangular blocky structure; friable when moist; few, thin, patchy clay films; few fine mica flakes; clear, smooth boundary.

B21t—21 to 32 inches, brown to dark-brown (7.5YR 4/4) fine sandy clay loam; weak, fine and medium, subangular blocky structure; friable when moist; few, thin, patchy clay films; few finely divided mica flakes; common root channels and common fine pores; clear, smooth boundary.

B22t—32 to 42 inches, reddish-brown (5YR 4/4) clay loam; moderate, medium, subangular blocky structure; friable when moist, sticky and plastic when wet; common thin clay films; few fine roots; common medium-sized root channels and fine pores; gradual, smooth boundary.

B3t—42 to 62 inches, brown to dark-brown (7.5YR 4/4) silty clay loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; patchy clay films; few waterworn pebbles; few mica flakes; few black mineral concretions; clear, smooth boundary.

C—62 to 66 inches +, gravel mixed with sand and silty soil material; gravel is from waterworn quartz, greenstone, and red shale of Triassic age.

The A horizons range from 10 to 20 inches in combined thickness and from brown or dark brown to yellowish brown in color. The B horizons range from brown or dark brown to reddish brown in color and from fine sandy clay loam to silty clay loam in texture. Most of the profile is free of cobblestones and pebbles, but beds of sand and gravel are at depths of more than 60 inches. Bedrock is generally at a depth of about 10 feet.

State soils occur with Comus and Buncombe soils. They are similar to the Comus soils in many respects, but they have a more clearly defined subsoil than those soils. They are finer textured and have a more clearly defined subsoil than the Buncombe soils. State soils occur at a slightly higher elevation than the Comus and Buncombe soils and are only infrequently flooded.

State loam, 0 to 4 percent slopes (StA).—This is the only soil of the State series mapped in Orange County. Erosion has not affected it to any extent. Small, rounded pebbles are scattered on the surface in a few areas. Included in mapping were small areas of Comus soils and small areas in which the surface layer is fine sandy loam.

The State soil is well suited to corn, hay, and truck crops. Nearly all of the acreage is used for field crops and pasture. (Capability unit I–2; woodland suitability group 1)

Tatum Series

The Tatum series consists of deep, well-drained, gently sloping to moderately steep soils of the uplands. These soils occupy large areas throughout the eastern part of the county, where they have formed in material weathered from fine-grained sericite-schist. The native vegetation is white, post, scarlet, and chestnut oaks, hickory, dogwood, shortleaf pine, white pine, and Virginia pine.

In a typical profile, the surface layer is mainly yellowish-brown silt loam and is about 8 inches thick. The subsoil is yellowish-red silty clay loam in the upper part, red silty clay in the middle part, and mottled, red silty clay loam at depths between 30 and about 45 inches. Underlying the subsoil is mottled, loamy material weathered from schist.

The Tatum soils are very strongly acid to extremely acid. They are low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is moderate to high.

These soils are in good tilth. They are fairly well suited to the crops commonly grown in this county.

Representative profile of Tatum silt loam, 2 to 7 percent slopes, in a forest of mixed hardwoods, 2 miles north of Rhoadesville and one-fourth mile east of Highway No. 621:

O1—1¼ inches to ¼ inch, partly decomposed leaves and twigs and fresh leaves and twigs.

O2—¼ inch to 0, black (10YR 2/1), partly decomposed organic matter from deciduous trees.

A1—0 to ¼ inch, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable when moist; many fine roots; abrupt, smooth boundary.

A2—¼ inch to 8 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, granular structure; friable when moist; many fine and medium roots; common small quartz pebbles; strongly acid; clear, smooth boundary.

B1t—8 to 13 inches, yellowish-red (5YR 4/8) silty clay loam; weak, fine and medium, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; few, thin, patchy clay films; many medium and coarse roots; many fine and medium pores; few small quartz pebbles; very strongly acid; clear, smooth boundary.

B21t—13 to 18 inches, red (2.5YR 4/6) silty clay; moderate, medium, subangular blocky structure; friable when moist, slightly plastic and slightly sticky when wet; common patchy clay films; common medium and coarse roots; few small fragments of quartz; very strongly acid; gradual boundary.

B22t—18 to 30 inches, red (2.5YR 4/8) silty clay; strong, medium and fine, subangular blocky structure; friable to firm when moist, slightly sticky and slightly plastic when wet; common, distinct, continuous clay films; common medium and coarse roots; common medium and fine pores; few weathered fragments of schist, and few small fragments of quartz; few very fine mica flakes; very strongly acid; gradual, smooth boundary.

B3t—30 to 45 inches, red (2.5YR 5/6) silty clay loam streaked with yellowish red (5YR 4/6) and strong brown (7.5YR 5/6); moderate to weak, fine, subangular blocky structure; friable when moist, slightly sticky and slightly plastic when wet; common, thin, patchy clay films; many fragments of weathered schist; few quartz pebbles; very strongly acid; irregular, wavy boundary.

C—45 to 47 inches, mottled red, yellowish-red, strong-brown, and gray material weathered from schist; firm in place but is easily dug out and crushed to friable loamy soil material; strongly acid; irregular, wavy boundary.

R—47 inches +, hard, multicolored, fine-grained schist that is difficult to dig with a spade.

The A horizon ranges from loam to silt loam in texture. It generally is 8 to 12 inches thick, but it is only about 3 inches thick in places. Color of the A horizon ranges from very dark grayish brown to yellowish brown, except in severely eroded areas, where red material from the subsoil is exposed. The B horizons range from 16 to 38 inches in combined thickness. The B2 horizons range from heavy silty clay loam to silty clay or clay in texture. The content of clay in the B2 horizons ranges from 35 to 55 percent. Thickness of the solum ranges from 30 to 60 inches, but it is about 40 inches in many places. Depth to bedrock ranges from 47 inches to more than 6 feet.

Tatum soils occur with Nason, Manteo, Lignum, and York soils. They have a more reddish and somewhat finer textured subsoil than the Nason soils. They have a thicker subsoil and more distinct subsoil horizons than the Manteo soils, and their subsoil contains more clay and fewer coarse fragments than the subsoil of the Manteo soils. Tatum soils are more reddish and are better drained than the Lignum and York soils. They contain more clay than the York soils, and they lack the fragipan that is typical in the York profile.

Tatum loam, 2 to 7 percent slopes, eroded (TaB2).—This soil has a profile similar to the one described as representative of the series, except that it has lost some soil material through erosion. The surface layer consists of 6 to 10 inches of grayish-brown to yellowish-brown loam. In some places this soil has a few quartz pebbles throughout the surface layer. Included in mapping were small areas of soils that are similar to this soil but that have a surface layer of fine sandy loam or silt loam. Also included were small areas of a Nason loam, and other areas of Seneca soils along small drainageways.

About 77 percent of the acreage is in forest, 13 percent is in field crops, and 10 percent is in pasture. This soil is suited to all the crops commonly grown in the county. (Capability unit IIe–3; woodland suitability group 8)

Tatum loam, 7 to 15 percent slopes, eroded (TaC2).—This soil has a profile similar to the one described as representative of the series, except that it has lost some soil material through erosion. The surface layer is 4 to 9 inches thick and is yellowish-brown to grayish-brown loam. A few areas contain outcrops of quartz bedrock, and other areas have gravel on the surface. The outcrops and gravelly areas are indicated on the soil map by appropriate symbols. Included with this soil in mapping were a few areas of a similar soil that has a surface layer of fine sandy loam or silt loam. Also included was a small acreage where the slopes are steeper than 15 percent.

About 83 percent of the acreage is in forest, 10 percent is in pasture, and 7 percent is in field crops. This soil is only fairly well suited to the crops commonly grown in the county. (Capability unit IIIe–3; woodland suitability group 8)

Tatum silt loam, 2 to 7 percent slopes (TsB).—This soil has the profile described as representative of the series. The surface layer is 8 to 12 inches thick. In wooded areas the surface layer is very dark gray, but it is yellowish brown in cultivated fields. In many places quartz pebbles are on and in the surface layer. Depth to hard rock is greater than 6 feet in many areas. Included with this soil in mapping were small areas of Seneca soils along small drainageways, small areas of Nason soils, and small areas where the surface layer is loam.

This Tatum soil is suited to cultivated crops, but nearly all of the acreage is in unproductive hardwood forests. Only about 1 percent is in field crops or pasture. (Capability unit IIe–3; woodland suitability group 8)

Tatum silt loam, 2 to 7 percent slopes, eroded (TsB2).—This soil is on upland ridgetops. Most areas are moderately to severely eroded. The present surface layer is yellowish brown and is only 4 to 8 inches thick. The plow layer is a mixture of material from the subsoil and of the remaining material from the original surface layer. In some places the quartz pebbles, numerous enough to interfere with tillage, are strewn over the surface. Some areas contain outcrops of quartz, which are indicated on the soil map by an appropriate symbol. Included in mapping were some areas where the surface layer is loam, and small areas of Nason soils. Also included were a few areas where the subsoil is sticky because of the influence of basic intrusive dikes. Other inclusions consist of soils adjacent to areas underlain by limestone, and those soils are more brownish than typical for Tatum soils.

About 70 percent of the acreage is in forest, 20 percent is in field crops, and 10 percent is in pasture. This soil is suited to cultivation. Corn, small grains, hay, pasture plants, and other crops are grown. (Capability unit IIe–3; woodland suitability group 8)

Tatum silt loam, 7 to 15 percent slopes (TsC).—This soil has a yellowish-brown surface layer that is 8 to 10 inches thick. In some places quartz pebbles are scattered over the surface and throughout the profile. Also, quartz bedrock crops out in places. The areas where the gravel and outcrops occur, and where they interfere with tillage, are indicated on the soil map by appropriate symbols.

About 98 percent of the acreage is in forest, and most of the rest is in pasture. This soil is suited to cultivation. In the small areas not in forest or pasture, the crops commonly grown are corn, small grains, and mixed hay. (Capability unit IIIe–3; woodland suitability group 8)

Tatum silt loam, 7 to 15 percent slopes, eroded (TsC2).—This soil has a yellowish-brown surface layer that is only 4 to 6 inches thick. A few areas have quartz pebbles throughout the surface layer. Included with this soil in mapping were small areas of Nason and Manteo soils, and a small acreage of moderately steep Tatum soils. Also included were a few gravelly areas and a few areas that contain outcrops of quartz that interfere with cultivation. The gravelly areas and the rock outcrops are indicated on the soil map by appropriate symbols.

About 70 percent of the acreage is in forest, 20 percent is in pasture or is idle, and 10 percent is in field crops. This soil is better suited to pasture and hay crops than to crops that require cultivation. (Capability unit IIIe–3; woodland suitability group 8)

Tatum silty loam, 2 to 7 percent slopes, severely eroded (TtB3).—This soil is on the ends of ridges. It has lost most of its original surface layer through erosion, and the present plow layer is a mixture of the remaining original surface soil and of material from the subsoil. The plow layer is only about 4 inches thick, and it ranges from yellowish brown to yellowish red in color. In many places small fragments of schist are on the surface and throughout the profile. A few shallow gullies have formed in places. Included with this soil in mapping were areas where the surface layer is heavy silt loam, and a few gravelly areas that are indicated on the soil map by an appropriate symbol.

About 53 percent of the acreage is in forest, 25 percent is idle or in pasture, and 22 percent is in field crops. The severe erosion makes this soil difficult to work and to keep in good tilth. This soil is better suited to hay and pasture than to field crops. (Capability unit IIIe–3; woodland suitability group 9)

Tatum silty clay loam, 7 to 15 percent slopes, severely eroded (TtC3).—This soil is on the side slopes of ridges and drainageways. It has lost most of its original surface layer through erosion, and the present surface layer

consists largely of material from the subsoil. The present surface layer is yellowish brown, yellowish red, or red and is only about 3 inches thick. It is mostly silty clay loam, but small areas where the surface layer is silt loam were included in mapping. Also included were small areas of moderately steep soils. The profile has fragments of schist throughout, and the number of fragments increases with depth.

About 60 percent of the acreage is in forest, 25 percent is in field crops, and 15 percent is in pasture. Because of the strong slopes and severe erosion, this soil is difficult to conserve and to work. It is better suited to pasture or trees than to field crops. (Capability unit IVe–2; woodland suitability group 9)

Turbeville Series

The Turbeville series consists of deep, well-drained gently sloping or sloping soils on high terraces along the larger streams in the county. The largest areas are near Flatrun and True Blue. These soils have formed in old alluvial material of sand, silt, clay, and cobblestones that washed from soils on uplands of the Piedmont Plateau. The native vegetation is white, red, black, and scarlet oaks, hickory, dogwood, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is loam about 8 inches thick. It is dark brown in the upper part and light yellowish brown in the lower part. The upper part of the subsoil is yellowish-red clay loam. The lower part, to a depth of about 49 inches, is dark-red clay. Beneath the clay is a layer of reddish-brown clay loam that extends to a depth of more than 64 inches.

The Turbeville soils are strongly acid and are moderately low in content of organic matter and in natural fertility. Infiltration is rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

These soils are well suited to the crops commonly grown in the county. A large part of the acreage is in field crops and pasture.

Representative profile of Turbeville loam, 2 to 7 percent slopes, in a bluegrass pasture one-half mile northeast of U.S. Highway No. 522 and Road No. 621, near Mountain Run:

A1—0 to 2 inches, dark-brown (10YR 3/3) loam; weak, fine, granular structure; very friable when moist; many grains of coarse sand; many fine roots; few quartz pebbles; abrupt, smooth boundary.

A2—2 to 8 inches, light yellowish-brown (10YR 6/4) loam; moderate, fine, granular structure; friable when moist; many fine and medium roots; common small pebbles; clear, smooth boundary.

B1t—8 to 15 inches, yellowish-red (5YR 4/6) clay loam; moderate, fine, subangular blocky structure; friable when moist, sticky and plastic when wet; common fine and medium roots; many fine pores; clear, smooth boundary.

B21t—15 to 24 inches, dark-red (2.5YR 3/6) clay; moderate, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; few thin clay films; few small quartz pebbles; common rounded grains of sand; gradual, smooth boundary.

B22t—24 to 49 inches, dark-red (10R 3/6) clay; strong, fine, subangular blocky structure; firm when moist, sticky and plastic when wet; common continuous clay films; few rounded quartz pebbles; gradual, smooth boundary.

IIB23t—49 to 64 inches +, reddish-brown (2.5YR 4/4) clay loam; common, medium, prominent mottles of dark red (10R 3/6), yellowish red (5YR 4/6), strong brown (7.5YR 5/6), yellowish brown (10YR 5/4), and pale brown (10YR 6/3); moderate, fine, subangular blocky structure; friable when moist, sticky and slightly plastic when wet; many rounded quartz pebbles; many rounded coarse grains of sand.

The A horizons range from brown or dark brown to light yellowish brown in color and from 4 to 12 inches in thickness. The B1t horizon is sandy clay loam in places, and it ranges from 6 to 10 inches in thickness. The B2t horizons range from 30 to 60 inches in combined thickness. The underlying material is sand, silt, and gravel mixed with clay loam soil material, mottled with yellowish, reddish, brownish, and grayish colors. Depth to hard rock ranges from 5 to 20 feet or more.

Turbeville soils occur with Hiwassee and Masada soils. They have a lighter colored, more sandy surface layer; a lighter colored, more reddish upper subsoil; and a somewhat lower content of clay than the Hiwassee soils. Turbeville soils have a more brownish surface layer and a more reddish subsoil than the Masada soils.

Turbeville loam, 2 to 7 percent slopes (TuB).—This soil has the profile described as representative of the series. The surface layer is 8 to 12 inches thick. Included in mapping were some areas in which the surface layer is yellowish brown, other small areas in which the surface layer is fine sandy loam, and small areas of Masada soils. Also included were areas where small, rounded quartz pebbles are throughout the profile.

About 47 percent of the acreage is in field crops, 32 percent is in pasture, and 21 percent is in forest. This soil is well suited to all the crops commonly grown in the county. Response is good to proper management. (Capability unit IIe–2; woodland suitability group 8)

Turbeville loam, 2 to 7 percent slopes, eroded (TuB2).—This soil has a profile similar to the one described as representative of the series, except that much of the original surface layer has been lost through erosion. The plow layer is a mixture of material from the remaining original surface layer and of material from the subsoil. It ranges from 4 to 8 inches in thickness. The subsoil is red or dark red and ranges from 30 to 58 inches in thickness. Included with this soil in mapping were small areas of Masada and Tatum soils. Also included were some areas of Seneca soils along small drainageways.

About 52 percent of the acreage is in field crops, 36 percent is in pasture, and 12 percent is in forest. This soil is well suited to cultivated crops. Corn, small grains, and hay are the crops most commonly grown. (Capability unit IIe–2; woodland suitability group 8)

Turbeville loam, 7 to 15 percent slopes, eroded (TuC2).—This soil has a profile similar to the one described as representative of the series, except that part of the original surface layer has been lost through erosion. Included in mapping were small areas where the surface layer is fine sandy loam, and other areas that are severely eroded. The severely eroded areas have a more reddish color and a finer texture than typical of this Turbeville soil. Other inclusions consist of a small acreage of moderately steep Turbeville soils and small areas of Masada, Hiwassee, and Tatum soils.

About 43 percent of the acreage is in pasture, 29 percent is in forest, and 28 percent is in field crops. This soil is suited to all of the locally grown crops, but good management is needed to reduce runoff and erosion. (Capability unit IIIe–2; woodland suitability group 8)

Vance Series

Deep, well-drained, gently sloping soils of the Piedmont Plateau are in the Vance series. These soils occur in small areas throughout the part of the county underlain by granitic rocks, mainly near Locustgrove. They have formed in material weathered from granite and granite gneiss. The native vegetation is white, red, black, and scarlet oaks, hickory, dogwood, redcedar, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is dark grayish-brown to brown fine sandy loam about 11 inches thick. The subsoil is yellowish-brown clay loam in the upper part. It is strong-brown, firm clay, mottled with red or yellowish red, in the middle part and is yellowish-red clay in the lower part. The clay in the middle and lower parts becomes plastic when wet. The subsoil is underlain by mottled, strong-brown clay loam soil material at a depth of about 38 inches.

The Vance soils are very strongly acid and are low in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is moderately slow or slow in the subsoil. The available moisture capacity is high.

Representative profile of Vance fine sandy loam, 2 to 7 percent slopes, in a field of mixed hay, 450 feet east of Locustgrove on the north side of Highway No. 20:

Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable when moist; many fine roots; few grains of coarse sand; few quartz pebbles; gradual, smooth boundary.

A2—5 to 11 inches, brown (10YR 5/3) fine sandy loam; weak, fine, granular structure; friable when moist; many fine and medium roots; many coarse grains of sand and small quartz pebbles; clear, smooth boundary.

B1t—11 to 16 inches, yellowish-brown (10YR 5/6) clay loam; moderate, medium, subangular blocky structure; friable when moist; few roots; common quartz pebbles up to 3 inches in diameter; gradual, smooth boundary.

B2t—16 to 27 inches, strong-brown (7.5YR 5/6) clay streaked with red (2.5YR 4/6); strong, fine and medium, subangular blocky structure; firm when moist, plastic when wet; prominent clay films; few fragments of quartz; gradual, smooth boundary.

B3t—27 to 38 inches, yellowish-red (5YR 5/8) clay streaked with red (10R 4/8) and yellowish brown (10YR 5/6); moderate, medium, subangular blocky structure; firm when moist, sticky and plastic when wet; few prominent clay films; few fragments of weathered granite; gradual, smooth boundary.

C—38 to 62 inches, strong-brown (7.5YR 5/8) clay loam soil material mottled with red (2.5YR 4/6), brownish yellow (10YR 6/8), and light gray (10YR 7/1); firm when moist, slightly sticky and slightly plastic when wet; few quartz pebbles; many fragments of weathered granite.

The A horizons range from dark grayish brown to yellowish brown in color and from 4 to 12 inches in combined thickness. The B1t horizon ranges from 4 to 6 inches in thickness. The B2t horizon is typically strong brown, but the color ranges to yellowish red mottled with red. Combined thickness of the Bt horizons ranges from 24 to 38 inches. The B3t horizon is mottled with red and yellowish brown. Depth to hard rock ranges from 6 to 20 feet.

Vance soils occur with Appling, Colfax, and Worsham soils. They are firmer than the Appling soils, and their subsoil has a slightly higher content of clay than the subsoil of the Appling soils. Vance soils are better drained than the Colfax and Worsham soils. They lack the fragipan that is typical in the profile of the Colfax soils and the low chroma mottling that is typical in the profile of the Worsham soils.

Vance fine sandy loam, 2 to 7 percent slopes (VaB).—This soil has the profile described as representative of the series. The surface layer is 8 to 12 inches thick. Included in mapping were a few small areas where the surface layer is loam. Also included were small areas of Appling and Colfax soils.

About 76 percent of the acreage is in forest, 14 percent is in pasture, and 10 percent is in field crops. Corn, small grains, and hay are the most commonly grown crops. The clayey, plastic subsoil makes this soil unsuited for alfalfa. (Capability unit IIe-4; woodland suitability group 13)

Vance fine sandy loam, 2 to 7 percent slopes, eroded (VaB2).—This soil has a profile similar to the one described as representative of the series, except that the surface layer is yellowish brown and is only 4 to 8 inches thick. Included in mapping were small areas of loam and small areas of Appling and Colfax soils. Also included were small areas of Vance soils that have slopes as steep as 12 percent.

About 43 percent of the acreage is in forest, 42 percent is in pasture, and 15 percent is in field crops. If this soil is well managed, it is fairly well suited to corn, hay, and pasture. It is not suited to alfalfa. (Capability unit IIe-4; woodland suitability group 13)

Wadesboro Series

The Wadesboro series consists of soils that are deep, well drained, and gently sloping to moderately steep. These soils occupy large areas in the vicinity of Haudricks Mountain, Somerset, and Barboursville. The material in which they formed was weathered from Triassic shale, sandstone, and conglomerate. The native vegetation is white, black, red, and scarlet oaks, hickory, dogwood, yellow-poplar, sassafras, gum, Virginia pine, and shortleaf pine.

In a typical profile, the surface layer is mainly brownish fine sandy loam and is about 6 inches thick. The subsoil, to a depth of about 49 inches, is mostly red clay to sandy clay loam. Beneath the subsoil is multicolored material weathered from sandstone and shale.

The Wadesboro soils are very strongly acid and are low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is high.

Representative profile of Wadesboro fine sandy loam, 2 to 7 percent slopes, eroded, in a forest of mixed pines and hardwoods, one-half mile north of Weyburn:

O1—1½ inches to 1 inch, undecomposed pine needles, sticks, twigs, and oak leaves.

O2—1 inch to 0, black (5YR 2/1), partly decomposed leaf litter; abrupt, smooth boundary.

A1—0 to ¼ inch, light brownish-gray (10YR 6/2) fine sandy loam; weak, very fine, granular structure; very friable when moist; abundant fine and medium roots; clear, smooth boundary.

A2—¼ inch to 4 inches, light yellowish-brown (10YR 6/4) fine sandy loam; weak, fine, granular structure; very friable when moist; abundant fine and medium roots; few quartz pebbles up to 2 inches in diameter; many grains of coarse sand; gradual, wavy boundary.

A3—4 to 6 inches, strong-brown (7.5YR 5/6), mingled with yellowish red (5YR 4/6) and brown (7.5YR 4/4), light silty clay loam; weak, fine, subangular blocky structure; friable when moist, slightly sticky when wet; few medium and fine roots; gradual, smooth boundary.

B1—6 to 10 inches, yellowish-red (5YR 4/6) silty clay loam; moderate, fine and medium, subangular blocky structure; friable when moist; few thin clay films; some sand grains throughout; gradual, wavy boundary.

B21t—10 to 24 inches, red (2.5YR 4/6) clay loam streaked with yellowish red (5YR 4/6) and strong brown (7.5YR 5/6); strong, fine and medium, subangular blocky structure; friable when moist; few thin clay films; few fragments of quartz and weathered sandstone; gradual, smooth boundary.

B22t—24 to 38 inches, red (2.5YR 4/6) clay; moderate, medium, subangular blocky structure; firm when moist, slightly sticky and slightly plastic when wet; many thin clay films; few fragments of weathered sandstone and shale; many grains of sand; gradual, wavy boundary.

B3t—38 to 49 inches, red (2.5YR 4/6) sandy clay loam; common, medium, distinct mottles of yellowish red (5YR 5/6); weak, fine, subangular blocky structure; friable when moist; thin, patchy clay films; many fragments of weathered sandstone and shale; gradual, smooth boundary.

C—49 to 62 inches +, multicolored yellowish-red (5YR 5/6), strong-brown (7.5YR 5/6), weak-red (10R 5/4), and pale-red (10R 6/2) material from highly weathered sandstone and shale; firm in place, friable if dug out; 25 percent of horizon is fragments of rock.

Thickness of the A horizon ranges from 4 to 12 inches. The B1 horizon ranges from silty clay loam to sandy clay loam in texture and from 3 to 6 inches in thickness. The B2 horizons are red clay or heavy clay loam and range from 18 to 30 inches in combined thickness. The B3t horizon is 10 to 18 inches thick and is red sandy clay loam to clay loam, generally mottled with yellowish red, strong brown, and yellowish brown. Thickness of the solum ranges from 30 to 60 inches, and depth to hard rock ranges from 8 to 15 feet or more.

Wadesboro soils occur with Bucks, Mayodan, Penn, and Pinkston soils. They have a lighter colored, coarser textured surface layer and are less silty throughout than the Bucks soils. The Wadesboro subsoil is more reddish than that of the Mayodan soils, and it is thicker, has a more continuous clayey texture, and has more clearly defined horizons than those of the Penn and Pinkston soils.

Wadesboro fine sandy loam, 2 to 7 percent slopes, eroded (WaB2).—This soil has the profile described as representative of the series. Included in mapping were areas of Wadesboro soils that are only slightly eroded or are not eroded. Also included were small areas of silt loam and of Bucks and Mayodan soils.

About 48 percent of the acreage is in forest, 27 percent is in field crops, and 25 percent is in pasture. If this soil is properly managed, it is well suited to all the crops commonly grown in this county. (Capability unit IIe–2; woodland suitability group 8)

Wadesboro fine sandy loam, 7 to 15 percent slopes, eroded (WaC2).—This soil is similar to the one for which a profile is described as representative of the series, except that it is steeper. Included in mapping was a small acreage of uneroded or only slightly eroded Wadesboro soils; a few areas where the surface layer is silt loam; and small areas of Bucks and Mayodan soils.

About 63 percent of the acreage is in forest, 21 percent is in pasture, and 16 percent is in field crops. This soil is suited to the crops commonly grown in the county, but good management is necessary to prevent further losses from erosion. (Capability unit IIIe–2; woodland suitability group 8)

Wadesboro fine sandy loam, 15 to 25 percent slopes, eroded (WaD2).—This soil has a surface layer only 4 to 7 inches thick. It has many fragments of sandstone in the subsoil. Included in mapping were small areas where the surface layer is loam and small areas of Klinesville and Pinkston soils.

About 90 percent of the acreage is in forest, and the rest is in pasture. This soil is better suited to trees and to pasture than to field crops. (Capability unit IVe–2; woodland suitability group 8)

Watt Series

Soils that are excessively drained, gently sloping to moderately steep, and shallow to moderately deep over bedrock are in the Watt series. These soils occur only on one long, narrow ridge, called Blue Hill, that extends through Eheart and thence northeastward to the Rapidan River. They have formed in material weathered from dark-colored graphitic schist and slate. The native vegetation is red, white, black, scarlet, and chestnut oaks, hickory, dogwood, mountain-laurel, white pine, and Virginia pine.

In a typical profile, the surface layer is very dark gray silt loam about 6 inches thick. The subsoil is weakly defined and consists of very dark gray silt loam. It is underlain at a depth of about 10 inches by dark-colored silt loam and fragments of schist. Dark-colored graphitic schist is at a depth of about 20 inches.

The Watt soils are very strongly acid and are low in content of organic matter and in natural fertility. Infiltration and permeability are both moderately rapid. The available moisture capacity is low to moderate.

Representative profile of Watt silt loam, 2 to 7 percent slopes, in a forest of mixed hardwoods, 2 miles northeast of Eheart along Highway No. 644:

O2—1½ inches to 0, black (5Y 2/1), partly decomposed forest litter; clear, smooth boundary.

A1—0 to 6 inches, very dark gray (5Y 3/1) silt loam; weak, fine, granular structure; very friable when moist; many fine and medium roots; many, small, black and gray fragments of schist; gradual, wavy boundary.

B—6 to 10 inches, very dark gray (5Y 3/1) silt loam; weak, fine, subangular blocky structure; friable when moist; many fragments of weathered, black schist 1 to 2 inches in diameter; gradual, wavy boundary.

C—10 to 20 inches, dark olive-gray (5Y 3/2), dark yellowish-brown (10YR 4/4), black (5Y 2/1), and very dark gray (5Y 3/1) silt loam soil material between the rock cleavage planes; 25 to 40 percent of horizon is fragments of schist.

R—20 inches +, dark-colored graphitic schist.

The A horizon ranges from 4 to 16 inches in thickness and from black to very dark gray in color. The B horizon ranges from 3 to 8 inches in thickness, from very dark gray to black in color, and from silt loam to light silty clay loam in texture. Thickness of the solum ranges from 7 to 24 inches. Depth to bedrock ranges from 1½ to 3 feet.

Watt soils occur with Elioak soils. They are shallower over bedrock, have a more grayish color, and contain much less clay and more coarse fragments than the Elioak soils. Also, they lack the clearly defined horizons that are typical of the Elioak soils.

Watt silt loam, 2 to 7 percent slopes (WbB).—This soil has the profile described as representative of the series. Included in mapping were small areas in which the surface layer is loam and small areas of similar soils that have a more brownish color than is considered typi-

cal for Watt soils. Also included were areas of reddish Elioak soils.

About 80 percent of the acreage is in forest, 15 percent is in pasture, and 5 percent is in field crops. Bedrock near the surface, low available moisture capacity, and low natural fertility make this soil more suitable for trees and pasture than for field crops. (Capability unit IIIe-6; woodland suitability group 4)

Watt silt loam, 7 to 15 percent slopes (WbC).—This soil has a surface layer of dark-gray to dark grayish-brown silt loam 4 to 10 inches thick. Included with it in mapping were areas of an unidentified soil that has a poorly defined subsoil or no subsoil. Also included were a few small areas of Hazel soils, and a few rock outcrops that are indicated on the soil map by an appropriate symbol.

About 70 percent of the acreage is in forest, 25 percent is in pasture, and 5 percent is in field crops. This soil is poorly suited to field crops, but it is suitable for forest or pasture. (Capability unit IVe-3; woodland suitability group 4)

Watt silt loam, 15 to 30 percent slopes (WbD).—This soil has a profile similar to the one described as representative of the series, except that the surface layer is only 4 to 10 inches thick. Many fragments of schist are on the surface and in the profile. Included in mapping were many areas of a soil that is similar to this one but that lacks a subsoil. Also included were small areas of Hazel soils, and a few rock outcrops that are indicated on the soil map by an appropriate symbol.

About 90 percent of the acreage is in forest, and 10 percent is in pasture. This soil is better suited to trees than to pasture or field crops. (Capability unit VIe-2; woodland suitability group 4)

Wehadkee Series

The Wehadkee series consists of nearly level, poorly drained soils on flood plains along the larger streams in the county. These soils have formed in fairly recent deposits of alluvial material washed from soils of Piedmont uplands. The native vegetation is river birch, sycamore, spicebush, smooth alder, buttonbush, elm, willow, and willow oak.

In a typical profile, the surface layer is dark-brown to dark grayish-brown silt loam about 16 inches thick. The subsoil is highly mottled, dark grayish-brown silty clay loam that extends to a depth of about 34 inches. The underlying material is highly mottled, grayish-brown clay.

The Wehadkee soils are strongly acid and are medium to high in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is high. A high water table limits the depth to which roots can penetrate.

Representative profile of Wehadkee silt loam in a pasture of swamp grasses, 1 mile northeast of Scuffletown off Highway No. 609, along the Rapidan River:

A11—0 to 10 inches, dark-brown (10YR 3/3) silt loam; few, fine, distinct mottles of dark grayish brown (2.5Y 4/2) and olive gray (5Y 4/2); weak, fine, granular structure; friable when moist; many fine roots; many fine mica flakes; clear, smooth boundary.

A12g—10 to 16 inches, dark grayish-brown (10YR 4/2) silt loam; common, distinct mottles of grayish brown (2.5Y 5/2) and olive brown (2.5Y 4/4); weak, fine, granular structure; friable when moist; many fine mica flakes; few fine roots; abrupt, smooth boundary.

Bg—16 to 34 inches, dark grayish-brown (2.5Y 4/2) light silty clay loam; common, coarse, prominent mottles of dark gray (N 4/0) and dark brown (10YR 4/3); weak, fine, subangular blocky structure; friable when moist, slightly sticky and plastic when wet; water table at a depth of 23 inches; many fine mica flakes; few quartz pebbles; clear, smooth boundary.

IIC1g—34 to 66 inches, grayish-brown (2.5Y 5/2) clay; many, coarse, prominent mottles of dark grayish brown (2.5Y 4/2) and dark yellowish brown (10YR 4/4); moderate, medium, columnar structure or massive; very plastic and sticky when wet; gradual, wavy boundary.

IIC2g—66 to 75 inches, dark-gray (5Y 4/1) clay; coarse columnar structure or massive; very plastic and sticky when wet; no mottling, as this layer is in water.

Thickness of the A horizon ranges from 8 to 14 inches, and the color of that horizon ranges from dark brown or brown to grayish brown or yellowish brown mottled with gray. The Bg horizon is stratified, and the texture ranges from fine sandy clay loam to clay. In places a layer of sand or gravel is at a depth of 4 to 6 feet. Depth to hard rock ranges from 4 to 8 feet.

Wehadkee soils occur with well drained Comus and moderately well drained Chewacla soils. They differ from those soils in being poorly drained.

Wehadkee silt loam (0 to 2 percent slopes) (We).—This is the only soil of the Wehadkee series mapped in Orange County. Its characteristics are variable because of the different sources of material in which it formed. The water table is at or near the surface throughout most of the year. Some areas are ponded, and those areas are indicated on the soil map by an appropriate symbol. Crawfish holes and mounds are numerous, especially in wet areas of this soil in depressions. Included in mapping were small areas where the surface layer is loam and small areas of Chewacla soils and of Mixed alluvial land.

About 55 percent of the acreage is in forest, 40 percent is in pasture, and 5 percent is in field crops. This soil is not suited to field crops, because of the high water table and the hazard of very frequent flooding. It is suited to fescue grown for pasture. (Capability unit IVw-2; woodland suitability group 3)

Wilkes Series

The Wilkes series consists of moderately deep, excessively drained, sloping to moderately steep soils of Piedmont uplands. These soils occupy small areas near Lahore, along the boundary between areas underlain by granite and areas underlain by diorite. They have formed in material weathered from mixed basic and acidic rocks of granite, gneiss, and diorite. The native vegetation is white, red, black, and scarlet oaks, redcedar, hickory, dogwood, and some shortleaf pine and Virginia pine.

In a typical profile, the surface layer is very dark grayish-brown sandy loam about 6 inches thick. The subsoil is weakly defined. It consists of yellowish-brown sandy loam about 10 inches thick. The subsoil is underlain by yellowish-brown, sandy soil material. Partly weathered rock is at a depth of about 26 inches.

The Wilkes soils are strongly acid and are low in content of organic matter and in natural fertility. Infil-

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tration is rapid in the surface layer, and permeability is moderate in the subsoil. The available moisture capacity is low.

Representative profile of Wilkes sandy loam, 7 to 15 percent slopes, in a bluegrass pasture one-fourth mile south of Lahore on a bluff above Pamunkey Creek:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, fine, granular structure; very friable when moist; many fine roots; clear, smooth boundary.

B—6 to 16 inches, yellowish-brown (10YR 5/6) sandy loam; weak, fine, granular structure; friable when moist; many fine roots; many grains of coarse sand; few fragments of weathered granite and basic rocks; clear, wavy boundary.

C—16 to 26 inches, yellowish-brown (10YR 5/4), friable, sandy soil material, with lenses or pockets of slightly plastic, clayey material; common, fine, distinct mottles of strong brown (7.5YR 5/6) and light brownish gray (2.5Y 6/2); firm in place but friable if dug out; 25 percent of horizon is fragments of partly weathered rock.

R—26 inches +, partly weathered granite and diorite rock.

The A horizon ranges from very dark grayish brown to yellowish brown in color and from 6 to 12 inches in thickness. The B horizon is weakly defined. It normally is sandy loam, but it contains pockets or lenses of sandy clay loam or clay that are as much as 6 inches thick in places. The solum ranges from 12 to 20 inches in thickness. Depth to hard rock ranges from 2½ to 4 feet or more.

Wilkes soils occur with Cecil, Helena, and Lloyd soils, but unlike those soils, they have a weakly defined subsoil. Also, they are coarser textured, are shallower over bedrock, and have a lower content of clay than those soils.

Wilkes sandy loam, 7 to 15 percent slopes (WkC).—This soil has the profile described as representative of the series. Included with it in mapping were areas of eroded Wilkes soils and small areas of Wilkes soils that have a loam surface layer. Also included were areas of rock outcrops that are indicated on the soil map by an appropriate symbol. Other inclusions consist of small areas of Lloyd, Bremo, and Cecil soils and of scattered areas in which the slopes are less than 7 percent.

About 50 percent of the acreage is in pasture, 45 percent is in forest, and 5 percent is in field crops. This soil is not suited to field crops, but it can be used for pasture or trees. (Capability unit IVe-3; woodland suitability group 4)

Wilkes sandy loam, 15 to 25 percent slopes (WkD).—This soil is similar to the one for which a profile is described as representative of the series, except that it is steeper. Included in mapping were areas of rock outcrops and areas of Wilkes soils that are eroded and that have slopes steeper than 25 percent.

About 63 percent of the acreage is in pasture, and the rest is in forest. This soil is suited to pasture and trees, but it is not suited to field crops. (Capability unit VIe-2; woodland suitability group 4)

Worsham Series

The Worsham series consists of deep, poorly drained, gently sloping soils on uplands and colluvial slopes at the heads of draws and along drainageways. These soils occur throughout the county, except in areas that are underlain by greenstone and by rocks of Triassic age. They have formed in a mixture of alluvial and colluvial material and in material that weathered from the underlying rocks. The native vegetation is willow oak, pin oak, scarlet oak, red maple, alder, elm, spicebush, and other plants that can tolerate wetness caused by restricted drainage.

In a typical profile, the surface layer is mottled, and it consists mainly of olive-gray silt loam in the upper part and of light brownish-gray silt loam in the lower part. The surface layer is about 9 inches thick. The subsoil is mostly highly mottled, gray clay. It is underlain by gravel and sand at a depth of about 52 inches.

Worsham soils are strongly acid and are low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderately slow in the subsoil. The available moisture capacity is moderate.

Representative profile of Worsham silt loam, 2 to 7 percent slopes, in a forest of swamp hardwoods, 1 mile east of Golddale along Road No. 621:

A11g—0 to 1½ inches, olive-gray (5Y 5/2) silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) and light olive brown (2.5Y 5/6); moderate, fine, granular structure; very friable when moist; many fine roots; clear, smooth boundary.

A12g—1½ to 6 inches, olive-gray (5Y 5/2) silt loam; many, coarse, prominent mottles of yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and light brownish gray (10YR 6/2); moderate, medium, granular structure; friable when moist, slightly sticky when wet; many fine and medium roots; many root channels; clear, smooth boundary.

A3g—6 to 9 inches, light brownish-gray (2.5Y 6/2) silt loam; many, medium, prominent mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; friable when moist; many fine pores and root channels; gradual, smooth boundary.

B1tg—9 to 16 inches, light olive-brown (2.5Y 5/4) silty clay loam, highly mottled with yellowish brown (10YR 5/4), light brownish gray (2.5Y 6/2), gray (N 6/0), and yellowish red (5YR 4/6); moderate, fine, subangular blocky structure; friable when moist; few patchy clay films; few medium roots; many fine and medium pores; few quartz pebbles; few black mineral concretions; gradual, smooth boundary.

B21tg—16 to 29 inches, gray (10YR 6/1) clay, highly mottled with yellowish brown (10YR 5/4), strong brown (7.5YR 5/6), and some yellowish red (5YR 4/6); strong, coarse, subangular blocky structure; firm when moist, slightly sticky and plastic when wet; few, thin, patchy clay films; gradual, smooth boundary.

B22tg—29 to 42 inches, gray (N 6/0) clay; many, coarse, prominent mottles of yellowish brown (10YR 5/6), yellowish red (5YR 4/6), and light gray (5Y 7/1); coarse angular blocky structure; slightly sticky and plastic when wet; many prominent clay films; many roots between peds; gradual, smooth boundary.

B3tg—42 to 52 inches, gray (5Y 6/1) clay; common, medium, prominent mottles of light olive brown (2.5Y 5/6) and light gray (5Y 7/2); massive; sticky and plastic when wet; no roots; few patchy clay films along cracks; few fragments of quartz; abrupt, wavy boundary.

IIC—52 inches +, gravel, weathered schist, and some fine sand.

The A horizon ranges from dark gray or olive gray to light brownish gray in color and from 6 to 14 inches in thickness. The B horizons range from 30 to 50 inches in combined thickness. The B3tg horizon is underlain by a layer of gravel in most places. Depth to hard rock is 5 to 10 feet or more.

Worsham soils occur with Appling, Colfax, Lignum, Louisburg, Manor, Nason, and York soils. They are more grayish than those soils, and unlike those soils, they are poorly drained.

Worsham silt loam, 2 to 7 percent slopes (WoB).—This is the only soil of the Worsham series mapped in Orange County. It has a high water table and receives seepage and runoff from higher areas. Where this soil is underlain by granite, areas were included that have a surface layer of fine sandy loam and a subsoil of heavy sandy clay loam. Also included were small areas of nearly level Worsham soils and small areas of Colfax, Lignum, and Seneca soils.

About 95 percent of the acreage is in forest, and the rest is in pasture. This soil is better suited to pasture and to trees that can tolerate wetness caused by restricted drainage than to field crops. (Capability unit Vw-1; woodland suitability group 3)

York Series

The York series consists of soils that are deep, moderately well drained, and gently sloping. These soils occupy small areas on Piedmont uplands throughout the eastern part of the county that is underlain by schist. They have formed in material weathered from fine-grained sericite-schist. The native vegetation is red, white, black, scarlet, and post oaks, red maple, shortleaf pine, and Virginia pine.

In a typical profile, the surface layer is pale-olive to light yellowish-brown silt loam about 8 inches thick. The subsoil, to a depth of about 25 inches, is light yellowish-brown to light olive-brown heavy silt loam. A weak fragipan of olive-yellow loam to silt loam is between depths of 25 and 40 inches. Mottled light yellowish-brown or yellowish-brown to yellowish-red heavy silt loam underlies the fragipan and extends to a depth of about 52 inches.

York soils are strongly acid and are low in content of organic matter and in natural fertility. Infiltration is moderately rapid in the surface layer, and permeability is moderately slow in the subsoil. The available moisture capacity is moderate.

Representative profile of York silt loam, 2 to 7 percent slopes, in a forest of mixed pines and hardwoods, 1¼ miles east of Nasons and west of Highway No. 725:

O1—2 inches, to 1 inch, partly decomposed oak leaves, pine needles, and twigs, and some fresh forest litter.

O2—1 inch to 0, very dark gray (N 3/0), partly decomposed organic matter.

A1—0 to 2 inches, pale-olive (5Y 6/3) silt loam; weak, fine, granular structure; very friable when moist, soft to slightly hard when dry; common fine and medium roots; few fragments of quartz one-fourth inch to 1 inch in diameter; strongly acid; clear, smooth boundary.

A2—2 to 8 inches, pale-olive (5Y 6/4) to light yellowish-brown (2.5Y 6/4) silt loam; weak, fine, granular structure; very friable when moist, soft to slightly hard when dry; common fine and medium roots; few fragments of quartz 2 millimeters to 1 inch in diameter; strongly acid; clear, smooth boundary.

B1—8 to 12 inches, light yellowish-brown (2.5Y 6/4) silt loam to heavy silt loam; weak, fine, subangular blocky structure but easily crushed to fine granular structure; very friable or friable when moist, soft to slightly hard when dry, slightly sticky when wet; common fine and medium roots and a few coarse roots; strongly acid; clear, smooth boundary.

B2t—12 to 25 inches, light olive-brown (2.5Y 5/4) heavy silt loam; weak, fine, subangular blocky structure; slightly sticky when wet; thin, discontinuous clay films; common fine and medium roots and a few coarse roots; few fragments of quartz 2 millimeters to three-fourths inch in diameter; strongly acid; clear, wavy boundary.

Bx—25 to 40 inches, olive-yellow (2.5Y 6/6) loam to silt loam; common, fine, faint mottles of pale yellow (2.5Y 7/4), light gray (2.5Y 7/2), and light olive brown (2.5Y 5/4); weak, medium, platy structure; hard and slightly brittle when dry, slightly sticky when wet; common vesicular pores; common grains of coarse sand and fine quartz pebbles; strongly acid; clear to diffuse, wavy boundary.

B3—40 to 52 inches, mottled light yellowish-brown (10YR 6/4), yellowish-brown (10YR 5/8), and yellowish-red (5YR 5/8) heavy silt loam; mixed weak, fine, granular and weak, fine, subangular blocky structure; friable when moist, slightly hard when dry, slightly sticky when wet; few fine and medium roots; few to common pebbles of quartz; strongly acid; diffuse boundary.

C—52 to 80 inches, mottled yellowish-brown (10YR 5/6), strong-brown (7.5YR 5/6), gray (N 6/0), and red (2.5YR 5/8) silty clay loam soil material that becomes more silty with depth; few strongly weathered fragments of schist; strongly acid.

R—80 inches +, hard, light-gray sericite-schist.

The A horizon ranges from pale olive to light olive brown or light yellowish brown in color. The B2t horizon ranges from heavy silt loam to light silty clay. Mottling in the Bx horizon ranges from olive yellow or pale yellow to light gray or light olive brown. Depth to the fragipan ranges from 20 to 33 inches. The solum is 40 to 60 inches thick. Depth to hard rock ranges from 6 to 10 feet or more.

York soils occur with Lignum, Nason, and Worsham soils. They are less well drained and have a coarser textured subsoil than the Nason soils. York soils contain less clay and are better drained than the Lignum and Worsham soils, and they lack the distinct mottling that is typical in the subsoil of the Lignum and Worsham soils.

York silt loam, 2 to 7 percent slopes (YoB).—This is the only soil of the York series mapped in Orange County. Included in mapping were areas of York soils that have a surface layer of loam, small areas that are eroded, and a few areas where slopes are steeper than 7 percent. Also included were small areas of Nason and Lignum soils. Other inclusions consist of York soils that are slightly finer textured and more brownish than normal for York soils and that occur in a narrow belt from the Orange County Airport to Gordonsville.

About 95 percent of the acreage is in forest, 4 percent is in pasture, and the rest is in cultivated crops. The fragipan and low natural fertility make this soil unsuitable for cultivation. (Capability unit IIIw-2; woodland suitability group 12)

Zion Series

The Zion series consists of moderately deep, moderately well drained soils of the Piedmont Plateau. These soils occur in small areas throughout the community of Lahore. They have formed in material weathered from basic rocks of quartz diorite and hornblende gneiss. The native vegetation is blackjack, red, and white oaks, hickory, walnut, dogwood, redcedar, and Virginia pine.

In a typical profile, the surface layer is brown or dark-brown silt loam about 10 inches thick. The upper part of the subsoil is a concretionary horizon of dark yellowish-brown silty clay loam that is about 20 percent gravel and small mineral concretions. The lower part is brown or dark-brown to dark yellowish-brown clay that

is mottled below a depth of 26 inches. The subsoil extends to a depth of about 32 inches and is underlain by partly decomposed basic rocks.

Zion soils are medium acid and are medium in content of organic matter and in natural fertility. Infiltration is moderate in the surface layer, and permeability is slow in the subsoil. The available moisture capacity is moderate.

Representative profile of Zion silt loam, 2 to 7 percent slopes, in a bluegrass pasture 2 miles northeast of Lahore, and east of U.S. Highway No. 522:

Ap—0 to 10 inches, brown to dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable when moist; many fine roots; few black mineral concretions; clear, smooth boundary.

B1t—10 to 18 inches, dark yellowish-brown (10YR 4/4) silty clay loam; few, fine, faint mottles of strong brown (7.5YR 5/6); moderate, fine, subangular blocky structure; friable when moist; about 20 percent of horizon is gravel and small black mineral concretions; clear, smooth boundary.

B2t—18 to 26 inches, brown to dark-brown (7.5YR 4/4) clay; coarse, angular blocky structure; firm when moist, hard when dry, sticky and plastic when wet; distinct clay films; few fine mica flakes; few, small, black mineral concretions; few small fragments of weathered basic rocks; gradual, smooth boundary.

B3—26 to 32 inches, dark yellowish-brown (10YR 4/4) clay mottled with black, green, and white; weak subangular blocky structure to massive; sticky and plastic when wet; 20 to 40 percent of horizon is fragments of weathered basic rock; few fine mica flakes; gradual, smooth boundary.

C—32 to 40 inches, partly decomposed, brown, green, black, and white basic rock; some clay in vertical cracks; friable to loose soil material if dug out.

R—40 inches +, hard basic rock.

The A horizon ranges from 4 to 12 inches in thickness. The B1t horizon ranges from strong brown to dark yellowish brown in color, from clay to silty clay loam in texture, and from 4 to 8 inches in thickness. From 20 to 40 percent of the B1t horizon is small, black mineral concretions, and this horizon also contains some quartz pebbles. The B2t horizon ranges from brown or dark brown to yellowish brown in color and from 4 to 12 inches in thickness. In this horizon base saturation is greater than 35 percent. The solum is 24 to 40 inches thick. The C horizon is weathered, basic hornblende gneiss and diorite. Depth to hard rock ranges from 2½ feet to 4 feet or more.

Zion soils occur with Fluvanna, Orange, Iredell, and Bremo soils. They are more brownish than the Orange soils and are shallower over bedrock and are less well drained than the Fluvanna soils. Zion soils lack the continuous clay subsoil typical of the Iredell soils, and they have a thicker solum and are finer textured than the Bremo soils.

Zion silt loam, 2 to 7 percent slopes (ZoB).—This soil has the profile described as representative of the series, but the surface layer is thinner than 10 inches in places. Included in mapping were areas where the surface layer is loam, and other areas where pebbles of brown quartz are in the surface layer. Also included were a few small areas of Bremo, Iredell, and Mecklenburg soils.

About 75 percent of the acreage is in pasture, 20 percent is in field crops, and 5 percent is in forest. This soil is especially well suited to bluegrass pasture, but it is also suited to corn, small grains, and mixed hay. (Capability unit IIe-4; woodland suitability group 13)

Zion silt loam, 7 to 15 percent slopes, eroded (ZoC2).—This soil has a profile similar to the one described as representative of the series, except that the surface layer is only 4 to 7 inches thick. Included in mapping were small areas where the surface layer is loam, and other small areas where the surface layer contains pebbles of brown quartz. Also included was a small acreage of Zion soils that have a thicker surface layer than typical and a few small areas of Bremo soils.

About 80 percent of the acreage is in pasture, 15 percent is in field crops, and 5 percent is in forest. This soil is well suited to bluegrass pasture. If well managed, it is also fairly well suited to corn, small grains, and hay. (Capability unit IIIe-4; woodland suitability group 13)

Use and Management of the Soils

This section has several main parts. It discusses management of the soils for crops and pasture and gives facts about woodland and wildlife in the county. It also describes use of the soils for engineering and for nonfarm purposes.

Management for Crops and Pasture

General practices of soil management are described in the following pages, the system of capability classification used by the Soil Conservation Service is explained, and use and management of the soils in each capability unit are discussed. Finally, estimated yields to be expected when a high level of management is used are given.

Basic principles of soil management

Most soils require good general management for continuing satisfactory yields. Before these practices can be applied, basic knowledge of the soils and of suitable management practices is necessary. A local representative of the Soil Conservation Service or the county agricultural agent will help the farmer learn about his soils and about suitable management practices.

Estimating the need for lime, phosphate, and potash.—Each soil contains some supplies of the nutrients needed by growing plants. Thus, each soil has some natural fertility. This natural fertility was estimated for the soils of each series in the section "Descriptions of the Soils." The estimates of natural fertility, supplemented with soil tests for plant nutrients, knowledge about past management, and information about the level of yield expected, make it possible to judge the need for additional plant nutrients on a particular soil. In deciding the actual kinds and amounts of fertilizer to apply, however, other factors are to be considered.

One part of a field is commonly more responsive to lime or to fertilization than another, because a field likely contains more than one kind of soil. The soil map and soil tests for fertility reveal differences in the soils and in soil fertility, and they should be studied before fertilizer or soil amendments are applied.

The level of management the operator wishes to use will partly determine the amount of plant nutrients that should be applied. Also to be considered are available capital and the current market.

Organic matter and nitrogen.—Most soils in Orange County are deficient in organic matter and nitrogen. The application of nitrogen to crops, except legumes, not only increases yields but it also increases the amount

of available organic matter that can be returned to the soils. Organic matter, in turn, increases the available moisture capacity and tilth, and it helps to reduce soil losses caused by erosion. Unlike phosphate and potash, nitrogen is not a constituent of the soil minerals. It comes largely from plant remains, especially from the remains of legumes, and from commercial fertilizer. Animal manure supplies considerable nitrogen and organic matter. Rain and air also supply some nitrogen, which is combined by bacteria with other elements in the soil. The use of crop residue, manure, and nitrogen depends largely upon the kind of crop to be grown.

A complete fertilizer (one containing nitrogen, phosphorus, and potassium) should be used with small grains, and a mineral fertilizer (phosphate and potash) with legumes at the time of seeding and as a topdressing.

Rotation of crops.—A good crop rotation adds organic matter to the soil at the time the crop most needs organic matter. For example, a green-manure crop or residue from legumes can be plowed under to increase the yield of corn. A good rotation also helps to control erosion, soil-borne diseases, and weeds. In addition, it distributes the drain of plant nutrients over a longer period of time. This distribution allows more time for the soil to furnish plant nutrients through the normal process of weathering. In Orange County a good rotation should include alfalfa, red clover, Ladino clover, lespedeza, or some other legume. The selection of the legume will depend mainly on the kind of soil and the level of soil productivity maintained.

Control of erosion.—Most of the soils of Orange County have been affected by sheet erosion. Some of the red soils are severely eroded and are dissected by shallow gullies. The erosion shows the need for improved management. If properly managed, the steep soils should be in forest or pasture, and the trees or pasture should be protected from fire or overgrazing. The sloping soils that are to be cultivated should be used for crop rotations consisting mostly of crops that cover the soil most of the time. A rotation consisting of 1 year of corn, 1 year of small grain, and 3 years of alfalfa, together with good management and adequate fertilization, is effective in protecting many sloping soils. Adequate fertilization is an essential part of good management on sloping soils, whether the soils are cultivated or in permanent pasture. A dense cover of growing plants and extensive development of plant roots can keep soil losses to a minimum. Contour stripcropping, contour tillage, terracing, and the sodding of drainageways are necessary in some places to control erosion.

Artificial drainage.—Crops growing on wet soils or on slowly permeable soils are more affected by unfavorable seasonal conditions than are those growing on permeable soils or on artificially drained soils. The effects of excess moisture can be lessened by proper fertilization and by choosing crops that can tolerate wet soil. Many somewhat poorly drained or poorly drained soils would be potentially excellent for pasture and could be used to some extent for crops if they could be drained. Therefore, each wet soil should be studied to determine the possibility of establishing drainage. Permeability of the subsoil is important to the efficiency of a tile drainage system. Wet soils that are not suitable for tile drainage are less desirable for crops than soils that are permeable to water and that can be readily penetrated by roots. Those wet soils are cold and waterlogged in wet seasons. They bake and are hard in dry seasons.

Tillage.—Soils must be in good tilth if maximum yields are to be obtained. Improper tillage can cause the deterioration of soil structure and the loss of organic matter. Many clayey soils, for example, must be cultivated within a narrow range of moisture content to prevent puddling and damage to structure. The deterioration of soil structure is gradual and is not easily noticed. Consequently, many farmers are not aware of damage until the soils have seriously deteriorated. The structure of damaged soils can be improved by adding organic matter and growing sod-forming crops. Tillage implements that incorporate organic matter into the surface layer help to keep the soil in good tilth. Soils should not be overcultivated.

Capability groups of soils

The capability classification is a grouping of soils to show, in a general way, their suitability for most kinds of farming. It is a practical classification based on the limitations of the soils, the risk of damage when they are used, and the way they respond to treatment. The classification does not apply to most horticultural crops or to rice and other crops that have special requirements. The soils are classified according to degree and kind of permanent limitation, but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soils, and without consideration of possible major reclamation projects.

In the capability system, all kinds of soils are grouped at three levels, the capability class, subclass, and unit. These are discussed in the following paragraphs.

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

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that restrict the choice of plants, require very careful management, or both.
- Class V soils are subject to little or no erosion but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife food and cover.
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife food and cover.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to grazing, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plant production and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes. (None in Orange 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 some parts of the United States but not in Orange County, 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, at the most, only subclasses indicated by *w*, *s*, and *c*, because the soils in it 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 soil 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 response 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 an Arabic numeral to the subclass symbol, for example, IIe–1 or IIIw–1. Thus, in one symbol, the Roman numeral designates the capability class or degree of limitation, and the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph. The Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

The capability units in Orange County are described in this part of the survey. The names of soil series represented are mentioned in the description of each capability unit, but this does not mean that all the soils of a given series appear in that unit. To find the capability classification of any given mapping unit, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT I–1

In this capability unit are deep, well-drained Manassas and Starr soils that have formed in recent colluvium. These soils have a surface layer of friable silt loam 10 to 20 inches thick and a weakly defined subsoil of friable silty clay loam. Permeability is moderate. Natural fertility, the content of organic matter, and available moisture capacity are high, and these soils are medium acid. Runoff and seepage from adjacent higher lying areas are sometimes a hazard to cultivated crops.

Soils of this unit are suited to corn and most hay crops. They are also well suited to small grains, though small grains have a tendency to lodge. The soils are not suited to alfalfa, for the stand deteriorates after 2 or 3 years. Legumes to which these soils are well suited are red clover and Ladino clover. The main grasses to which they are well suited are orchardgrass, timothy, tall fescue, and bluegrass. These soils are well suited to home gardens.

Many areas of these soils are in minor drainageways in large fields. Where the soils occur in these places, they should be kept in grass and used as waterways in which runoff from higher slopes can be conveyed safely to other areas. The grass provides protection from erosion and catches soil material carried in the runoff water. Where these soils are cultivated, a rotation commonly used is one that consists of a row crop followed by a small grain and then by 1 or 2 years of hay.

Turning under crop residue helps to supply needed organic matter. Nitrogen should not be applied where small grains are grown, because it increases the tendency of the small grains to lodge.

CAPABILITY UNIT I–2

Only State loam, 0 to 4 percent slopes, is in this capability unit. It is a deep, well-drained, highly productive soil that is nearly level or gently sloping and is on low stream terraces. The surface layer is friable loam underlain by fine sandy loam, and it is 10 to 20 inches thick. The subsoil is weakly defined and consists of friable fine sandy clay loam to clay loam. Infiltration is rapid, permeability is moderate, and the available moisture capacity is high. This soil is medium acid to strongly acid. It has high fertility and a high content of organic matter.

This soil is especially well suited to vegetables, but it is also well suited to many other crops, including corn, small grains, and hay. Red clover is the most suitable legume, and orchardgrass, tall fescue, and timothy are the most suitable grasses to grow for hay or pasture. Alfalfa does not grow well on this soil; the stand deteriorates after only 1 or 2 years.

Corn may be grown year after year, or a cropping sequence consisting of corn, small grains, and hay may be used. Where corn is grown year after year, plowing under the stalks provides regular additions of organic matter.

This soil is considered suitable for sprinkler irrigation. High-value row crops can be grown year after year if the content of organic matter is kept high. Flooding rarely occurs, but it is the chief hazard to growing crops.

CAPABILITY UNIT IIe–1

This capability unit consists of deep, well-drained, gently sloping, red or dark-red Bucks, Davidson, Dyke, Fauquier, Hiwassee, Lloyd, Rabun, and Rapidan soils on uplands and high stream terraces. Most of these soils are moderately eroded. The surface layer is friable loam, silt loam, or clay loam 4 to 10 inches thick, and the subsoil is friable or firm silty clay loam to clay. Depth to bedrock ranges from 4 to 30 feet. Permeability is moderately rapid or moderate, and the available moisture capacity is high. The content of organic matter and the natural fertility are medium to high.

These are among the soils best suited to the crops commonly grown in the county. Under good management they are well suited to wheat, oats, barley, corn, alfalfa, red clover, Ladino clover, orchardgrass, tall fescue, timothy, and bluegrass.

The hazard of further erosion is great enough that a close-growing crop should be grown at least 1 year out of 2 so that losses from erosion will be minimized. A rotation commonly used is one that consists of a row crop followed by a fall-seeded small grain and then by a mixture of grasses and legumes sown in the small grain in spring. This grass-legume mixture is cut for hay the third year.

These soils can be satisfactorily tilled only within a rather narrow range of moisture content. If they are tilled when too wet or too dry, large clods form, and these clods can be broken down by freezing and thawing. As a result, plowing is usually done in fall or early in winter. In some years the soils freeze and thaw when the surface is not protected by snow, and the stand of alfalfa is lost as a result of heaving. Boron is required if a productive stand of alfalfa is to be established and maintained. Plowing under all crop residue provides regular additions of organic matter.

Further erosion caused by runoff is the chief hazard where these soils are cultivated. Tilling on the contour, including adequately fertilized close-growing crops in the rotation, and establishing grassed waterways are effective practices for controlling erosion. These soils are suitable for sprinkler irrigation.

CAPABILITY UNIT IIe-2

This capability unit consists of deep, well-drained, red or reddish-brown, gently sloping Cecil, Elsinboro, Madison, Myersville, Turbeville, and Wadesboro soils on uplands and stream terraces. Most of these soils are eroded. The surface layer is friable fine sandy loam, sandy loam, loam, or silt loam 4 to 10 inches thick. The subsoil is firm to friable clay loam, silty clay loam, or clay. Depth to bedrock ranges from 5 to 20 feet. Permeability is moderate, and the available moisture capacity is high. The content of organic matter and the natural fertility are medium to low. Reaction is medium acid to very strongly acid.

These soils are well suited to a number of different crops. If they are properly managed, they are well suited to oats, wheat, barley, and corn. They are also suited to alfalfa, red clover, and Ladino clover. Grasses most commonly grown and well adapted are timothy, tall fescue, and orchardgrass.

The hazard of further erosion is great enough that a close-growing crop should be grown at least 1 year out of 2. A crop rotation commonly used is one that consists of corn or some other row crop followed by a small grain, and then by 1 year of clover and grasses grown for hay.

Where these soils are cultivated, further erosion caused by runoff is the chief hazard. Tilling on the contour, including adequately fertilized close-growing crops in the rotation, and establishing grassed waterways are effective practices for controlling erosion. These soils are suitable for sprinkler irrigation.

CAPABILITY UNIT IIe-3

This capability unit consists of deep, dominantly well-drained, slightly eroded and moderately eroded soils of uplands and stream terraces. These soils are in the Altavista, Appling, Elioak, Glenelg, Grover, Masada, Mayodan, Nason, Seneca, and Tatum series. The surface layer is friable sandy loam to silt loam. The subsoil ranges from friable sandy clay loam to silty clay loam in texture and from red or yellowish red to yellowish brown in color. Permeability is moderate, and the available moisture capacity is moderate to high. The content of organic matter is medium to low. Reaction ranges from extremely acid to medium acid.

If these soils are well managed, they are fairly well suited to corn, wheat, oats, barley, and other crops commonly grown in the county, but not all of the soils are well suited to alfalfa. Red clover and Ladino clover are much more suitable legumes than alfalfa. The soils are well suited to orchardgrass, tall fescue, and timothy if a large amount of a suitable fertilizer is applied.

The hazard of erosion is great enough that a close-growing crop should be grown 1 year out of 2. A cropping sequence commonly used is corn, small grain, and 1 year of mixed grasses and clover grown for hay.

Even where these soils are well managed, the supply of organic matter is depleted at a moderately rapid rate. Turning under all crop residue and turning under a cover crop 1 year out of every 3 or 4 will provide regular additions of organic matter.

Erosion caused by runoff is the chief hazard where these soils are cultivated. Tilling on the contour, including an adequately fertilized close-growing crop in the cropping sequence, and establishing grassed waterways are effective practices for controlling erosion. These soils are suitable for sprinkler irrigation.

CAPABILITY UNIT IIe-4

This capability unit consists of deep, slightly eroded and moderately eroded Fluvanna, Mecklenburg, Vance, and Zion soils on uplands. The surface layer is friable silt loam or fine sandy loam. The subsoil is slightly plastic or plastic clay. Depth to bedrock ranges from 2½ to 12 feet or more. Permeability is moderate to slow, and the available moisture capacity is moderate to high. Natural fertility and the content of organic matter are low to medium. Reaction ranges from medium acid to very strongly acid.

The subsoil of heavy clay limits suitability of these soils for crops. The soils are fairly well suited to corn, but planting is sometimes delayed in spring. They are fairly well suited to small grains, but they are not well suited to alfalfa. Red clover and Ladino clover are legumes to which the soils are suited, and orchardgrass, tall fescue, and timothy are grasses to which they are suited. These soils are well suited to native bluegrass pasture if they are properly managed.

The hazard of erosion is great enough that a close-growing crop should be grown at least 1 year out of 2. Because these soils are not especially well suited to corn, a cropping sequence commonly used is 1 year of a small grain and 2 years of mixed hay.

Even where management is good, the supply of organic matter is depleted at a moderately rapid rate. Turning under all crop residue and turning under a cover crop 1 year out of every 3 or 4 will provide regular additions of organic matter.

Erosion caused by runoff is the chief hazard where these soils are cultivated. Tilling on the contour, including an adequately fertilized close-growing crop in the cropping sequence, and establishing grassed waterways are effective practices for controlling erosion. The soils

are not well suited to sprinkler irrigation, because of the limited number of crops for which they are suitable.

CAPABILITY UNIT IIw-1

This capability unit consists of deep, well-drained Bermudian and Comus soils on flood plains that are subject to overflow. The surface layer is very friable silt loam or fine sandy loam 6 to 24 inches thick. The subsoil is friable, dark reddish-brown to dark yellowish-brown fine sandy loam to silt loam. Permeability is moderately rapid, and the available moisture capacity is high. The content of organic matter and the natural fertility are high. Reaction is strongly acid to medium acid.

These soils are suited to many different crops. If properly managed, they are well suited to corn. They are also well suited to small grains, though small grains tend to lodge if nitrogen is applied. Legumes to which these soils are suited are red clover and Ladino clover, and tall grasses to which they are suited are orchardgrass, tall fescue, and timothy. Except that flooding is a hazard, these soils are well suited to truck crops.

Erosion is not a hazard, but silt carried by floodwaters is occasionally deposited in small areas. Flooding is the only hazard to crops, and it generally occurs early in spring and in summer. Because flooding is a risk, high-value crops are seldom grown. Where corn is not damaged by floodwaters, it grows well year after year if organic matter is added regularly by turning under all crop residue. These soils are well suited to sprinkler irrigation.

CAPABILITY UNIT IIw-2

Only Altavista loam, 0 to 2 percent slopes, is in this capability unit. It is a deep, moderately well drained, yellowish-brown soil on stream terraces. The surface layer is friable loam 6 to 10 inches thick. The subsoil is friable sandy clay loam. Permeability is moderate, and the available moisture capacity is high. The content of organic matter and natural fertility are medium. Reaction is strongly acid.

If properly managed, this soil is well suited to corn and small grains, but moderate wetness limits its suitability for many crops. Legumes to which it is well suited are red clover and Ladino clover, and grasses to which it is suited are orchardgrass, tall fescue, and timothy. This soil is not suited to alfalfa.

Erosion is not a hazard, but water occasionally ponds in small depressions. These ponded areas are difficult to drain, and maintaining good supplies of organic matter and plant nutrients is difficult. Organic matter may be added by turning under crop residue and turning under a cover crop every 3 or 4 years. Where drainage is provided, this soil is suitable for sprinkler irrigation.

CAPABILITY UNIT IIIe-1

This capability unit consists of deep, well-drained Bucks, Davidson, Dyke, Fauquier, Hiwassee, Lloyd, Rabun, and Rapidan soils on uplands, stream terraces, and old colluvial slopes. The sloping soils are eroded but generally are not severely eroded. The gently sloping, red soils are severely eroded. The surface layer is friable clay loam, silt loam, clay or loam. The subsoil is reddish, firm to friable clay to silty clay loam. Depth to bedrock ranges from 4 to 20 feet or more. Permeability is moderate to moderately rapid, and the available moisture capacity is high. The content of organic matter is medium to low, and natural fertility is medium to high.

These soils are suited to many different crops. If properly managed, they are well suited to corn and small grains, and they are also well suited to alfalfa, red clover, and Ladino clover. Grasses to which they are well suited are orchardgrass, tall fescue, and timothy.

The hazard of erosion is great enough that close-growing crops should be grown at least 2 years out of 3. A cropping sequence commonly used is 1 year of a row crop followed by a small grain and then 1 or 2 years of hay. Also used is a cropping sequence consisting of corn, small grain, and 4 or 5 years of alfalfa. Where this last cropping sequence is used, alfalfa is planted in an especially prepared seedbed after the small grain is harvested.

Even where these soils are well managed, the supply of organic matter is rapidly depleted. Turning under all crop residue and barnyard manure and turning under a cover crop every 3 or 4 years provide a fairly good supply of organic matter and help to improve tilth. These practices also widen the range of moisture content within which the soils can be tilled and a favorable seedbed prepared. Soils not in good tilth are difficult to work and can be prepared for a seedbed only within a narrow range of moisture content.

Erosion caused by runoff is the main hazard where these soils are cultivated. The severely eroded soils should be kept in continuous hay or pasture. Erosion can be controlled on cultivated soils by growing crops in contour strips and by including adequately fertilized close-growing crops in the cropping sequence. Terraces or diversions that safely convey the water to a grassed waterway reduce the amount of runoff.

These soils are considered suitable for sprinkler irrigation. High-value crops should be grown no more frequently than 1 year out of every 3 or 4, because of the steepness of the slopes.

CAPABILITY UNIT IIIe-2

This capability unit consists of deep, well-drained Cecil, Elsinboro, Madison, Myersville, Turbeville, and Wadesboro soils that are sloping and eroded. These soils are on uplands and stream terraces. The surface layer is friable loam, silt loam, sandy loam, or fine sandy loam 4 to 8 inches thick. The subsoil is red to yellowish-red, firm to friable clay, clay loam, or silty clay loam. Depth to bedrock ranges from 5 to 20 feet or more. Permeability is moderate, and the available moisture capacity is high. The content of organic matter is low, and natural fertility is low to medium. Reaction is medium acid to very strongly acid.

If properly managed, these soils are will suited to corn, small grains, and many other commonly grown crops. They are also well suited to alfalfa, red clover, and Ladino clover and to orchardgrass, tall fescue, and timothy.

The hazard of erosion is great enough that a close-growing crop should be grown at least 2 years out of 3. A cropping sequence commonly used is a row crop followed by a small grain and then by 1 or 2 years of hay. Also used is a cropping sequence consisting of corn, a small grain, and 4 or 5 years of alfalfa. The alfalfa is

planted in an especially prepared seedbed after the small grain is harvested.

Even where these soils are well managed, the supply of organic matter is rapidly depleted. Turning under all crop residue and turning under a cover crop every 3 or 4 years will provide a fairly good supply of organic matter.

Good tilth is easily maintained, except in small severely eroded areas where the plow layer consists mostly of material from the subsoil. In those areas tillage is difficult and a favorable seedbed can be prepared only within a narrow range of moisture content. Barnyard manure and crop residue turned under provide a supply of organic matter and help to improve tilth.

Erosion caused by runoff is the main hazard where these soils are cultivated. Erosion can be controlled in cultivated areas by growing crops in contour strips and by including adequately fertilized close-growing crops in the cropping sequence. Terraces or diversions that safely convey water to a grassed waterway reduce the amount of runoff.

Soils of this unit are suitable for sprinkler irrigation. High-value crops should be grown no more frequently than 1 year out of every 3 or 4, however, because of the slopes.

CAPABILITY UNIT IIIe-3

This capability unit consists of deep, well-drained, sloping, eroded Appling, Elioak, Glenelg, Grover, Masada, Mayodan, Nason, and Tatum soils, and of gently sloping, severely eroded Elioak and Tatum soils. These soils are red or yellowish red. They are on uplands and stream terraces. The surface layer is sandy loam to silt loam 4 to 10 inches thick. The subsoil is firm to friable clay loam to clay. Depth to bedrock ranges from 4 to 20 feet or more. Permeability is moderate, and the available moisture capacity is high to moderate. The content of organic matter is low, and natural fertility is low or medium. Reaction is strongly acid to extremely acid.

These soils are fairly well suited to most crops commonly grown in the county, but they are not suited to alfalfa. If well managed, they are well suited to corn and small grains and to red clover and Ladino clover. Grasses to which these soils are well suited are orchardgrass, tall fescue, and timothy.

The hazard of erosion is great enough that a close-growing crop should be grown at least 2 years out of 3. A cropping sequence commonly used is corn, a small grain, and then 1 or 2 years of mixed clover and grasses grown for hay.

Erosion caused by runoff is the chief hazard where these soils are cultivated. The severely eroded soils should be kept in continuous hay or pasture. Erosion can be controlled and soil losses kept to a minimum in cultivated areas by growing crops in contour strips and by including an adequately fertilized close-growing crop in the cropping sequence. Terraces or diversions that safely convey water to a grassed waterway reduce the amount of runoff.

These soils are suitable for sprinkler irrigation, but row crops should be grown no more frequently than 1 year out of 3 or 4.

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CAPABILITY UNIT IIIe-4

In this capability unit are deep and moderately deep, well drained or moderately well drained Fluvanna, Mecklenburg, and Zion soils on uplands. The surface layer of these soils is friable silt loam, and the subsoil is yellowish-red or brown clay. Depth to hard rock ranges from 2½ to more than 5 feet. Permeability is slow to moderate, and the available moisture capacity is moderate to high. The content of organic matter and the natural fertility are medium. Reaction is medium acid to strongly acid.

These soils are only fairly well suited to the crops commonly grown in the county. Even under good management, they are poorly suited to corn, but they are fairly well suited to small grains if they are well managed. The soils are not suited to alfalfa, but they are fairly well suited to red clover and Ladino clover. Grasses to which they are suited are orchardgrass, tall fescue, and timothy. If well managed, the soils are well suited to native pasture.

The hazard of erosion is great enough that a close-growing crop should be grown at least 2 years out of 3. A cropping sequence commonly used is 1 year of a small grain followed by 2 years of mixed hay.

Erosion caused by runoff is the chief hazard where these soils are cultivated. Soil losses can be kept to a minimum in cultivated areas by growing crops in contour strips and by including adequately fertilized close-growing crops in the cropping sequence. Terraces or diversions that safely convey the water to a grassed waterway reduce the amount of runoff. These soils are not suitable for sprinkler irrigation, because they are not suitable for high-value crops.

CAPABILITY UNIT IIIe-5

This capability unit consists of moderately well drained or somewhat poorly drained, gently sloping Helena, Iredell, and Orange soils and a concretionary variant of the Orange soils. All of these soils are on uplands. The surface layer is friable silt loam or fine sandy loam 6 to 14 inches thick. The subsoil is yellowish-brown to olive-brown, plastic clay. Depth to bedrock is 3 to 5 feet. Permeability is slow, and the available moisture capacity is moderate to low. The content of organic matter and the natural fertility are low to medium. Reaction is medium acid to strongly acid.

These soils are limited in suitability for crops. They are well suited to small grains but are poorly suited to corn and are only fairly well suited to mixed hay. Because of the plastic subsoil, these soils are not suited to alfalfa. The legumes to which they are well suited are red clover and Ladino clover, and the grasses to which they are well suited are orchardgrass, tall fescue, and timothy. The hazard of erosion is great enough that close-growing crops should be grown 1 year out of 2. A cropping sequence commonly used is a small grain and mixed hay.

Erosion caused by runoff is the main hazard where these soils are cultivated. Soil losses can be kept to a minimum in cultivated areas by tilling on the contour and by including an adequately fertilized close-growing crop in the cropping sequence. In places grassed waterways are needed to help to control erosion. Because of

their low infiltration rate and limited suitability for crops, these soils are not suitable for sprinkler irrigation.

CAPABILITY UNIT IIIe-6

This capability unit consists of well-drained and excessively drained Manteo, Penn, and Watt soils that are shallow or moderately deep over bedrock. These soils are on uplands. Both the surface layer and the subsoil are friable silt loam. The soils contain thin, discontinuous layers of clay and an abundance of shale or schist fragments. Depth to bedrock ranges from 1½ to 3½ feet. Permeability is moderately rapid or rapid, and the available moisture capacity is low to moderate. The content of organic matter and the natural fertility are low, and reaction is extremely acid or strongly acid.

These soils are poorly suited to the crops commonly grown in the county. Even where they receive the best management, they are poorly suited to corn. They are only fairly well suited to small grains and mixed hay, even though good management is used. These soils are too shallow over bedrock to be suitable for alfalfa. The grasses to which they are fairly well suited are orchardgrass, tall fescue, and timothy.

The hazard of erosion is great enough that close-growing crops should be grown at least 2 years out of 3. A cropping sequence commonly used is 1 year of a small grain and 1 or 2 years of mixed hay.

Erosion caused by runoff is the main hazard where these soils are cultivated. Soil losses can be kept to a minimum in cultivated areas by tilling on the contour and by including an adequately fertilized close-growing crop in the cropping sequence. These soils are not suitable for sprinkler irrigation.

CAPABILITY UNIT IIIw-1

Deep and moderately deep, moderately well drained or somewhat poorly drained Chewacla and Rowland soils and Mixed alluvial land are in this capability unit. These soils are on flood plains. The surface layer is mostly silt loam or fine sandy loam 12 to 16 inches thick, and the subsoil is silt loam to sandy loam. Permeability is moderate to slow. The content of organic matter and the natural fertility are medium to high. Reaction is medium acid to strongly acid.

If these soils are well managed, they are well suited to corn and mixed hay. Because of the seasonal high water table, the soils are not suitable for alfalfa, but they are well suited to red clover and Ladino clover. Tall grasses to which they are well suited are orchardgrass, tall fescue, and timothy.

Excessive wetness and frequent flooding are the greatest hazards to use of these soils for crops. Where suitable outlets can be found, tile drains can be installed and these soils can then be used for row crops grown year after year. After tile drains are installed, the soils are suitable for sprinkler irrigation, and they are excellent for corn.

CAPABILITY UNIT IIIw-2

This capability unit consists of moderately well drained and somewhat poorly drained Augusta, Calverton, Creedmoor, Colfax, Lignum, and York soils on uplands and stream terraces. These soils have a fragipan or other layers that restrict the growth of roots at a depth of 20 to 36 inches. The surface layer is friable loam or silt loam 8 to 12 inches thick. The subsoil is clay loam to clay, and it is yellowish brown to reddish brown mottled with gray. Depth to bedrock is 4 to more than 10 feet. Permeability is moderately slow or slow, and the available moisture capacity is moderate to high. The content of organic matter and the natural fertility are low.

If these soils are properly managed, they are fairly well suited to corn, small grains, mixed hay, and other crops commonly grown in the county. They are also fairly well suited to red clover. They are better suited to Ladino clover, however, than to red clover and are better suited to tall fescue and timothy than to orchardgrass.

Erosion is a moderate hazard in gently sloping cultivated areas. The slow movement of water through the soils that are slowly permeable delays tillage late in winter and early in spring. Therefore, these soils are better suited to mixed hay, pasture plants, and other close-growing crops than to cultivated crops. Where the soils are cultivated, a cropping sequence that may be used is corn, a small grain, and 1 year of hay.

Excess moisture is the main hazard to crops. Tile drains or open ditches are beneficial in disposing of excess water. After the soils are drained, they are suitable for sprinkler irrigation, and some high-value crops can be grown.

CAPABILITY UNIT IIIs-1

Only Buncombe loamy fine sand is in this capability unit. It is a deep, excessively drained, yellowish-brown soil of flood plains. The surface layer is loose loamy fine sand as much as 24 inches thick. Underlying the surface layer is sand and loamy sand and some silt and clay. Permeability is rapid, and the available moisture capacity is low. This soil is low in content of organic matter and in natural fertility. It is strongly acid. Frequent flooding is a hazard.

Even under good management, this soil has limited suitability for corn, small grains, mixed hay, and most other commonly grown crops. It is well suited to melons, but melons are seldom grown in this county.

Little can be done to improve this soil for crops. Added plant nutrients and organic matter are leached out rapidly.

CAPABILITY UNIT IVe-1

This capability unit consists of deep, well-drained, sloping, severely eroded Bucks, Fauquier, Hiwassee, Lloyd, and Rapidan soils and of moderately steep, eroded, red Davidson and Rabun soils. These soils are on uplands and stream terraces. The surface layer is friable clay loam, silty clay loam, or clay, and the subsoil is firm or friable silty clay loam to clay. Depth to bedrock ranges from 4 to 16 feet or more. Permeability is moderate to moderately rapid, and the available moisture capacity is high. The content of organic matter is medium to low. Reaction is medium acid to strongly acid.

The severely eroded soils of this unit are difficult to work and are hard to keep in good tilth, but all the soils are suited to the crops commonly grown in this county. Under good management these soils are well suited to corn, small grains, and mixed hay. They are also well suited to alfalfa. A stand of alfalfa is sometimes difficult

to establish, however, if a hard rain has fallen immediately after an area is seeded, because the surface layer in severely eroded areas tends to puddle and form a crust after a hard rain. These soils are well suited to red clover and Ladino clover. They are also well suited to orchardgrass, tall fescue, and timothy and to bluegrass grown for pasture.

The hazard of erosion is great enough that close-growing crops should be grown 3 years out of 4. A cropping sequence commonly used is corn, a small grain, and 2 years of mixed hay. Also used is a cropping sequence consisting of 1 year of a small grain followed by alfalfa grown for as long as the stand lasts.

Good tilth is easily maintained, except where the plow layer consists mostly of material that was formerly part of the subsoil. In those areas tillage is difficult and the soils can be satisfactorily tilled only within a narrow range of moisture content. Where these soils alternately freeze and thaw in winter, stands of alfalfa and small grains are likely to be lost as the result of heaving. Adding manure or other kinds of organic matter makes the soils less susceptible to frost action.

Erosion caused by runoff is the main hazard where these soils are cultivated. Soil losses from erosion can be kept to a minimum by growing crops in contour strips and by including adequately fertilized close-growing crops in the cropping sequence. Diversions that safely direct the water to a grassed waterway reduce the amount of runoff. The severely eroded soils are not suitable for sprinkler irrigation, because of their reduced rate of infiltration.

CAPABILITY UNIT IVe-2

This capability unit consists of deep, well-drained, sloping, severely eroded Cecil, Elioak, Grover, Madison, Masada, Nason, and Tatum soils and of moderately steep, eroded Nason and Wadesboro soils. These soils are on uplands and stream terraces. The surface layer of the sloping, severely eroded soils is sandy clay loam, clay loam, or silty clay loam, and the surface layer of the moderately steep soils is fine sandy loam or silt loam. The subsoil is friable or firm, red and yellowish-red clay, clay loam, or silty clay loam. Depth to bedrock ranges from 4 to 12 feet or more. Permeability is moderate, and the available moisture capacity is moderately high or high. These soils are low in content of organic matter and in natural fertility. They are strongly acid to extremely acid.

Soils of this unit are limited in suitability for the crops commonly grown in the county. If properly managed, however, they are well suited to corn, small grains, and mixed hay. They are also well suited to alfalfa, but a stand of alfalfa is sometimes difficult to establish because a surface crust forms after hard rains. These soils are well suited to red clover and Ladino clover. Tall grasses to which they are well suited are orchardgrass, tall fescue, and timothy. The soils are also well suited to bluegrass grown for pasture.

The hazard of erosion is great enough that close-growing crops should be grown 3 years out of 4. A cropping sequence commonly used is corn, a small grain, and 2 or 3 years of mixed hay. Also used is a cropping sequence consisting of 1 year of a small grain followed by alfalfa grown for as long as the stand lasts.

Tillage is difficult, and these soils, especially the severely eroded ones, can be satisfactorily tilled only within a narrow range of moisture content. Where these soils alternately freeze and thaw in winter, stands of alfalfa and small grains are likely to be lost as the result of heaving. Adding manure and other organic matter helps to reduce this tendency to heaving.

Erosion caused by runoff is the main hazard in cultivated areas. Soil losses from erosion can be kept to a minimum by growing crops in contour strips and by including adequately fertilized close-growing crops in the cropping sequence. Diversions that safely convey the water to a grassed waterway reduce the amount of runoff. Because of erosion and the moderately steep slopes, these soils are not suitable for sprinkler irrigation.

CAPABILITY UNIT IVe-3

Well-drained to excessively drained, slightly eroded Bremo, Catoctin, Hazel, Louisburg, Manteo, Penn, Pinkston, Watt, and Wilkes soils that are shallow to moderately deep over bedrock are in this capability unit. These soils are on uplands. They have a surface layer of friable silt loam, loam, fine sandy loam, or sandy loam 3 to 16 inches thick. The subsoil is weakly defined and consists of friable or very friable silt loam to sandy loam. Depth to bedrock ranges from 1 foot to 6 feet or more. Permeability is rapid, and the available moisture capacity is moderate to low. The content of organic matter and the natural fertility are low to medium.

These soils are poorly suited to crops that require cultivation, but small grains do fairly well. The soils are better suited to pasture than to field crops. Orchardgrass or tall fescue and Ladino clover are suitable for improved pasture. If good management is used, and if enough rainfall is received, bluegrass and white clover can also be grown for pasture.

The hazard of erosion is great enough that close-growing crops should be grown 3 to 4 years out of every 5. A cropping system commonly used is 1 year of a small grain and at least 3 years of tall grasses and Ladino clover.

These soils are fairly easy to keep in good tilth. They can be worked fairly early in spring.

Erosion and droughtiness are the chief hazards if these soils are cultivated. Growing crops in contour strips and including in the cropping sequence 3 to 4 years of grasses and legumes will help to control erosion.

CAPABILITY UNIT IVe-4

This capability unit consists of deep or moderately deep, moderately well drained or somewhat poorly drained, eroded Helena, Iredell, and Orange soils of uplands. These soils have a surface layer of friable silt loam or fine sandy loam 6 to 10 inches thick. Their subsoil is yellowish-brown to olive-brown, heavy, plastic clay. Permeability is slow, and the available moisture capacity is low to moderate. The content of organic matter is low to medium, and natural fertility ranges from low to high. Reaction is medium acid to strongly acid.

These soils are limited in suitability for crops. They are well suited to small grains but are poorly suited to corn and are fairly well suited to mixed hay. The soils

are better suited to red clover and Ladino clover than to other legumes. The plastic subsoil makes them unsuitable for alfalfa. Tall grasses to which these soils are well suited are orchardgrass, tall fescue, and timothy.

The hazard of erosion is great enough that close-growing crops should be grown 1 year out of 2. A cropping sequence commonly used is 1 year of a small grain and 1 year of mixed hay.

Erosion is the main hazard where these soils are cultivated. Growing crops on the contour and including adequately fertilized close-growing crops in the cropping sequence will help to keep soil losses to a minimum. In some places grassed waterways are needed to help to control erosion. These soils are not suitable for sprinkler irrigation.

CAPABILITY UNIT IVw-1

This capability unit consists of nearly level, moderately well drained, deep Orange and Iredell soils and a concretionary variant of the Orange soils. All of these soils are on uplands. The surface layer is friable silt loam 6 to 16 inches thick, and the subsoil is plastic, heavy clay. Permeability is slow, and the available moisture capacity is low to moderate. The soils are low to medium in content of organic matter and are medium acid to strongly acid.

These soils may be cultivated, but their suitability for cultivated crops is limited by slow drainage and a shallow root zone. If these soils are well managed, they are fairly well suited to small grains, but they are poorly suited to corn. Red clover and Ladino clover are more suitable for seeding than other legumes. These soils are fairly well suited to timothy, orchardgrass, and tall fescue. A cropping sequence that is commonly used is 1 year of a small grain followed by 2 or 3 years of mixed hay.

Water that ponds in slight depressions is the greatest hazard to crops grown on these soils. Where outlets can be obtained, surface field ditches should be installed.

CAPABILITY UNIT IVw-2

Deep, poorly drained Bowmansville, Elbert, and Wehadkee soils are in this capability unit. These soils are on flood plains or at the heads of drainageways. The surface layer is friable silt loam 6 to 14 inches thick. The subsoil is mottled, friable to firm or plastic silty clay loam to clay. Permeability is moderate to slow, and the available moisture capacity is high. These soils are medium to high in content of organic matter and in natural fertility. They are medium acid to very strongly acid.

These soils are not well suited to cultivated crops, because of excess water, but they can be fairly suitable for pasture. Installing tile drains and establishing diversion ditches at the bases of slopes will greatly aid in making these soils more suitable for crops. Where outlets are available, open ditches make the soils more suitable for corn and mixed hay.

Excessive surface water caused by overflow is the chief hazard where these soils are cultivated. Pasture is a better use than growing cultivated crops.

CAPABILITY UNIT Vw-1

This capability unit consists of deep, poorly drained Albano, Elbert, Roanoke, and Worsham soils on stream terraces, along drainageways, and on upland flats. The surface layer of these soils is friable silt loam 6 to 12 inches thick, and the subsoil is plastic clay. Permeability is slow, and the available moisture capacity is moderate to high. The content of organic matter and the natural fertility range from low to high. Reaction is medium acid to strongly acid.

These soils have a high water table and lack drainage outlets. Therefore, they are not generally suited to cultivation. They are suitable for pasture if surface drainage is provided.

CAPABILITY UNIT VIe-1

Deep, well-drained, red or dark-red Davidson, Lloyd, and Rabun soils are in this capability unit. These soils are on uplands. Some of them are moderately steep and are severely eroded, and others are steep and eroded. The surface layer is clay loam or clay. In some places all of the original surface layer has been lost through erosion. In others the original surface layer is as much as 6 inches thick. The subsoil is firm or friable clay 20 to 60 inches thick. Permeability is moderate to moderately rapid, and the available moisture capacity is high. The content of organic matter ranges from low to high, and natural fertility is medium to high. Reaction is medium acid to very strongly acid.

Steep or moderately steep slopes and severe erosion make these soils unsuitable for cultivation. Alfalfa, fescue, orchardgrass, Ladino clover, and other grasses and legumes grow well, however, after a stand is established. Further erosion is the main hazard. These soils are better suited to pasture than to field crops.

CAPABILITY UNIT VIe-2

This unit consists of well-drained or excessively drained, moderately steep Bremo, Catoctin, Hazel, Klinesville, Louisburg, Manor, Manteo, Pinkston, Watt, and Wilkes soils that are not eroded or are only slightly eroded, and it also includes an eroded, sloping Louisburg soil. These soils are shallow to moderately deep over bedrock. The surface layer is friable silt loam, fine sandy loam, or sandy loam. In a few places, all of the original surface layer has been lost through erosion. In others the original surface layer is as much as 12 inches thick. In most of the soils, the subsoil is weakly defined. Permeability is moderate to rapid, and the available moisture capacity is low to moderate. The content of organic matter and the natural fertility are low to medium. Reaction ranges from medium acid to extremely acid.

Bedrock near the surface, moderately steep slopes, and past erosion and the hazard of further erosion make these soils unsuitable for cultivation. The soils can be used to a limited extent for pasture, but they are better used as woodland or wildlife habitat.

CAPABILITY UNIT VIe-3

Only Orange silt loam, concretionary variant, 7 to 15 percent slopes, eroded, is in this capability unit. It is a deep, moderately well drained soil on uplands. The surface layer is yellowish-brown silt loam, and the subsoil is massive, very plastic clay. In most places a brittle, firm to hard concretionary layer overlies the plastic material. Permeability is slow. The available moisture capacity is low to moderate, the content of organic matter is low,

and natural fertility is medium. Reaction is medium acid to strongly acid.

This soil is poorly suited to field crops. It is not well suited to pasture or hay crops, and it is only fairly well suited to trees.

CAPABILITY UNIT VIs-1

This capability unit consists of a deep, well-drained, dark reddish-brown, stony Davidson soil and of rocky, sloping miscellaneous land types. The stones are larger than 12 inches in diameter and are numerous enough that they make tillage impractical. Permeability is moderate to moderately rapid, and the available moisture capacity is low to high. Depth to bedrock ranges from 2½ to 10 feet.

The soils of this unit are not suited to cultivation. They are more suitable for use as woodland or as wildlife habitat than for pasture, but they can be used for native pasture.

CAPABILITY UNIT VIIe-1

This capability unit consists of excessively drained Klinesville, Louisburg, and Manteo soils that are shallow to moderately deep over bedrock. These soils are on uplands. The surface layer is brownish, very friable sandy loam or silt loam 4 to 19 inches thick. In most places the subsoil is weakly defined, but a few small areas of these soils contain a distinct, thin subsoil layer. Permeability is rapid, and the available moisture capacity is low to moderate. The content of organic matter and the natural fertility are low. Reaction is very strongly acid to extremely acid.

These soils are not suited to cultivation. They are more suitable for use as woodland and as wildlife habitat than for pasture or field crops, but some areas may be used for native pasture.

CAPABILITY UNIT VIIs-1

This capability unit consists of stony, moderately steep and steep Catoctin and Davidson soils and of rocky miscellaneous land types. The surface layer is variable in texture and is 4 to 9 inches thick. Stones larger than 1 foot in diameter cover 15 to 50 percent of the surface. Depth to bedrock ranges from 2½ to 10 feet.

The stones and the steep or moderately steep slopes make these soils unsuitable for cultivation. Woodland and wildlife habitat are suitable uses.

Estimated yields

Table 2 gives estimates of the average acre yields of the principal crops that can be obtained on the soils of Orange County under a high level of management. The management includes the use of lime and fertilizer in amounts currently recommended by the Virginia Agricultural Experiment Station. It also includes control of erosion; drainage where needed; proper preparation of the seedbed; use of a suitable cropping system and of crop residue; control of plant diseases, weeds, and insects; and, for pasture, regulation of grazing. Figures in table 2 are based on observations made by the soil survey party and on yields reported by some farmers and other agricultural workers in this county and in nearly counties in Virginia.

Woodland Uses of the Soils

Before Orange County was settled, hardwood forests covered most of the area. Trees were mainly white oak and chestnut, but there were scattered large yellow-poplars, red oaks, and hickory trees. Pines grew in scattered, small patches throughout the area, where fire, disease, or other natural disasters had interrupted the natural succession of hardwoods. The forest was a stabilized plant community and contained little undergrowth.

The best hardwoods grew on soils underlain by greenstone. Settlers soon learned that these soils also produced the best field crops, and they cleared those soils first. They cleared the poorer soils next and abandoned them as those soils became less productive of crops. Shortleaf and Virginia pines seeded and established themselves in these abandoned clearings, and they also became established where the settlers had allowed fires to escape. Pines are subclimax species, and they will gradually be replaced by oak and hickory. The early settlers used the chestnut trees as construction material for cabins and fences and as a source of tanning material. They also used the nuts as food.

In 1957, according to the last forest survey made in Orange County, about 143,100 acres, or nearly 63 percent of the land area in the county, was in forest. All of the forest is in private ownership. About 20 percent of the timber volume is pine, and the rest is hardwoods.

Stands of large, high-quality trees are difficult to find in Orange County at the present time. Most of the large trees that remain are on estates where the harvest of mature timber is not an economic necessity. Predominant in this county are white oak, northern red oak, chestnut oak, southern red oak, yellow-poplar, scarlet oak, blackgum, hickory, soft maple, and beech. Predominant softwoods are Virginia pine, shortleaf pine, redcedar, and loblolly pine in plantations.

Soils differ greatly in their suitability for trees. Among the most important factors that affect the productive capacity of a soil for trees are its ability to provide a good supply of moisture, and ability to provide adequate space for roots. Soil depth, texture, consistence, structure, and topographic position are the most significant characteristics that determine if a soil is suitable for trees.

The best hardwoods grow on the deep, well-drained, friable Davidson, Rapidan, and Bucks soils; the poorest quality hardwoods grow on the Nason, Tatum, and Manteo soils and on wet soils. Pine grows on nearly all of the soils, but it cannot compete with hardwoods on the better soils and is crowded out. Pine, especially loblolly pine, grows better on wet soils than do hardwoods. It also grows better on acid soils than do hardwoods. Soils that contain a fragipan or that have plastic clay in their subsoil, for example the Colfax, Iredell, Orange, and Calverton soils, are poorly suited to hardwoods because neither moisture nor root space is sufficient for the growth of trees. Tree roots require oxygen, and they obtain much of their supply from the soils.

Little is known about the nutrient requirements of trees. The Virginia Polytechnic Institute has started fertilization experiments with loblolly pine growing on Tatum and Nason soils. It is too early to evaluate the results of these tests.

TABLE 2.—*Estimated average acre yields of the principal crops grown under a high level of management*

[Dashes indicate that the crop is not commonly grown or that the soil is not suited to the crop]

Soil	Corn [1]	Wheat	Oats	Barley	Alfalfa [1]	Red clover	Mixed hay	Pasture [1]	
								Bluegrass and white clover	Tall grasses and Ladino clover
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Albano silt loam								75	175
Altavista loam, 0 to 2 percent slopes [3]		30	55	35		3	3	95	150
Altavista loam, 2 to 7 percent slopes	80	35	60	38	2.2	3	3	100	175
Altavista loam, 2 to 12 percent slopes, eroded	75	35	55	38	2.2	3	3	100	175
Appling sandy loam, 2 to 7 percent slopes	115	45	70	50	3.5	3	3.2	110	225
Appling sandy loam, 2 to 7 percent slopes, eroded	115	45	70	50	3.5	3	3.2	110	225
Appling sandy loam, 7 to 15 percent slopes, eroded	105	40	65	46	3	2.5	2.5	100	210
Augusta silt loam, 0 to 2 percent slopes								85	190
Augusta silt loam, 2 to 7 percent slopes							2.5	85	190
Bermudian silt loam [3]	130							110	275
Bowmansville silt loam								80	180
Bremo silt loam, 4 to 15 percent slopes		30	55	38		1.2	1.7	70	150
Bremo silt loam, 15 to 25 percent slopes								65	140
Bucks silt loam, 2 to 7 percent slopes, eroded	120	45	75	60	4.5	3.7	4	110	275
Bucks silt loam, 7 to 15 percent slopes, eroded	110	40	70	55	4.2	3.5	3.7	100	255
Bucks silt loam, conglomerate substratum, 2 to 7 percent slopes, eroded	120	45	75	60	4.5	3.7	4	110	275
Bucks silt loam, conglomerate substratum, 7 to 15 percent slopes, eroded	110	40	70	55	4.2	3.5	3.7	100	255
Bucks silty clay loam, 7 to 15 percent slopes, severely eroded	85	35	60	35	4	3	3.2	85	230
Buncombe loamy fine sand [3]	70							65	145
Calverton loam, 2 to 7 percent slopes								65	155
Calverton-Creedmoor complex, 2 to 7 percent slopes		(1)						65	155
Catoctin silt loam, 5 to 15 percent slopes		30	50	35				70	145
Catoctin silt loam, 15 to 25 percent slopes								65	145
Catoctin stony silt loam, 10 to 25 percent slopes								60	135
Catoctin stony silt loam, 25 to 45 percent slopes								60	135
Cecil fine sandy loam, 2 to 7 percent slopes, eroded	115	45	80	60	4.2	3.5	3.5	110	255
Cecil fine sandy loam, 7 to 15 percent slopes, eroded	105	40	75	56	4	3	3	100	235
Cecil loam, 2 to 7 percent slopes, eroded	115	45	80	60	4.2	3.5	3.5	110	255
Cecil loam, 7 to 15 percent slopes, eroded	105	40	75	56	3.7	3	3	100	235
Cecil clay loam, 4 to 15 percent slopes, severely eroded	60	30	60	33	2.7	2	2	70	195
Chewacla silt loam [3]	90							130	225
Colfax loam, 2 to 7 percent slopes								65	155
Comus fine sandy loam [3]	120							95	265
Comus silt loam [3]	130							110	275
Davidson clay loam, 2 to 7 percent slopes, eroded	120	40	70	55	5	4.2	4.5	110	275
Davidson clay loam, 7 to 15 percent slopes, eroded	110	35	65	50	4.5	4	4	100	255
Davidson clay loam, 15 to 25 percent slopes, eroded					4	3	3	85	225
Davidson stony clay loam, 7 to 15 percent slopes								80	210
Davidson stony clay loam, 15 to 25 percent slopes								75	185
Davidson stony clay loam, 25 to 45 percent slopes								60	120
Davidson clay, 2 to 7 percent slopes, severely eroded	90	30	60	36	4	3.2	3.5	90	235
Davidson clay, 7 to 15 percent slopes, severely eroded	80		55	30	3.7	3	3.2	80	215
Davidson clay, 15 to 25 percent slopes, severely eroded					3	2.5	2.7	75	200

See footnotes at end of table.

TABLE 2.—*Estimated average acre yields of the principal crops grown under a high level of management*—Continued

Soil	Corn [1]	Wheat	Oats	Barley	Alfalfa [1]	Red clover	Mixed hay	Pasture [1]	
								Bluegrass and white clover	Tall grasses and Ladino clover
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Dyke loam, 2 to 7 percent slopes, eroded	120	40	70	55	5	4. 2	4. 5	110	275
Dyke loam, 7 to 15 percent slopes, eroded	110	35	65	50	4. 5	4	4	100	255
Elbert silt loam	--------	--------	--------	--------	--------	--------	--------	70	145
Elbert silt loam, overwash	60	--------	--------	--------	--------	--------	--------	85	160
Elioak fine sandy loam, 2 to 7 percent slopes, eroded	100	45	80	60	4	3. 2	3. 2	100	275
Elioak fine sandy loam, 7 to 15 percent slopes, eroded	95	40	75	56	3. 5	2. 5	2. 5	95	235
Elioak clay loam, 2 to 7 percent slopes, severely eroded	--------	40	65	36	2. 5	2	2	75	225
Elioak clay loam, 7 to 15 percent slopes, severely eroded	--------	35	60	32	2	1. 7	1. 7	70	200
Elsinboro loam, 2 to 7 percent slopes	120	45	80	60	4. 7	4. 2	4. 5	130	255
Elsinboro loam, 2 to 7 percent slopes, eroded	120	45	80	60	4. 7	4. 2	4. 5	130	255
Elsinboro loam, 7 to 15 percent slopes, eroded	110	35	75	56	4	4	4	110	255
Fauquier silt loam, 2 to 7 percent slopes, eroded	100	45	70	55	4	3. 7	3. 7	100	255
Fauquier silt loam, 7 to 15 percent slopes, eroded	95	35	65	50	3. 7	2. 5	2. 5	95	205
Fauquier silty clay loam, 4 to 20 percent slopes, severely eroded	75	--------	55	30	3	2	2	80	195
Fluvanna silt loam, 2 to 7 percent slopes	100	45	70	55	3. 7	3. 2	3. 2	120	275
Fluvanna silt loam, 2 to 7 percent slopes, eroded	100	45	70	55	3. 2	3	3	120	275
Fluvanna silt loam, 7 to 15 percent slopes, eroded	95	35	65	52	3	2. 7	2. 7	110	235
Glenelg loam, 2 to 7 percent slopes, eroded	100	45	70	38	3. 2	2. 5	2. 5	110	275
Glenelg loam, 7 to 15 percent slopes, eroded	95	35	65	35	2. 7	2. 2	2	100	235
Grover sandy loam, 2 to 7 percent slopes, eroded	115	45	70	58	3. 5	3. 2	3. 2	110	225
Grover sandy loam, 7 to 15 percent slopes, eroded	105	35	65	46	3	3	3	100	210
Grover sandy clay loam, 7 to 15 percent slopes, severely eroded	--------	35	60	42	2. 2	2	2	90	190
Hazel loam, 7 to 15 percent slopes	--------	30	--------	32	--------	--------	--------	70	125
Hazel loam, 15 to 30 percent slopes	--------	--------	--------	--------	--------	--------	--------	55	110
Helena fine sandy loam, 2 to 7 percent slopes	--------	--------	--------	--------	--------	--------	--------	70	180
Helena fine sandy loam, 2 to 10 percent slopes, eroded	--------	--------	--------	--------	--------	--------	--------	65	170
Hiwassee loam, 2 to 7 percent slopes	120	45	70	58	5	4. 2	4. 5	110	275
Hiwassee loam, 2 to 7 percent slopes, eroded	120	45	70	58	5	4. 2	4. 5	110	275
Hiwassee loam, 7 to 15 percent slopes, eroded	110	35	65	53	4. 5	4	4. 2	100	235
Hiwassee clay loam, 4 to 15 percent slopes, severely eroded	80	35	55	42	3. 5	3	3. 2	80	190
Klinesville silt loam, 15 to 25 percent slopes	--------	--------	--------	--------	--------	--------	--------	60	90
Klinesville silt loam, 25 to 45 percent slopes	--------	--------	--------	--------	--------	--------	--------	60	85
Lignum silt loam, 2 to 7 percent slopes	--------	--------	--------	--------	--------	--------	--------	65	155
Lloyd loam, 2 to 7 percent slopes, eroded	115	50	80	62	4. 7	3. 7	3. 7	125	275
Lloyd loam, 7 to 15 percent slopes, eroded	105	40	75	58	4	3. 2	3. 2	110	255
Lloyd clay loam, 2 to 7 percent slopes, severely eroded	80	40	70	52	3. 7	3. 5	3	90	235
Lloyd clay loam, 7 to 15 percent slopes, severely eroded	60	35	65	48	3. 2	2. 2	2. 2	85	215
Lloyd clay loam, 15 to 25 percent slopes, severely eroded	--------	--------	--------	--------	2. 5	1. 7	1. 7	70	200
Louisburg sandy loam, 5 to 15 percent slopes	--------	25	45	32	--------	--------	--------	50	100
Louisburg sandy loam, 7 to 15 percent slopes, eroded	--------	--------	--------	--------	--------	--------	--------	40	75
Louisburg sandy loam, 15 to 25 percent slopes	--------	--------	--------	--------	--------	--------	--------	50	90
Louisburg sandy loam, 15 to 25 percent slopes, eroded	--------	--------	--------	--------	--------	--------	--------	40	70
Madison sandy loam, 2 to 7 percent slopes, eroded	100	45	80	60	4. 2	3..7	3. 7	100	255
Madison sandy loam, 7 to 15 percent slopes, eroded	95	35	75	56	4	3. 5	3. 5	95	235

See footnotes at end of table.

TABLE 2.—*Estimated average acre yields of the principal crops grown under a high level of management*—Continued

Soil	Corn [1]	Wheat	Oats	Barley	Alfalfa [1]	Red clover	Mixed hay	Pasture [1]	
								Bluegrass and white clover	Tall grasses and Ladino clover
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Madison clay loam, 7 to 15 percent slopes, severely eroded	60	30	55	36	2.7	2.2	2.2	85	195
Manassas silt loam, 2 to 7 percent slopes	110	(4)	(4)	(4)	(5)	4.2	4.2	130	255
Manor silt loam, 10 to 25 percent slopes								50	85
Manteo silt loam, 2 to 7 percent slopes								50	85
Manteo silt loam, 7 to 15 percent slopes								40	75
Manteo silt loam, 15 to 25 percent slopes								35	60
Manteo silt loam, 25 to 45 percent slopes								35	60
Masada loam, 2 to 7 percent slopes	115	45	80	60	4	4	4	110	275
Masada loam, 2 to 7 percent slopes, eroded	115	45	80	60	3.7	3.7	3.7	110	275
Masada loam, 7 to 15 percent slopes, eroded	105	35	75	56	3.5	3.5	3.5	95	235
Masada sandy clay loam, 7 to 15 percent slopes, severely eroded		30	55	33	3	3	3	70	195
Mayodan fine sandy loam, 2 to 7 percent slopes	100	45	65	50	3.5	3	3	110	225
Mayodan fine sandy loam, 2 to 7 percent slopes, eroded	100	45	65	50	3.5	3	3	110	225
Mayodan fine sandy loam, 7 to 15 percent slopes, eroded	90	35	60	46	3	2.7	2.7	100	210
Mecklenburg silt loam, 2 to 7 percent slopes, eroded	90	40	70	56	2.7	3	3	110	245
Mecklenburg silt loam, 7 to 15 percent slopes, eroded	80	30	60	45	2.2	2.5	2.7	100	235
Mixed alluvial land [3]								80	220
Myersville silt loam, 2 to 7 percent slopes, eroded	115	45	75	60	4	3.7	3.7	110	275
Myersville silt loam, 7 to 15 percent slopes, eroded	105	35	65	56	3.7	3.2	3.2	110	265
Nason loam, 2 to 7 percent slopes, eroded	90	50	70	45	3	2.2	2.2	80	220
Nason loam, 7 to 15 percent slopes, eroded	85	45	65	42	2.5	2	2	75	210
Nason silt loam, 2 to 7 percent slopes	90	50	70	45	3	2.2	2.2	80	220
Nason silt loam, 2 to 7 percent slopes, eroded	85	45	70	45	3	2.2	2.2	80	220
Nason silt loam, 7 to 15 percent slopes	80	35	65	42	2.5	2	2	75	210
Nason silt loam, 7 to 15 percent slopes eroded	80	35	65	42	2.5	2	2	75	210
Nason silt loam, 15 to 25 percent slopes, eroded								60	190
Nason silty clay loam, 5 to 15 percent slopes, severely eroded		40	55	34	2	1.5	1.7	55	190
Orange silt loam, concretionary variant, 0 to 2 percent slopes			40	32		2	2	75	150
Orange silt loam, concretionary variant, 2 to 7 percent slopes			40	32		2	2	80	155
Orange silt loam, concretionary variant, 2 to 7 percent slopes, eroded			40	32		1.5	1.7	80	155
Orange silt loam, concretionary variant, 7 to 15 percent slopes, eroded						1.5	1.5	70	140
Orange-Iredell silt loams, 0 to 2 percent slopes [3]	50		(1)	(1)		2	2	90	180
Orange-Iredell silt loams, 2 to 7 percent slopes	60		(1)	(1)		2	2	90	180
Orange-Iredell silt loams, 2 to 7 percent slopes, eroded	45							85	175
Penn silt loam, 2 to 7 percent slopes	75	35	55	32		1.5	1.5	70	170
Penn silt loam, 7 to 15 percent slopes	70	30	50	32			1.2	60	145
Pinkston fine sandy loam, 7 to 15 percent slopes								50	85
Pinkston fine sandy loam, 15 to 25 percent slopes								40	75
Rabun clay loam, 2 to 7 percent slopes, eroded	115	45	65	55	4	4.7	4.7	100	65
Rabun clay loam, 7 to 15 percent slopes, eroded	105	35	60	50	3.5	3.5	3.5	95	255
Rabun clay loam, 15 to 25 percent slopes, eroded					2.5	2	2	80	225

See footnotes at end of table.

TABLE 2.—*Estimated average acre yields of the principal crops grown under a high level of management*—Continued

Soil	Corn [1]	Wheat	Oats	Barley	Alfalfa [1]	Red clover	Mixed hay	Pasture [1]	
								Bluegrass and white clover	Tall grasses and Ladino clover
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [2]	*Cow-acre-days* [2]
Rabun clay loam, 25 to 45 percent slopes, eroded	--------	--------	--------	--------	--------	--------	--------	55	110
Rabun clay, 15 to 25 percent slopes, severely eroded	--------	--------	--------	--------	--------	--------	--------	65	165
Rapidan silt loam, 2 to 7 percent slopes, eroded	120	45	75	60	4. 5	4. 2	4. 2	110	275
Rapidan silt loam, 7 to 15 percent slopes, eroded	110	40	70	55	4	4	4. 2	100	265
Rapidan silty clay loam, 7 to 15 percent slopes, severely eroded	85	35	60	35	3. 7	3	3	85	235
Roanoke silt loam	--------	--------	--------	--------	--------	--------	--------	75	145
Rock land, acidic, sloping	--------	--------	--------	--------	--------	--------	--------	40	75
Rock land, acidic, moderately steep	--------	--------	--------	--------	--------	--------	--------	35	70
Rock land, basic, sloping	--------	--------	--------	--------	--------	--------	--------	60	90
Rock land, basic, steep	--------	--------	--------	--------	--------	--------	--------	50	85
Rowland silt loam [3]	90	--------	--------	--------	--------	--------	2. 5	130	190
Seneca fine sandy loam, 2 to 7 percent slopes	90	(4)	(4)	(4)	--------	3	3. 2	130	225
Starr silt loam, 2 to 10 percent slopes	110	(4)	(4)	(4)	(5)	4. 2	4. 5	130	255
State loam, 0 to 4 percent slopes	130	(4)	(4)	(4)	(5)	4	4. 2	130	275
Tatum loam, 2 to 7 percent slopes, eroded	90	50	70	48	3. 7	3	3	90	235
Tatum loam, 7 to 15 percent slopes, eroded	85	45	65	42	3. 2	2. 7	2. 7	80	225
Tautm silt loam, 2 to 7 percent slopes	90	50	70	48	3. 7	3	3	90	235
Tatum silt loam, 2 to 7 percent slopes, eroded	90	50	70	42	3. 7	3	3	90	235
Tatun silt loam, 7 to 15 percent slopes	85	45	65	42	3. 2	2. 7	2. 7	80	225
Tatum silt loam, 7 to 15 percent slopes, eroded	85	45	65	40	3. 2	2. 7	2. 7	80	225
Tatum silty clay loam, 2 to 7 percent slopes, severely eroded	65	45	60	36	3	2. 2	2. 2	65	200
Tatum silty clay loam, 7 to 15 percent slopes, severely eroded	--------	40	55	30	2. 5	1. 7	1. 7	60	190
Turbeville loam, 2 to 7 percent slopes	115	45	80	60	4. 5	4	4	110	275
Turbeville loam, 2 to 7 percent slopes, eroded	115	45	80	60	4. 5	4	4	110	275
Turbeville loam, 7 to 15 percent slopes, eroded	105	40	75	56	4	3. 5	3. 7	100	235
Vance fine sandy loam, 2 to 7 percent slopes	90	35	60	50	--------	3	3	115	225
Vance fine sandy loam, 2 to 7 percent slopes, eroded	90	35	60	50	--------	3	3	110	225
Wadesboro fine sandy loam, 2 to 7 percent slopes, eroded	115	45	80	60	4. 2	3. 5	3. 5	110	255
Wadesboro fine sandy loam, 7 to 15 percent slopes, eroded	105	40	72	56	3. 7	3	3	95	225
Wadesboro fine sandy loam, 15 to 25 percent slopes, eroded	--------	(1)	--------	--------	3	2. 5	2. 5	80	200
Watt silt loam, 2 to 7 percent slopes	--------	35	45	32	--------	1	1	50	85
Watt silt loam, 7 to 15 percent slopes	--------	35	45	32	--------	--------	--------	40	75
Watt silt loam, 15 to 30 percent slopes	--------	--------	--------	--------	--------	--------	--------	35	60
Wehadkee silt loam	--------	--------	--------	--------	--------	--------	(1)	80	140
Wilkes sandy loam, 7 to 15 percent slopes	--------	30	45	36	--------	1. 2	1. 2	70	120
Wilkes sandy loam, 15 to 25 percent slopes	--------	(1)	(1)	--------	--------	--------	--------	65	100
Worsham silt loam, 2 to 7 percent slopes	--------	--------	--------	--------	--------	--------	--------	75	125
York silt loam, 2 to 7 percent slopes	75	30	55	36	--------	2. 2	2. 2	70	190
Zion silt loam, 2 to 7 percent slopes	60	30	55	40	--------	2. 2	2. 2	90	180
Zion silt loam, 7 to 15 percent slopes, eroded	--------	25	45	38	--------	1. 7	1. 7	85	175

[1] Yields of crop are limited in this county because moisture may be inadequate in summer.

[2] The number of days in 1 year that 1 acre will support one cow, steer, or horse; five hogs; or seven sheep or goats without injury to the pasture.

[3] Subject to overflow or occasional flooding.

[4] Small grains lodge on this soil.

[5] Average life of stand is 1 to 2 years.

Woodland suitability groups

Woodland can be more easily managed if soils are grouped according to those characteristics that affect the growth of trees and the management of the stands. Therefore, the soils of Orange County have been placed in 17 woodland suitability groups. All the soils in one group have about the same potential for producing wood crops and require about the same management. All have about the same limitations to the use of equipment, and all are limited to about the same degree by the hazards of plant competition, seedling mortality, erosion, and windthrow. The woodland group in which a given mapping unit has been placed can be learned by referring to the "Guide to Mapping Units" as the back of this survey.

Potential productivity is expressed in terms of *site index*. Site index is the height, in feet, that trees of a specified kind can be expected to reach in 50 years on a specified soil. It depends largely on the capacity of soil to furnish moisture and growing space for roots. The site indexes given in the descriptions of woodland suitability groups are estimates and should be used only as a general guide in judging the suitability of a soil for use as woodland. The data on which the site indexes were based were obtained through the study of a limited number of woodland plots in this county and adjoining counties in Virginia, made cooperatively by foresters of the Virginia Division of Forestry and Soil Conservation Service. This data was supplemented by similar information from other States.

Plant competition refers to the competition from undesirable trees and shrubs that invade the site and hinder the establishment and growth of desirable trees after the woodland has been disturbed by cutting, fire, grazing, or other means. Competition is *slight* if unwanted plants are no special problem. It is *moderate* if the invaders do not prevent but only delay the establishment of a normal, fully stocked stand of desirable plants. Where plant competition is moderate, preparation of the seedbed generally is not needed and simple methods can be used to prevent undesirable plants from invading. Competition is *severe* if trees cannot regenerate naturally. If seedlings are planted, undesirable plants must be controlled by carefully preparing the site by prescribed burning, spraying with chemicals, girdling the undesirable trees, bulldozing, and heavy disking.

Seedling mortality refers to the expected loss of seedlings as a result of unfavorable characteristics of the soil. A mortality rating of *slight* means that the expected loss of planted seedlings is not more than 25 percent and that natural regeneration ordinarily is good. A rating of *moderate* indicates that a loss of 25 to 50 percent of the seedlings planted is to be expected, or that natural regeneration cannot be relied on for adequate and immediate stocking. In some places replanting to fill open spaces will be necessary. A rating of *severe* indicates that a loss of more than 50 percent of the planted seedlings is to be expected, or that trees do not ordinarily regenerate naturally. Extra precautions are needed in preparing the seedbed to insure a satisfactory stand of trees.

Erosion hazard refers to the potential hazard of erosion where accepted woodland management practices are followed. Such practices include selection of species, adjusting the interval between harvest cuttings, and carefully constructing and maintaining logging roads, trails, and landings. The hazard is *slight* if no special erosion control practices are needed, as on slopes of 0 to 2 percent, and only a small loss of soil material is expected. The hazard is *moderate* if a moderate amount of soil material is lost where runoff is not controlled and the vegetation is not adequate for protection. The hazard is *severe* where the slopes are steep, runoff is rapid, infiltration and permeability are slow, and past erosion makes the soils more susceptible to further erosion.

Equipment limitation refers to restrictions in the use of woodland equipment caused by such unfavorable soil characteristics as poor drainage, steep slopes, stones, or unfavorable soil texture. The limitation is *slight* if there are no restrictions on the type of equipment or on the time of year that the equipment can be used. It is *moderate* if the slopes are moderately steep; if the use of heavy equipment is restricted by wetness in winter and early in spring; or if the use of equipment damages the roots of trees to some extent. The limitation is *severe* if many types of equipment cannot be used; if equipment severely damages the roots of trees and the structure and stability of the soils; and if slopes are steep or moderately steep or the soils are stony and contain rock outcrops. In winter and early in spring, the limitations are severe on wet bottom land and low terraces.

Windthrow hazard is related to soil characteristics that affect the development of tree roots and the firmness with which the roots anchor the tree in the soil so that it resists the force of a normal wind. The development of roots may be prevented by a high water table or by an impermeable layer. The protection that surrounding trees provide each other affects the hazard of windthrow. Knowing the degree of this hazard is important when choosing trees for planting and when planning release cuttings or harvest cuttings. The hazard of windthrow is *slight* if roots hold the tree firmly against a normal wind, and if individual trees are likely to remain standing, even though protective trees on all sides are removed. The hazard is *moderate* if roots develop well enough to hold the tree firmly, except when the soil is excessively wet and the velocity of the wind is very high. It is *severe* if roots do not extend deep enough to give adequate stability, and if individual trees are likely to be blown over if they are released on all sides.

WOODLAND SUITABILITY GROUP 1

In this woodland group are deep, well-drained and excessively drained soils of the Bermudian, Buncombe, Manassas, Starr, and State series. The surface layer of these soils ranges from loamy fine sand to silt loam in texture and from 8 to 24 inches in thickness. The subsoil, where present, is weakly defined and consists of friable sand and fine sandy clay loam to clay loam. Permeability is rapid to moderately rapid, and the available moisture capacity ranges from low to high. Natural fertility and the content or organic matter range from low to high. Reaction is medium acid to very strongly acid. Slopes range from 0 to 10 percent.

Following are the estimated site indexes of the principal species: Loblolly pine, 85 or more; yellow-poplar, 100 or more; shortleaf pine, 60 to 69; and oaks, 75 or more.

Plant competition to pines is slight, and seedlings can successfully compete in height growth with other plants already on the site. Most species of trees reproduce satisfactorily through natural seeding without preparation of the site, and a thick stand of seedlings is desirable. Yellow-poplar reproduces better through natural seeding if the site is prepared by light disking or harrowing. The most desirable trees to plant or to favor in existing stands are loblolly pine, yellow-poplar, black walnut, and shortleaf pine. Seedling mortality is slight because ample soil moisture is available. The hazard of erosion is slight, and equipment needed for planting and harvesting trees can be used year round. The hazard of windthrow is slight because the root systems can develop normally.

WOODLAND SUITABILITY GROUP 2

In this woodland suitability group are well drained and moderately well drained soils of the Chewacla, Comus, Rowland, and Seneca series. These soils are on first bottoms and in areas where fairly recent colluvium has accumulated. Their surface layer is fine sandy loam or silt loam 8 to 24 inches thick. The subsoil, where present, is weakly defined and consists of friable silt loam to silty clay loam. Permeability is moderately rapid to moderately slow, and the available moisture capacity is moderate to high. Natural fertility and the content of organic matter are medium to high. Reaction is medium acid to very strongly acid. Slopes range from 0 to 7 percent.

Following are the estimated site indexes of the principal species: Loblolly pine, 85 or more; yellow-poplar, 85 to 99; oaks, 75 or more; shortleaf pine and Virginia pine, 70 or more.

Plant competition from hardwoods is severe. Most kinds of trees reproduce satisfactorily through natural seeding without special preparation of the site. To assure regeneration of desirable species, spraying, clearing, disking, and other methods of removing undesirable plants are needed. The most desirable trees to plant or to favor in existing stands are loblolly pine, shortleaf pine, and yellow-poplar. Seedling mortality is slight because soil moisture is ample throughout the growing season. The hazard of erosion is slight, and equipment limitations are slight to moderate. In most places equipment needed for planting and harvesting trees can be used 10 months of the year, but drainage is needed to make some roads passable. The hazard of windthrow is slight because roots can develop normally.

WOODLAND SUITABILITY GROUP 3

Poorly drained Albano, Bowmansville, Roanoke, Wehadkee, and Worsham soils and Mixed alluvial land are in this woodland group. Some of these soils are subject to flooding and have formed in alluvium. Those on terraces or colluvial slopes ordinarily are not flooded. Most of these soils have a silt loam surface layer, 8 to 16 inches thick, and a highly mottled silty clay loam to plastic clay subsoil. Permeability is slow, and the available moisture capacity is moderate to moderately high. The content of organic matter is low to medium, and natural fertility is low to moderately high. Reaction ranges from strongly acid to medium acid. Slopes range from 0 to 7 percent.

Following are the estimated site indexes of the principal species: Loblolly pine, 75 to 84; Virginia pine, less than 50; and oaks, less than 55.

Competition from hardwoods is severe. Natural regeneration does not provide adequate restocking of desirable trees. Before trees are planted, competing hardwoods should be removed through prescribed burning, use of chemical sprays, girdling, clearing, disking, and other special practices. Loblolly pine is the most desirable kind of tree to plant or to favor in existing stands. Seedling mortality is moderate because of the excess water. The hazard of erosion is slight. The use of equipment needed for planting and harvesting trees is severely limited because water stands on or near the surface during most of the year. Controlled drainage is necessary in many places before a site can be fully utilized. Outlets are not available in all areas, however, and the cost of drainage is high. Windthrow is slight to moderate because of the excessive moisture, which restricts the depth to which roots can penetrate.

WOODLAND SUITABILITY GROUP 4

In this woodland group are shallow, somewhat excessively drained and excessively drained soils of the Bremo, Catoctin, Hazel, Klinesville, Louisburg, Manor, Manteo, Penn, Pinkston, Watt, and Wilkes series. These soils are on uplands. They have a surface layer of sandy loam to silt loam 3 to 19 inches thick. In places the subsoil is weakly defined and consists of friable material as much as 8 inches thick. In other places the surface layer directly overlies the substratum. Permeability is moderate to very rapid, and the available moisture capacity is low or very low. Natural fertility and the content of organic matter are medium to very low. Reaction is extremely acid to medium acid. Slopes range from 2 to 45 percent.

Following are the estimated site indexes of the principal species: Loblolly pine, 75 to 84; shortleaf pine and Virginia pine, 60 to 69; and oaks, 55 to 64.

Plant competition is slight. Special preparation of the site is not needed to obtain natural seeding. The most desirable trees to plant or to favor on these soils are loblolly and shortleaf pines. Planted seedlings should be placed 1 inch deeper than they were growing in the nursery bed. Seedling mortality is moderate because the soils are droughty. The hazard of erosion is slight to moderate. Limitations to the use of equipment needed for planting and harvesting trees are slight, and this equipment can be used year round. The hazard of windthrow is slight because trees can develop a good root system.

WOODLAND SUITABILITY GROUP 5

Eroded Louisburg sandy loams are in this woodland group. These soils are on uplands and are shallow and excessively drained. The surface layer is sandy loam, and the weakly defined subsoil also is sandy loam. In some places the substratum directly underlies the surface layer. Permeability is very rapid, and the available moisture capacity is very low. Natural fertility and the content of organic matter are very low. Reaction is very strongly acid or extremely acid. Slopes range from 7 to 25 percent.

Following are the estimated site indexes of the principal species: Loblolly pine, 65 to 74; Virginia pine and shortleaf pine, 50 to 59; and oaks, less than 55.

Plant competition is slight; the present vegetation offers no competition to the development of seedlings. For natural seeding, no special preparation of the site is needed. The most desirable trees to plant or to favor in existing stands are loblolly pine or Virginia pine. Seedling mortality is severe because the soils are droughty and are shallow over bedrock. The hazards of erosion and windthrow are severe. Equipment limitations are moderate to severe because of the slopes.

WOODLAND SUITABILITY GROUP 6

In this woodland group are deep, well-drained Bucks, Davidson, Dyke, Fauquier, Hiwassee, Lloyd, Rabun, and Rapidan soils. Some of these soils are on uplands, and others are on old alluvial terraces. The surface layer ranges from dark brown to dark reddish brown in color, from loam to clay loam in texture, and from 4 to 10 inches in thickness. The subsoil is dark red and ranges from silty clay loam to clay. Permeability is moderately rapid or rapid, and the available moisture capacity is high. The content of organic matter is medium to high, and natural fertility is moderately low to high. These soils are very strongly acid to medium acid. Slopes range from 2 to 45 percent.

Following are the estimated site indexes for the principal species: Loblolly pine, 75 to 84; Virginia and shortleaf pines, 70 or more; yellow-poplar, 100 or more; white pine, 90 or more; and oaks, 75 or more.

Plant competition is slight. The existing vegetation does not restrict the growth of seedlings to any extent. In general, special preparation of the site is not required for adequate natural seeding of most species. Preparation of the site by light disking or harrowing is needed, however, if yellow-poplar is to be established. The most desirable trees to plant or to favor in existing stands are yellow-poplar, white pine, loblolly pine, shortleaf pine, and black walnut. Seedling mortality is slight because ample soil moisture is available. The hazard of erosion is slight to moderate. Limitations to use of equipment are slight to moderate, depending on the degree of slope. The hazard of windthrow is slight because the growth of roots is not restricted.

WOODLAND SUITABILITY GROUP 7

In this woodland group are severely eroded, deep, well-drained Bucks, Davidson, Fauquier, Hiwassee, Lloyd, Rabun, and Rapidan soils. These soils are on uplands and on old alluvial terraces. The surface layer is red or dark-red clay, clay loam, or silty clay loam, and the subsoil is dark-red clay or silty clay loam. Permeability is moderately rapid or rapid, and the available moisture capacity is high. Natural fertility is moderately low to high, and the content of organic matter is medium to low. Reaction is medium acid to very strongly acid. Slopes range from 2 to 25 percent.

Following are the estimated site indexes for the principal species: Loblolly pine, 65 to 74; white pine, 70 to 79; shortleaf pine and Virginia pine, 60 to 69; yellow-poplar, 70 to 84; and oaks, 55 to 64.

Plant competition is slight because existing vegetation does not compete with seedlings. Special preparation of the site is not required for natural seeding. The most desirable trees to plant or to favor in existing stands are loblolly pine or white pine. Seedling mortality is severe because the soils are severely eroded. Equipment limitations are slight to moderate, depending on the extent of gullying and on steepness of the slope. The hazard of windthrow is slight to moderate, as normal growth of roots is somewhat restricted on the steeper slopes.

WOODLAND SUITABILITY GROUP 8

This woodland group consists of deep, well-drained Cecil, Elioak, Elsinboro, Madison, Tatum, Turbeville, and Wadesboro soils. These soils are on uplands and old terraces. The surface layer is brown to yellowish-brown sandy loam to silt loam and is 6 to 12 inches thick. The subsoil is red silty clay loam to clay. Permeability is moderately rapid or rapid, and the available moisture capacity is moderate to moderately high. Natural fertility and the content of organic matter are low to moderately high. Reaction is very strongly acid to medium acid. Slopes range from 2 to 25 percent.

Following are the estimated site indexes for the principal species: Loblolly pine, 75 to 84; yellow-poplar, 85 to 99; oaks, 65 to 74; Virginia pine, 70 or more; and shortleaf pine, 60 to 69.

Plant competition is slight; existing vegetation does not compete with seedlings. Special preparation of the site is not required for natural seeding. Yellow-poplar reproduces better, however, if the site is prepared by light disking or harrowing. The most desirable trees to plant or to favor in existing stands are loblolly and shortleaf pines and yellow-poplar. Seedling mortality is slight because enough soil moisture is available for seedlings to grow well. The hazard of erosion is slight. Erosion does not result from ordinary disturbance of the soil. Limitations to the use of equipment are slight where the slopes are less than 15 percent and moderate where the slopes are greater than 15 percent. Because the growth of roots is not restricted, the hazard of windthrow is slight.

WOODLAND SUITABILITY GROUP 9

In this woodland group are severely eroded, well-drained Cecil, Elioak, Madison, and Tatum soils on uplands. The surface layer of these soils is red or yellowish-red clay loam or silty clay loam. The subsoil is red silty clay loam to clay. Permeability is moderately rapid or rapid, and the available moisture capacity is moderate. These soils are low in content of organic matter and have low to medium natural fertility. Reaction is very strongly acid to medium acid. Slopes range from 2 to 15 percent.

Following are the estimated site indexes of the principal species: Loblolly pine, 65 to 74; Virginia pine, 60 to 69; shortleaf pine, 50 to 59; yellow-poplar, less than 70; and oaks, less than 55.

Plant competition is slight because existing vegetation does not compete with seedlings. For natural seeding, special preparation of the site is not required. The most desirable trees to plant or to favor in existing stands are loblolly pine or Virginia pine. Planted seedlings of these species should be placed 1 to 2 inches deeper than they were growing in the nursery bed. Because the soils do not retain adequate moisture for the seedlings, seedling mortality is severe. The hazard of erosion is severe. The limitations to the use of equipment needed for planting and harvesting trees are slight to moderate. The pene-

tration of roots is restricted to some degree. Therefore, the hazard of windthrow is slight to moderate.

WOODLAND SUITABILITY GROUP 10

This woodland group consists of deep, well-drained Appling, Glenelg, Grover, Masada, Mayodan, Myersville, and Nason soils. These soils are on uplands and old terraces. They have a surface layer of grayish-brown to yellowish-brown sandy loam to silt loam 6 to 12 inches thick. The subsoil is yellowish-red to yellowish-brown sandy clay loam to clay. Permeability is moderate to rapid, and the available moisture capacity is moderate to high. The content of organic matter and natural fertility range from low to high. Reaction is very strongly acid to medium acid. Slopes range from 2 to 25 percent.

Following are the estimated site indexes of the principal species: Loblolly pine, 75 to 84; yellow-poplar, 85 to 99; oaks, 65 to 74; Virginia pine, 70 or more; and shortleaf pine, 60 to 69.

Plant competition is slight; existing vegetation normally does not restrict the growth of desirable species. Special preparation of the site is not required for the natural seeding of most species, but it is needed for yellow-poplar. The most desirable trees to plant on these soils are loblolly or shortleaf pines. Seedling mortality is slight because ample soil moisture is normally available for roots to develop. The hazard of erosion is slight. Equipment limitations are slight, and most equipment needed for the planting and harvesting of trees can be used year round. The hazard of windthrow is slight because the penetration of roots is not restricted.

WOODLAND SUITABILITY GROUP 11

In this woodland group are severely eroded, well-drained Grover, Masada, and Nason soils on uplands and old terraces. The surface layer of these soils is yellowish sandy clay loam to silty clay loam. The subsoil is yellowish-red sandy clay loam, clay loam, or silty clay loam. Permeability is moderate or moderately rapid, and the available moisture capacity is moderate. These soils are low in content of organic matter and are low to medium in natural fertility. Reaction is very strongly acid. Slopes range from 7 to 15 percent.

Following are the estimated site indexes of the principal species: Loblolly pine, 65 to 74; shortleaf and Virginia pines, 50 to 59; oaks, less than 55; and yellow-poplar, less than 70.

Plant competition is slight. Existing vegetation does not compete with the growth of seedlings. Special preparation of the site is not needed for natural seeding. The most desirable tree to plant or to favor on these soils is loblolly pine. Seedling mortality is severe because of the severe erosion and inadequate moisture during the growing season. The hazard of erosion is severe. Equipment limitations are slight to moderate; most equipment needed for planting and harvesting trees can be used year round. Because the development of roots is somewhat impeded, the hazard of windthrow is moderate.

WOODLAND SUITABILITY GROUP 12

In this woodland group are deep, moderately well drained or well drained Altavista and York soils on uplands and terraces. The surface layer of these soils is 4 to 10 inches thick and is grayish-brown loam or silt loam. The subsoil is yellowish-brown or brownish-yellow clay loam or silty clay loam. Permeability is moderate, and the available moisture capacity is moderate or moderately low. Natural fertility and the content of organic matter are medium to low. Reaction is strongly acid or very strongly acid. Slopes range from 0 to 12 percent.

Following are the estimated site indexes for the principal species. Loblolly pine, 75 to 84; shortleaf and Virginia pines, 60 to 69; yellow-poplar, 70 to 84; and oaks, 55 to 64.

Plant competition is slight; existing vegetation normally does not interfere with the growth of planted or natural seedlings. No special preparation of the site is needed for natural seeding. The most desirable trees to plant or to favor in existing stands are loblolly pine and shortleaf pine. Seedling mortality is slight, for ample moisture is normally available.

Because of the mild slopes in most places, the hazard of erosion is slight. Limitations to the use of equipment are moderate, as the soils are wet during short periods of the year. The hazard of windthrow is slight.

WOODLAND SUITABILITY GROUP 13

In this woodland group are well-drained to somewhat poorly drained Fluvanna, Helena, Meckenburg, Vance, and Zion soils. These soils are on uplands. The surface layer is brown silt loam to fine sandy loam 6 to 12 inches thick. The subsoil is yellowish-brown or yellowish-red, slightly plastic or plastic clay or clay loam. Permeability is moderate to slow, and the available moisture capacity ranges from low to high. Natural fertility and the supply of organic matter are medium to low. Reaction is medium acid to strongly acid. Slopes range from 2 to 15 percent.

Following are the estimated site indexes for the principal species: Loblolly pine, 65 to 74; shortleaf and Virginia pines, 60 to 69; oaks, 55 to 64; and yellow-poplar, less than 70.

Plant competition is moderate; existing vegetation does not interfere with the growth of seedlings. No special preparation of the site is needed for natural seeding. The most desirable species to plant or to favor in existing stands is loblolly pine. Seedling mortality is slight, as moisture is normally available for the development of roots. The hazard of erosion is slight. Limitations to the use of equipment are moderate to severe because the soils in this group are wet most of the time. The hazard of windthrow is moderate, for a high water table impedes the penetration of roots.

WOODLAND SUITABILITY GROUP 14

In this woodland group are moderately well drained or somewhat poorly drained Orange and Iredell soils on uplands. The surface layer of these soils is light yellowish-brown silt loam 4 to 14 inches thick. The subsoil is mottled yellowish-brown, plastic clay. Permeability is slow, and the available moisture capacity is low. These soils are low in content of organic matter and low to medium in natural fertility. Reaction is medium acid to very strongly acid. Slopes range from 0 to 15 percent.

Following are the estimated site indexes for the principal species: Loblolly pine, 60 to 74; shortleaf and Virginia pines, 45 to 59; and oaks, 55 or less.

Plant competition is moderate. Preparation of the site is needed to obtain natural seeding of desirable species. The most desirable species to plant or to favor in existing stands is loblolly pine. Seedling mortality is moderate or severe because the soils dry out rapidly during periods of no rain, and they are shallow over bedrock in some places. The hazard of erosion is slight to severe. Equipment limitations are severe because the equipment tends to mire on these soils. The hazard of windthrow is moderate to severe because the normal development of roots is restricted.

WOODLAND SUITABILITY GROUP 15

This woodland group consists of moderately well drained or somewhat poorly drained Augusta, Calverton, Colfax, Creedmoor, and Lignum soils that have a fragipan. The surface layer of these soils is grayish-brown silt loam to sandy loam 8 to 12 inches thick. The subsoil is mottled silty clay loam or clay loam. Permeability is slow or very slow, and the available moisture capacity is moderately low or low. Natural fertility and the content of organic matter are low to medium. Reaction is strongly acid or very strongly acid. Slopes range from 0 to 7 percent.

Following are the estimated site indexes for the principal species: Loblolly pine, 75 to 84; shortleaf and Virginia pines, 60 to 69; and oaks, 55 to 64.

Plant competition is moderate; existing vegetation tends to shade out natural or planted seedlings. Preparation of the site is needed where new seedlings are to be established. The most desirable species to plant or to favor in existing stands is loblolly pine. Seedling mortality is moderate because of the excess moisture. The hazard of erosion is slight. Equipment limitations are severe because the soils are wet and soggy most of the year. The hazard of windthrow is moderate, for the high water table restricts the normal development of roots.

WOODLAND SUITABILITY GROUP 16

In this woodland group are somewhat poorly drained and poorly drained Elbert soils. The surface layer of these soils is dark grayish-brown to gray silt loam 6 to 12 inches thick. The subsoil is mottled, plastic clay. Permeability is slow or very slow, and the available moisture capacity is moderate. Natural fertility and the supply of organic matter are medium. Reaction is medium acid to strongly acid. Slopes range from 0 to 7 percent.

Following are the estimated site indexes for the principal species: Loblolly pine, less than 65; Virginia pine, less than 50; and oaks, less than 55.

Plant competition from existing vegetation is severe. Preparation of the site is needed to obtain regeneration of desirable species of trees. The most desirable species to plant or to favor in existing stands is loblolly pine. Seedling mortality is moderate to severe because of excess water. The hazard of erosion is slight. Equipment limitations are severe because the soils are wet. The hazard of windthrow is moderate, for the high water table restricts the normal development of roots.

WOODLAND SUITABILITY GROUP 17

Only the Rock land miscellaneous land types are in this woodland group. These land types are generally unsuitable for the production of commercial sawtimber. Permeability ranges from very slow to rapid, and the available moisture capacity ranges from low to high. Natural fertility and the content of organic matter are low to high. Reaction is medium acid to very strongly acid. Slopes range from 0 to 45 percent.

Following are the estimated site indexes for the principal species: Loblolly, Virginia, and shortleaf pines, 40 to 70; and oaks, 40 to 60.

Plant competition ranges from slight to severe. Spot planting of pines can be done where the soil material is deep enough. Seedling mortality ranges from moderate to severe. The hazard of erosion is slight to severe. Equipment limitations are moderate to severe, depending on the amount of rock and the steepness of the slope. Because the development of roots is restricted, the hazard of windthrow is severe.

Soil Interpretations for Wildlife Habitat [2]

The wildlife population of any area depends upon the availability of food, cover, and water in a suitable combination (*1*).[3] The lack of any of these requirements, an unfavorable balance between them, or an inadequate distribution of them 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 in carrying out these measures. Such information is also useful in broad-scale planning for parks, nature areas, or other recreational developments having wildlife management aspects. It is an important aid in planning for the acquisition of land for development of wildlife habitat or protection of wildlife.

Interpretations of the usefulness of soils for wildlife habitat are helpful in selecting sites that are suitable for management and in determining the level of management needed to achieve satisfactory results. Interpretations may also reveal reasons that make a particular area unsuitable for a specific kind of wildlife. Table 3 rates the soils of Orange County according to their suitability for eight elements of wildlife habitat and also for four classes of wildlife.

Habitat suitability ratings

Meanings of the numerical ratings used in table 3 are as follows:

1, *well suited*; 2, *suited*; 3, *poorly suited*; and 4, *not suited*. *Well suited* means that habitats generally are easily created, improved, or maintained; that the soil has few or no limitations that affect management; and that satisfactory results can be expected. *Suited* means that habitats can be created, improved, or maintained in most places; that the soil has moderate limitations that affect management; and that moderate intensity of management and fairly frequent attention may be required for satisfactory results. *Poorly suited* means that habitats can be created, improved, or maintained in most places;

[2] By R. F. Dugan, biologist, Soil Conservation Service.
[3] Italic numbers in parentheses refer to Literature Cited, p. 168.

that the soil has rather severe limitations; that habitat management is difficult and expensive and that it requires intensive effort; and that results are not always satisfactory. *Not suited* means that creating, improving, or maintaining habitats is impractical or impossible and that unsatisfactory results are probable.

Habitat elements

The eight elements of wildlife habitat listed in table 3 are described in the following paragraphs.

Grain and seed crops refers to grain-producing or seed-producing annual plants that are suitable as food for wildlife. Examples are corn, wheat, oats, barley, rye, buckwheat, soybeans, cowpeas, millet, sorghum, and sunflower.

Grasses and legumes refers to forage crops that are commonly planted for wildlife food or cover. Examples are fescue, orchardgrass, bluegrass, timothy, reed canarygrass, clover, alfalfa, lespedeza, trefoil, and crownvetch.

Wild herbaceous upland plants refers to native or introduced grasses and forbs (weeds) that provide food and cover for upland wildlife. Examples are partridgepea, wild millet, goldenrod, lespedeza, strawberry, broomsedge, beggarweed, ragweed, and dandelion.

Hardwood woody plants refers to nonconiferous trees, shrubs, and woody vines that produce fruits, nuts, or other food used extensively by wildlife. These include oak, beech, hickory, maple, birch, locust, dogwood, viburnum, honeysuckle, grape, sumac, blackberry, autumn-olive, multiflora rose, and shrub lespedeza.

Coniferous woody plants refers to cone-bearing trees and shrubs that are used mainly as cover but that can furnish food in the form of browse, seeds, or fruitlike cones. Examples are pine, spruce, hemlock, fir, cedar, juniper, larch, yew, and cypress. Highest suitability ratings are given to soils on which conifers grow slowly and maintain an open-crown canopy. Evidence indicates that wildlife are more numerous in a coniferous habitat where trees grow slowly and have an open canopy than where conifers grow rapidly and form a dense, closed-crown canopy. Soils on which conifers grow rapidly are also the better soils for hardwoods. Consequently, they are rated lower in suitability for coniferous habitat.

Wetland food and cover plants refers to wild herbaceous plants that grow on moist to wet sites. Examples are smartweed, barnyard grass, wildrice, rush, sedge, burreed, rice cutgrass, arrowhead, and millet.

Shallow water developments are impoundments or excavations in which the level of the water table can be controlled at will at any depth from normal water table to an elevation of 3 feet above grade. Included are low dikes and levees, shallow dugouts, level ditches, and devices for controlling the water level in marshy channels or drainageways.

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*

[Numerals in vertical columns have the following meanings: 1, well suited; 2, suited; 3, poorly suited; and 4, not suited]

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Fish ponds	Openland	Woodland	Wetland	Pond fish
Albano (Ab)	3	2	2	1	2	1	1	1	2	1	1	2
Altavista:												
(AlA)	2	1	1	1	3	3	3	2	1	1	3	2
(AlB, AlC2)	2	1	1	1	3	4	4	2	1	1	4	2
Appling (ApB, ApB2, ApC2)	2	1	1	1	3	4	4	2	1	1	4	2
Augusta:												
(AuA)	2	1	1	1	3	3	3	2	1	1	3	2
(AuB)	2	1	1	1	3	4	4	2	1	1	4	2
Bermudian (Be)	4	3	3	1	2	1	2	4	3	2	2	4
Bowmansville (Bo)	4	3	3	1	2	1	2	4	3	2	2	4
Bremo (BrC, BrD)	3	3	2	2	2	4	4	3	3	2	4	3
Bucks:												
(BsB2, BsC2, BtB2, BtC2)	2	1	1	1	3	4	4	3	1	1	4	3
(BuC3)	3	2	1	1	3	4	4	3	2	2	4	3
Buncombe (Bw)	3	3	3	3	1	4	4	4	3	3	4	4
Calverton (CaB, CbB) (For ratings of the Creedmoor soil in mapping unit CbB, refer to the Creedmoor series.)	2	1	1	1	3	3	3	2	1	1	3	2

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Fish ponds	Openland	Woodland	Wetland	Pond fish
Catoctin:												
(CcC)	2	2	2	2	2	4	4	3	2	2	4	3
(CcD)	3	2	2	2	2	4	4	4	2	2	4	4
(CdD, CdE)	4	3	2	2	2	4	4	4	3	2	4	4
Cecil:												
(CeB2, CeC2, CmB2, CmC2)	2	1	1	1	3	4	4	2	1	1	4	2
(CsC3)	4	2	1	1	3	4	4	3	2	2	4	3
Chewacla (Cw)	2	1	1	1	3	3	3	1	1	1	3	1
Colfax (CxB)	2	2	1	1	3	3	3	2	1	2	3	2
Comus (Cy, Cz)	2	1	1	1	3	4	4	4	1	1	4	4
Creedmoor (Mapped only with soils of the Calverton series.)	2	1	1	1	3	4	4	1	1	1	4	1
Davidson:												
(DaB2)	2	1	1	1	3	4	4	2	1	1	4	2
(DaC2)	3	2	1	1	3	4	4	2	2	2	4	2
(DaD2, DcD, DcE)	4	2	1	1	3	4	4	4	2	2	4	4
(DcC)	3	2	1	1	3	4	4	3	2	2	4	3
(DdB3)	3	2	2	1	2	4	4	2	2	1	4	2
(DdC3)	4	3	2	1	2	4	4	3	3	2	4	3
(DdD3)	4	3	2	1	2	4	4	4	3	2	4	4
Dyke (DkB2, DkC2)	2	1	1	1	3	4	4	3	1	1	4	3
Elbert (Eb, Ee)	3	3	2	2	2	1	1	1	3	2	1	2
Elioak:												
(ElB2, ElC2)	2	1	1	1	3	4	4	2	1	1	4	2
(EmB3)	3	2	1	1	3	4	4	2	2	2	4	2
(EmC3)	4	2	1	1	3	4	4	3	2	2	4	3
Elsinboro (EsB, EsB2, EsC2)	2	1	1	1	3	4	4	2	1	1	4	2
Fauquier:												
(FaB2)	2	1	1	1	3	4	4	3	1	1	4	3
(FaC2, FcC3)	3	2	1	1	3	4	4	3	2	2	4	3
Fluvanna (FlB, FlB2, FlC2)	2	1	1	1	3	4	4	1	1	1	4	1
Glenelg (GlB2, GlC2)	2	1	1	1	3	4	4	2	1	1	4	2
Grover:												
(GrB2, GrC2)	2	1	1	1	3	4	4	2	1	1	4	2
(GsC3)	3	2	1	1	3	4	4	3	2	2	4	3
Hazel:												
(HaC)	3	3	2	2	2	4	4	3	3	2	4	3
(HaD)	4	3	2	2	2	4	4	4	3	2	4	4
Helena (HeB, HeC2)	2	1	1	1	3	4	4	1	1	1	4	1
Hiwassee:												
(HsB, HsB2)	2	1	1	1	3	4	4	3	1	1	4	3
(HsC2)	3	2	1	1	3	4	4	3	2	2	4	3
(HwC3)	4	3	2	1	2	4	4	3	3	2	4	3

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Fish ponds	Openland	Woodland	Wetland	Pond fish
Iredell:												
(OrA)	2	2	1	1	3	3	3	1	1	2	3	1
(OrB, OrB2)	2	2	1	1	3	4	4	1	1	2	4	1
(For ratings of the Orange soils in these mapping units, refer to the Orange series.)												
Klinesville (KID, KIE)	4	3	2	2	2	4	4	4	3	2	4	4
Lignum (LgB)	2	1	1	1	3	4	4	2	1	1	4	2
Lloyd:												
(LlB2, LlC2)	2	1	1	1	3	4	4	3	1	1	4	3
(LmB3)	3	2	1	1	3	4	4	2	2	2	4	2
(LmC3)	4	2	1	1	3	4	4	3	2	2	4	3
(LmD3)	4	3	1	1	3	4	4	4	3	2	4	4
Louisburg:												
(LoC)	2	2	2	2	2	4	4	3	2	2	4	3
(LoC2, LoD)	3	2	2	2	2	4	4	4	2	2	4	4
(LoD2)	4	3	2	2	2	4	4	4	3	2	4	4
Madison:												
(MaB2, MaC2)	2	1	1	1	3	4	4	2	1	1	4	2
(MdC3)	3	2	1	1	3	4	4	3	2	2	4	3
Manassas (MnB)	2	1	1	1	3	4	4	2	1	1	4	2
Manor (MoD)	3	2	2	2	2	4	4	4	2	2	4	4
Manteo:												
(MrB, MrC)	2	2	2	2	2	4	4	3	2	2	4	3
(MrD)	3	2	2	2	2	4	4	4	2	2	4	4
(MrE)	4	3	2	2	2	4	4	4	3	2	4	4
Masada:												
(MsB, MsB2, MsC2)	2	1	1	1	3	4	4	2	1	1	4	2
(MtC3)	3	2	1	1	3	4	4	3	2	2	4	3
Mayodan (MuB, MuB2, MuC2)	2	1	1	1	3	4	4	2	1	1	4	2
Mecklenburg (MvB2, MvC2)	2	1	1	1	3	4	4	1	1	1	4	1
Mixed alluvial land (Mx)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)	(1)
Meyersville (MyB2, MyC2)	2	1	1	1	3	4	4	2	1	1	4	2
Nason:												
(NaB2, NaC2, NsB, NsB2, NsC, NsC2)	2	1	1	1	3	4	4	2	1	1	4	2
(NsD2)	3	2	1	1	3	4	4	4	2	2	4	4
(NtC3)	4	2	1	1	3	4	4	3	2	2	4	3
Orange (concretionary variant):												
(OgA)	2	2	1	1	3	3	3	1	1	2	3	1
(OgB, OgB2, OgC2)	2	2	1	1	3	4	4	2	1	2	4	2
Orange:												
(OrA)	2	2	1	1	3	3	3	1	1	2	3	1
(OrB, OrB2)	2	2	1	1	3	4	4	2	1	2	4	2
(For ratings of the Iredell soils in these mapping units, refer to the Iredell series.)												

[1] Characteristics are too variable for rating.

TABLE 3.—*Suitability of soils for elements of wildlife habitat and for kinds of wildlife*—Continued

Soil series and map symbols	Elements of wildlife habitat								Kinds of wildlife			
	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants	Hardwood woody plants	Coniferous woody plants	Wetland food and cover plants	Shallow water developments	Fish ponds	Openland	Woodland	Wetland	Pond fish
Penn (PeB, PeC)	2	2	2	2	2	4	4	2	2	2	4	2
Pinkston:												
(PkC)	2	2	2	2	2	4	4	3	2	2	4	3
(PkD)	3	2	2	2	2	4	4	4	2	2	4	4
Rabun:												
(RaB2)	2	1	1	1	3	4	4	2	1	1	4	2
(RaC2)	3	2	1	1	3	4	4	3	2	2	4	3
(RaD2)	4	2	1	1	3	4	4	4	2	2	4	4
(RaE2, RcD3)	4	3	2	1	2	4	4	4	3	2	4	4
Rapidan:												
(RdB2)	2	1	1	1	3	4	4	3	1	1	4	3
(RdC2, ReC3)	3	2	1	1	3	4	4	3	2	2	4	3
Roanoke (Rk)	3	2	2	1	2	1	1	1	2	1	1	2
Rock land (RnC, RnD, RoC, RoE)	4	3	3	3	1	4	4	4	4	3	4	4
Rowland (Rw)	2	1	1	1	3	3	3	1	1	1	3	1
Seneca (SeB)	1	1	1	1	3	4	4	2	1	1	4	2
Starr (SrC)	2	1	1	1	3	4	4	2	1	1	4	2
State (StA)	1	1	1	1	3	4	4	2	1	1	4	2
Tatum:												
(TaB2, TaC2, TsB, TsB2, TsC, TsC2)	2	1	1	1	3	4	4	2	1	1	4	2
(TtB3)	3	2	1	1	3	4	4	2	2	2	4	2
(TtC3)	4	2	1	1	3	4	4	3	2	2	4	3
Turbeville (TuB, TuB2, TuC2)	2	1	1	1	3	4	4	2	1	1	4	2
Vance (VaB, VaB2)	2	1	1	1	3	4	4	1	1	1	4	1
Wadesboro:												
(WaB2, WaC2)	2	1	1	1	3	4	4	2	1	1	4	2
(WaD2)	3	2	1	1	3	4	4	4	2	2	4	4
Watt:												
(WbB, WbC)	3	3	2	2	2	4	4	3	3	2	4	3
(WbD)	4	3	2	2	2	4	4	4	3	2	4	4
Wehadkee (We)	3	2	2	1	2	2	2	2	2	1	2	2
Wilkes:												
(WkC)	2	2	2	2	2	4	4	3	2	2	4	3
(WkD)	3	2	2	2	2	4	4	4	2	2	4	4
Worsham (WoB)	3	2	2	1	2	3	4	2	2	1	4	2
York (YoB)	2	1	1	1	3	4	4	2	1	1	4	2
Zion (ZoB, ZoC2)	2	1	1	1	3	4	4	1	1	1	4	1

Fish ponds are dugout areas or impoundments that retain water at least 6 feet deep over at least one-fourth of their area and that have an ample supply and quality of water suitable for fish. Elbert silt loam is an example of a soil that provides suitable areas for ponds for fishing and other recreation (fig. 7).

Classes of wildlife

The four classes of wildlife listed in table 3 are defined in the following paragraphs:

Openland wildlife refers to birds and mammals that normally live on cropland, pasture, meadow, and brushy, idle land. Examples are rabbit, quail, pheasant, mourning dove, field sparrow, meadowlark, and killdeer. Ratings in this column are a weighted average of the suitability ratings for habitat elements consisting of grain and seed crops, grasses and legumes, wild herbaceous upland plants, and hardwood woody plants.

Woodland wildlife refers to birds and mammals that normally live in wooded areas where hardwood trees and shrubs and coniferous trees and shrubs grow. Examples are wild turkey, white-tailed deer, ruffed grouse, gray squirrel, fox squirrel, raccoon, wood thrush, vireos, warblers, and woodpeckers. Ratings in this column are a weighted average of suitability ratings for habitat elements consisting of grasses and legumes, wild herbaceous upland plants, hardwood woody plants, and coniferous woody plants.

Wetland wildlife refers to birds and mammals that normally live in such wet areas as ponds, marshes, and swamps. Examples are ducks, coots, herons, geese, snipe, rail, mink, muskrat, and beaver. Ratings in this column are a weighted average of suitability ratings for habitat elements consisting of wetland food and cover plants, shallow water developments, and fish ponds.

Pond fish refers to fish that are generally stocked in small ponds. Examples are brook trout, rainbow trout, channel catfish, carp, bluegill, redear sunfish, and largemouth bass. Ratings in this column are weighted averages of suitability ratings for habitat elements consisting of shallow water developments and fish ponds.

Engineering Uses of the Soils [4]

Some soil properties are of special interest to engineers because they affect the construction and maintenance of roads, airports, pipelines, building foundations, water-storage facilities, erosion-control structures, drainage systems, and sewage disposal systems.

Information in this soil survey can be used by engineers to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.

[4] BUELL M. FERGUSON, assistant State conservation engineer, Soil Conservation Service, assisted in the preparation of this section.

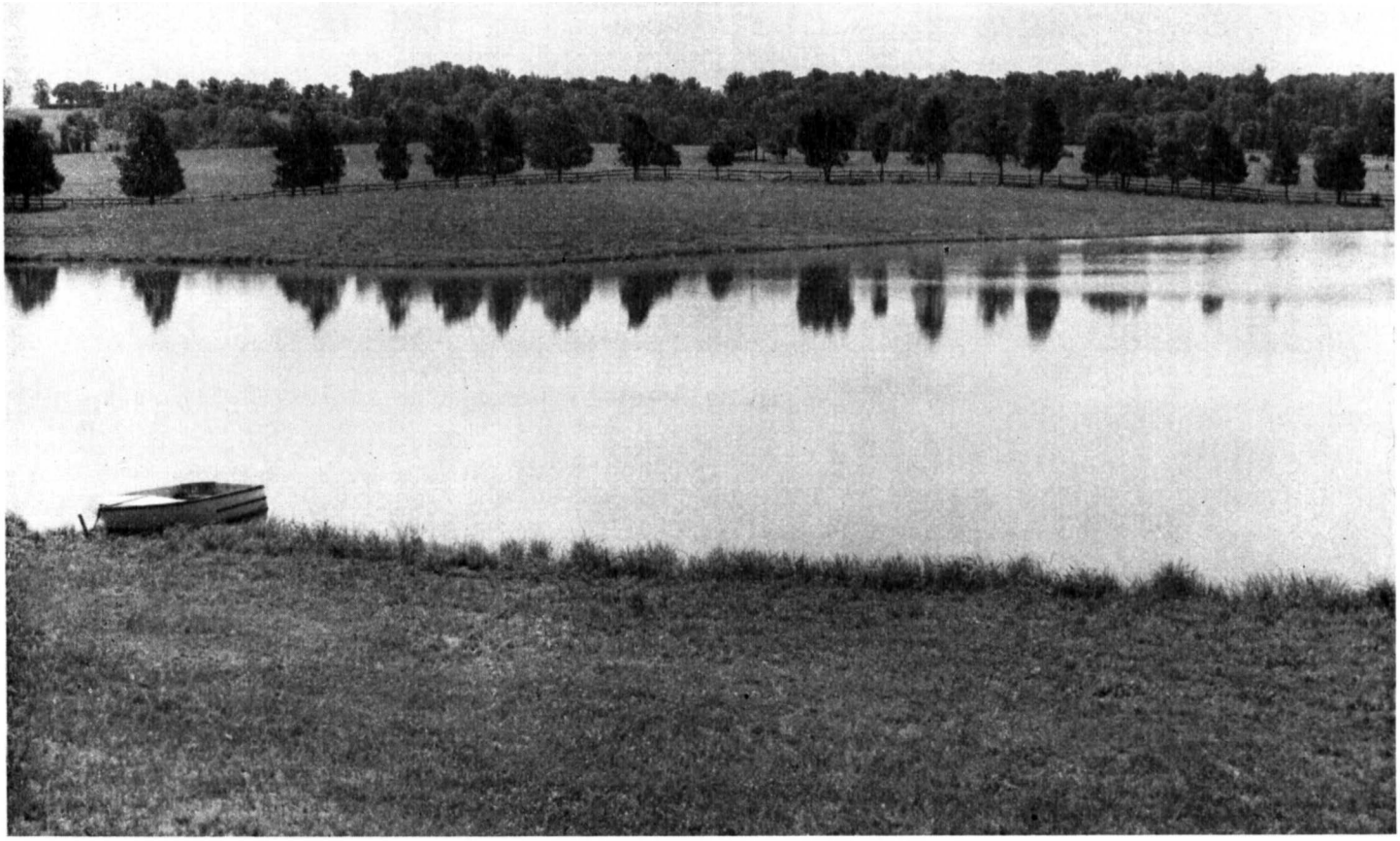

Figure 7.—**Pond in an area of Elbert silt loam, which is poorly drained. Myersville silt loam, 2 to 7 percent slopes, eroded, is in the foreground. Fauquier silt loam, 2 to 7 percent slopes, eroded, is in the background.**

2. Make preliminary estimates of the engineering properties of soils in the planning of agricultural drainage systems, farm ponds, and diversion terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations at the selected locations.
4. Locate possible sources of stone, gravel, and other construction material.
5. Correlate the performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining certain engineering structures.
6. Evaluate the suitability of soil mapping units for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth to—		Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve—			Classification by particle size
	Seasonal high water table	Bedrock			No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	USDA texture
	Feet	*Feet*	*Inches*	*Percent*				
Albano (Ab)	0–1½	3½	0–10	----------	95–100	95–100	65–90	Silt loam
			10–40	----------	95–100	95–100	80–95	Silty clay loam, silty clay, clay.
			40–46	----------	85–100	80–100	60–90	Silty soil material and weathered shale.
Altavista (AlA, AlB, AlC2) [1]	2½–3½	7+	0–9	----------	95–100	90–95	55–70	Loam
			9–53	----------	95–100	95–100	60–80	Sandy clay loam
Appling (ApB, ApB2, ApC2)	10+	7+	0–6	----------	95–100	90–100	25–45	Sandy loam
			6–50	----------	95–100	90–100	60–80	Sandy clay loam to heavy clay loam.
			50–60	----------	95–100	90–100	40–65	Sandy clay loam
Augusta (AuA, AuB) [1]	1–1½	6+	0–8	----------	100	90–95	60–70	Silt loam
			8–18	----------	--------	100	60–80	Sandy clay loam, clay loam
			18–40	----------	--------	95–100	75–95	Clay
			40–49	----------	100	95–100	25–55	Sandy clay loam, loamy fine sand.
Bermudian (Be)	3½+	4+	0–6	----------	--------	100	70–95	Silt loam
			6–32	----------	--------	100	40–75	Fine sandy loam, loam
			32–48	----------	--------	100	70–90	Silt loam
			48–60	----------	95–100	80–100	40–70	Loam
			60	----------	--------	--------	--------	Sand and gravel
Bowmansville (Bo) [1]	0–1	4+	0–12	----------	--------	100	65–95	Silt loam
			12–41	----------	--------	100	80–95	Silty clay loam
			41–46	----------	--------	100	40–60	Sandy clay loam
Bremo (BrC, BrD) [1]	10+	2+	0–12	----------	90–100	85–100	65–85	Silt loam
			12–20	10	85–100	65–85	65–85	Silt loam
			20–25	----------	85–100	65–85	65–85	Silt loam
			25	----------	--------	--------	--------	Hard basic rock

See footnotes at end of table.

It should be emphasized that the interpretations made in this soil survey may not eliminate the need for sampling and testing needed at a site chosen for a specific engineering work that involves heavy loads or at a site where excavations are to be deeper than the depths of the layers here reported. Also, engineers should not apply specific values to the estimates for bearing capacity given in this survey. Nevertheless, by using this survey, an engineer can select and concentrate on those soil units most important for his proposed kind of construction, and in this manner reduce the number of samples taken for laboratory testing and complete an adequate soil investigation at minimum cost.

Some of the terms used by the soil scientist may be unfamiliar to the engineer, and some words—for example, soil, clay, silt, and sand—may have a special meaning in soil science. These and other special terms used in the soil survey are defined in the Glossary at the back of this survey.

Most of the information in this subsection is in tables. Table 4 gives estimates of the physical properties of the soils, and table 5 provides engineering interpretations of these properties. Table 6 gives engineering test data obtained when the samples of selected soil series were tested.

properties of the soils

Classification by particle size—Con.		Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential		Hazard from stream overflow
Unified	AASHO							Steel	Concrete	
		Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lb. per cu. ft.*				
ML	A-4	0. 63–2. 0	0. 18–0. 23	5. 1–5. 5	15–22	100–110	Low	High	Moderate.	None, but receives seepage from higher areas.
CL, CH	A-6, A-7	<0. 20–0. 63	0. 15–0. 21	5. 1–5. 5	18–22	100–105	Moderate	High	Moderate.	
ML	A-4, A-6	0. 20–0. 63	0. 18–0. 21	5. 1–5. 5	18–22	95–105	Low	High	Moderate.	
ML, ML-CL	A-4	2. 0–6. 3	0. 10–0. 15	5. 1–5. 5	12–18	105–115	Low	Moderate	Moderate.	None.
CL	A-6, A-7	0. 63–2. 0	0. 12–0. 18	5. 1–5. 5	12–20	100–120	Moderate	High	Moderate.	
SM	A-2, A-4	2. 0–6. 3	0. 10–0. 14	4. 5–5. 0	12–14	110–120	Low	Low	High.	None.
CL, MH	A-6, A-7	0. 63–2. 0	0. 16–0. 18	4. 5–5. 0	14–20	100–115	Moderate	Moderate	High.	
SC, CL	A-6	0. 63–2. 0	0. 14–0. 18	4. 5–5. 0	14–20	100–115	Moderate	Moderate	High.	
ML	A-4	0. 63–2. 0	0. 18–0. 23	5. 1–5. 5	15–22	100–115	Low	High	Moderate.	None.
CL	A-4, A-6	0. 20–2. 0	0. 14–0. 18	5. 1–5. 5	15–25	95–110	Moderate	High	Moderate.	
MH, CH	A-7	0. 20–0. 63	0. 15–0. 18	5. 1–5. 5	15–25	90–110	Moderate	High	Moderate.	
SM, SC	A-4, A-2	0. 63–2. 0	0. 06–0. 14	5. 1–5. 5	10–14	110–120	Low	High	Moderate.	
ML	A-4	>6. 3	0. 18–0. 23	5. 1–6. 0	15–22	100–110	Low	Low	Moderate.	Very frequent flooding.
SM, SC, ML, CL	A-4, -6	2. 0–6. 3	0. 12–0. 18	5. 1–6. 0	12–18	105–115	Low	Low	Moderate.	
ML, CL	A-4, 6	0. 63–6. 3	0. 18–0. 23	5. 1–6. 0	15–22	100–110	Low	Low	Moderate.	
SM, SC, ML, CL	A- A-6	0. 63–6. 3	0. 14–0. 18	5. 1–6. 0	12–18	105–115	Low	Low	Moderate.	
ML	A-4	0. 63–2. 0	0. 18–0. 23	4. 5–5. 0	22–28	90–105	Low	High	High.	Very frequent flooding.
CL	A-6, A-7	0. 63–2. 0	0. 19–0. 21	4. 5–5. 0	22–28	90–105	Moderate	High	High.	
SC, ML-CL	A-4, A-6	0. 63–2. 0	0. 14–0. 18	4. 5–5. 0	18–24	100–110	Moderate	High	High.	
ML	A-4	0. 63–2. 0	0. 18–0. 23	5. 1–6. 0	10–15	105–115	Low	Low	Moderate.	None.
ML-CL	A-4	0. 63–2. 0	0. 18–0. 23	5. 1–6. 0	10–15	105–120	Low	Low	Moderate.	
ML-CL	A-4	0. 63–2. 0	0. 18–0. 23	5. 1–6. 0	10–15	105–115	Low	Low	Moderate.	

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface typical (profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification by particle size: USDA texture
	Feet	*Feet*	*Inches*	*Percent*				
Bucks (BsB2, BsC2, BtB2, BtC2, BuC3).	10+	4+	0–9	----------	--------	100	60–85	Silt loam
			9–36	----------	--------	100	75–85	Silty clay loam
			36–67	----------	--------	100	60–75	Silt loam
Buncombe (Bw)	4+	5+	0–20	----------	90–100	90–100	15–25	Loamy fine sand
			20–77	----------	90–100	90–100	5–20	Loamy sand, sand
Calverton (CaB, CbB) [1] (For properties of the Creedmoor soil in mapping unit CbB, refer to the Creedmoor series.)	1–1½	5+	0–7	----------	100	90–100	60–75	Loam
			7–23	----------	95–100	90–100	70–90	Clay loam, silty clay loam
			23–31	----------	90–100	90–100	30–55	Sandy clay loam
			31–47	----------	80–100	80–100	80–95	Silty clay loam
Catoctin (CcC, CcD, CdD, CdE).	10+	1–2½	0–11	----------	85–100	80–100	65–95	Silt loam
			11–22	----------	60–70	60–70	40–60	Silt loam
			22	----------	--------	--------	--------	Greenstone
Cecil (CeB2, CeC2, CmB2, CmC2, CsC3).	10+	10+	0–7	----------	80–100	80–100	45–80	Loam, sandy loam
			7–49	----------	90–100	90–100	55–85	Clay loam, sandy clay loam, clay.
			49–67	----------	85–100	80–100	55–75	Loamy soil material
Chewacla (Cw)	1–1½	6+	0–28	----------	90–100	85–100	65–95	Silt loam
			28–63	----------	90–100	85–100	45–65	Fine sandy loam, silt loam
Colfax (CxB)	1–1½	4+	0–10	----------	90–100	90–100	60–75	Loam
			10–20	----------	90–100	90–100	40–55	Sandy clay loam
			20–40	----------	90–100	90–100	25–35	Sandy loam
			40–62	----------	90–100	90–100	25–45	Sandy loam
Comus (Cy, Cz)	2½–4	6+	0–22	----------	85–100	80–100	40–55	Fine sandy loam
			22–40	----------	85–100	80–100	25–55	Fine sandy loam, loamy fine sand.
			40–73	----------	85–100	80–100	40–55	Fine sandy loam
Creedmoor (Mapped only with soils of the Calverton series.)	1–1½	4+	0–10	----------	95–100	90–100	65–95	Silt loam
			10–28	----------	95–100	90–100	70–95	Clay loam, silty clay loam
			28–45	----------	95–100	90–100	75–95	Clay
			45–59	----------	80–100	75–100	60–85	Clay loam, silt loam
Davidson (DaB2, DaC2, DaD2, DcC, DcD, DcE, DdB3, DdC3, DdD3).	10+	6+	0–7	----------	85–100	85–100	70–90	Clay loam
			7–87	----------	90–100	90–100	70–95	Clay
			87–133	----------	90–100	90–100	75–95	Silty clay loam

See footnotes at end of table.

properties of the soils—Continued

Classification by particle size—Con.		Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential		Hazard from stream overflow
Unified	AASHO							Steel	Concrete	
		Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lb. per cu. ft.*				
ML-CL	A-4	2. 0-6. 3	0. 18-0. 24	5. 1-6. 0	12-18	105-115	Low	Low	Moderate.	None.
CL, CH	A-6, A-7	0. 63-2. 0	0. 14-0. 22	5. 1-6. 0	18-25	95-105	Moderate	Moderate	Moderate.	
ML	A-4	0. 63-2. 0	0. 15-0. 20	5. 1-6. 0	20-25	95-105	Moderate	Moderate	Moderate.	
SM	A-2	>6. 3	0. 06-0. 08	5. 1-5. 5	10-15	110-120	Low	Low	High.	Very frequent flooding.
SM, SP-SM	A-2	>6. 3	0. 02-0. 08	5. 1-5. 5	10-15	110-120	Low	Low	High.	
ML	A-4	0. 63-2. 0	0. 14-0. 18	4. 5-5. 0	12-20	100-110	Low	Moderate	High.	None, but receives seepage from higher areas.
CL, ML	A-7	0. 20-2. 0	0. 16-0. 21	4. 5-5. 0	18-24	95-110	Moderate	High	High.	
SM, SC, CL	A-2, A-4	<0. 20	0. 14-0. 18	4. 5-5. 0	22-28	100-115	Moderate	High	High.	
CL, CH	A-7	0. 20-0. 63	0. 18-0. 21	4. 5-5. 0	18-24	95-110	Moderate	High	High.	
ML	A-4	>6. 3	0. 18-0. 23	5. 6-6. 0	14-18	100-110	Low	Low	Moderate.	None.
ML, GM	A-4, A-6	0. 36-2. 0	0. 18-0. 23	5. 6-6. 0	14-18	100-110	Low	Low	Moderate.	
ML, SM	A-4	2. 0-6. 3	0. 12-0. 18	4. 5-5. 5	12-18	105-120	Low	Low	High.	None.
CL, MH	A-6, A-7	0. 63-2. 0	0. 14-0. 18	4. 5-5. 5	15-28	100-110	Moderate	Moderate	High.	
ML, CL	A-4, A-6	0. 63-2. 0	0. 12-0. 18	4. 5-5. 5	18-25	100-110	Moderate	Moderate	High.	
ML, CL	A-4, A-6	0. 63-2. 0	0. 18-0. 23	5. 1-6. 0	22-28	95-105	Low	Moderate	Moderate.	Frequent flooding.
SC, ML, CL	A-4, A-6	0. 63-2. 0	0. 14-0. 20	5. 1-6. 0	22-28	95-110	Low	Moderate	Moderate.	
ML, CL	A-4, A-6	2. 0-6. 3	0. 14-0. 18	4. 5-5. 0	14-18	100-110	Low	High	High.	None.
SC, CL	A-4, A-6	0. 63-2. 0	0. 14-0. 18	4. 5-5. 0	14-20	100-120	Moderate	High	High.	
SM, SC	A-2	<0. 20	0. 12-0. 18	4. 5-5. 0	10-15	115-125	Low	Moderate	High.	
SM, SC	A-2, A-4	0. 63-2. 0	0. 12-0. 16	4. 5-5. 0	12-18	110-120	Low	Moderate	High.	
SM, ML	A-4	>6. 3	0. 12. 0. 23	5. 1-6. 0	14-20	100-115	Low	Low	Moderate	Infrequent flooding.
SM, ML CL	A-2, A-4, A-6	2. 0-6. 3	0. 12-0. 23	5. 1-6. 0	14-20	100-115	Low	Low	Moderate.	
SM, ML	A-4	2. 0-6. 3	0. 12-0. 23	5. 1-6. 0	14-20	100-115	Low	Low	Moderate.	
ML	A-4	0. 63-2. 0	0. 18-0. 23	5. 1-5. 5	14-20	100-110	Low	High	Moderate.	None.
CL	A-6, A-7	0. 20-0. 63	0. 14-0. 18	5. 1-5. 5	18-22	95-105	Moderate	High	Moderate.	
CL, MH	A-7	<0. 20	0. 18-0. 21	4. 5-5. 0	20-26	90-100	Moderate	High	High.	
CL	A-7, A-6	0. 20-0. 63	0. 14-0. 18	4. 5-5. 0	16-22	95-110	Moderate	High	High.	
ML-CL	A-7, A-6	>6. 3	0. 16-0. 18	5. 6-6. 0	20-31	100-110	Low	Moderate	Moderate.	None.
MH	A-7	2. 0-6. 3	0. 15-0. 18	5. 6-6. 0	20-31	90-105	Moderate	High	Moderate.	
MH	A-7	2. 0-6. 3	0. 18-0. 21	5. 6-6. 0	20-31	90-105	Moderate	Moderate	Moderate.	

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification by particle size: USDA texture
	Feet	*Feet*	*Inches*	*Percent*				
Dyke (DkB2, DkC2)	10+	8+	0–15	----------	85–100	80–100	60–80	Loam, clay loam
			15–58	----------	85–100	80–100	75–95	Clay, silty clay
			58–64	15	85–100	80–100	75–95	Silty clay loam
Elbert (Eb, Ee)	0–1	3+	0–6	----------	90–100	90–100	65–85	Silt loam
			6–48	----------	95–100	90–100	65–95	Silty clay, clay
Elioak (ElB2, ElC2, EmB3, EmC3).	10+	7+	0–8	----------	90–100	90–100	25–60	Fine sandy loam
			8–38	----------	90–100	90–100	80–95	Silty clay loam
			38–62	----------	75–100	70–100	45–55	Micaceous silt loam
Elsinboro (EsB, EsB2, EsC2) [1]	5+	8+	0–10	----------	85–100	80–100	55–75	Loam
			10–42	----------	85–100	80–100	55–85	Clay loam
			42–78	----------	85–100	80–100	55–75	Silty clay loam
Fauquier (FaB2, FaC2, FcC3) [2]	10+	8+	0–5	----------	90–100	85–100	65–85	Silt loam
			5–26	----------	90–100	85–100	70–90	Silty clay loam, clay, silty clay
			26–62	----------	80–100	75–100	65–90	Silty clay loam, silt loam
Fluvanna (FlB, FlB2, FlC2)[1]	10+	5+	0–8	----------	90–100	85–100	65–90	Silt loam
			8–29	----------	90–100	90–100	70–90	Clay loam, clay
			29–62	----------	85–100	80–100	55–85	Silty clay loam
Glenelg (GlB2, GlC2)	10+	10+	0–7	----------	85–100	80–100	55–80	Loam
			7–30	----------	85–100	80–100	55–90	Silty clay loam
			30–62	----------	85–100	80–100	45–80	Micaceous silt loam
Grover (GrB2, GrC2, GsC3)	10+	5+	0–12	----------	95–100	90–100	25–45	Sandy loam
			12–27	----------	95–100	90–100	60–85	Sandy clay loam, clay loam
			27–75	----------	100	95–100	30–45	Sandy loam, micaceous material
Hazel (HaC, HaD)	10+	1½+	0–13	5	85–100	80–100	55–80	Loam
			13–20	10	85–100	80–100	25–60	Very fine sandy loam
			20–30	10	60–90	60–90	45–80	Loam

See footnotes at end of table.

properties of the soils—Continued

Classification by particle size—Con.		Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential		Hazard from stream overflow
Unified	AASHO							Steel	Concrete	
		Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lb. per cu. ft.*				
ML-CL	A-4, A-6	2. 0-6. 3	0. 14-0. 18	5. 1-6. 0	16-20	100-110	Low	Moderate	Moderate.	None.
MH	A-6, A-7	0. 63-2. 0	0. 15-0. 18	5. 1-6. 0	20-30	90-105	Moderate	High	Moderate.	
ML, CL, MH	A-6, A-7	0. 63-2. 0	0. 18-0. 21	5. 1-6. 0	20-30	90-105	Moderate	Moderate	Moderate.	
CL	A-6	2. 0-6. 3	0. 18-0. 23	5. 6-6. 0	16-20	100-110	Low	High	Moderate.	None, but receives seepage from higher areas.
CL, CH-MH	A-7	<0. 20-0. 63	0. 16-0. 22	5. 6-6. 0	18-30	85-100	High	High	Moderate.	
SM, SC, CL	A-4, A-2	2. 0-6. 3	0. 12-0. 16	5. 1-5. 5	16-20	105-115	Low	Low	Moderate.	None.
MH	A-7	0. 63-2. 0	0. 18-0. 21	5. 1-5. 5	18-24	95-105	Moderate	Moderate	Moderate.	
SM, SC, ML	A-5	0. 63-2. 0	0. 14-0. 18	5. 1-5. 5	18-24	100-110	Low	Moderate	Moderate.	
ML-CL	A-6	2. 0-6. 3	0. 14-0. 18	5. 6-6. 0	16-20	100-110	Low	Low	Moderate.	None.
CL	A-6, A-7	0. 63-2. 0	0. 16-0. 18	5. 6-6. 0	18-22	100-105	Moderate	Moderate	Moderate.	
CL	A-6, A-7	0. 63-2. 0	0. 18-0. 21	5. 6-6. 0	18-24	100-110	Moderate	Moderate	Moderate.	
ML, CL	A-4	2. 0-6. 3	0. 18-0. 22	5. 6-6. 0	16-20	100-110	Low	Low	Moderate.	None.
MH, CL	A-6, A-7	0. 63-2. 0	0. 15-0. 18	5. 6-6. 0	18-24	95-105	Moderate	High	Moderate.	
ML-CL	A-4, A-6	0. 63-2. 0	0. 18-0. 21	5. 6-6. 0	16-22	95-110	Moderate	Moderate	Moderate.	
ML, CL	A-4	2. 0-6. 3	0. 18-0. 22	5. 1-6. 0	16-20	100-110	Low	Low	Moderate.	None.
CL, MH	A-6, A-7	0. 63-2. 0	0. 15-0. 18	5. 1-6. 0	20-28	90-105	Moderate	High	Moderate.	
CL	A-4, A-6	0. 63-2. 0	0. 16-0. 21	5. 1-6. 0	20-26	95-105	Moderate	Moderate	Moderate.	
ML-CL	A-4	2. 0-6. 3	0. 14-0. 18	4. 5-5. 1	16-20	100-115	Low	Low	High.	None.
CL	A-6, A-7	0. 63-2. 0	0. 18-0. 21	4. 5-5. 1	16-22	95-105	Moderate	Moderate	High.	
SM, SC, ML	A-4, A-5	0. 63-2. 0	0. 16-0. 22	4. 5-5. 1	16-20	100-110	Moderate	Moderate	High.	
SM	A-2, A-4	>6. 3	0. 10-0. 14	4. 5-5. 0	10-15	110-120	Low	Low	High.	None.
CL, MH	A-7	0. 63-2. 0	0. 16-0. 18	4. 5-5. 0	18-22	95-105	Moderate	Moderate	High.	
SM	A-5, A-2	0. 63-2. 0	0. 14-0. 18	4. 5-5. 0	16-20	100-110	Moderate	Low	High.	
ML, ML-CL	A-4	2. 0-6. 3	0. 14-0. 18	5. 1-5. 5	14-18	105-115	Low	Low	Moderate.	None.
SM, SC, ML	A-2, A-4	2. 0-6. 3	0. 12-0. 18	5. 1-5. 5	14-20	110-120	Low	Low	Moderate.	
SM, ML, ML-CL	A-4	2. 0-6. 3	0. 12-0. 14	5. 1-5. 5	14-20	110-120	Low	Low	Moderate.	

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification by particle size: USDA texture
	Feet	*Feet*	*Inches*	*Percent*				
Helena (HeB, HeC2)[1]	1½–2½	3+	0–8	----------	85–100	80–100	35–60	Fine sandy loam
			8–16	----------	90–100	90–100	75–95	Silty clay loam
			16–37	----------	90–100	90–100	70–95	Clay
			37–58	10	80–100	80–100	30–80	Loam
Hiwassee (HsB, HsB2, HsC2, HwC3).	10+	10+	0–12	----------	95–100	80–100	60–80	Clay loam, silt loam, loam
			12–60	2	95–100	80 100	70–95	Silty clay loam, clay
Iredell (Mapped only with soils of the Orange series.)	2–3	3+	0–11	----------	95–100	95–100	60–75	Silt loam
			11–41	----------	95–100	95–100	80–95	Clay
			41–52	----------	95–100	95–100	35–55	Clay, coarse sandy loam
Klinesville (KlD, KlE)	10+	1–2	0–7	----------	50–70	40–70	30–60	Shaly silt loam
			7–20	----------	25–40	25–40	20–35	Very shaly silt loam
			20	----------	--------	--------	--------	Red shale
Lignum (LgB)	1–2	4+	0–4	----------	95–100	90–100	75–90	Silt loam
			4–14	----------	95–100	90–100	80–95	Silty clay loam
			14–20	----------	95–100	90–100	85–95	Silty clay loam
			20–37	----------	95–100	90–100	80–95	Silty clay loam, clay loam
			37–87	----------	95–100	90–100	65–85	Sandy clay loam, silt loam
Lloyd (LlB2, LlC2, LmB3, LmC3, LmD3).	10+	5+	0–11	----------	95–100	95–100	60–80	Loam, clay loam
			11–32	----------	95–100	95–100	75–95	Clay
			32–62	----------	80–100	80–100	65–95	Clay loam
Louisburg (LoC, LoC2, LoD, LoD2).	10+	2+	0–9	----------	85–100	80–100	25–45	Sandy loam
			9–30	5	85–100	80–100	25–45	Sandy loam
			30	----------	--------	--------	--------	Granite
Madison (MaB2, MaC2, MdC3).	10+	5+	0–8	----------	85–100	80–100	30–80	Sandy loam, loam
			8–49	----------	85–100	80–100	65–85	Silty clay loam, clay
			49–97	----------	85–100	80–100	30–45	Micaceous sandy loam material from granite.
Manassas (MnB)	2½+	4+	0–14	----------	85–100	80–100	70–95	Silt loam
			14–49	----------	85–100	80–100	80–95	Silty clay loam
			49–70	----------	80–100	80–100	65–90	Silt loam

See footnotes at end of table.

properties of the soils—Continued

Classification by particle size—Con.		Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential		Hazard from stream overflow
Unified	AASHO							Steel	Concrete	
		Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lb. per cu. ft.*				
SM, SC, ML	A-4	0. 63-2. 0	0. 12-0. 16	4. 5-6. 0	5-15	115-125	Low	Low	High.	None.
CL	A-6, A-7	0. 63-2. 0	0. 18-0. 21	4. 5-6. 0	18-20	100-110	Moderate	High	High.	
MH, CH	A-7	<0. 20	0. 15-0. 18	4. 5-6. 0	18-24	90-100	High	High	High.	
ML-CL, CL, SM, SC	A-6, A-7, A-2	0. 63-2. 0	0. 14-0. 18	4. 5-6. 0	12-16	110-120	Moderate	High	High.	
ML-CL	A-4, A-6	2. 0-6. 3	0. 14-0. 22	5. 1-6. 0	15-20	100-110	Low	Low	Moderate.	None.
MH	A-6, A-7	0. 63-2. 0	0. 15-0. 18	5-1-6. 0	22-30	90-100	Moderate	High	Moderate.	
ML-CL	A-4	0. 63-2. 0	0. 18-0. 23	5. 6-6. 0	14-18	105-115	Low	Moderate	Moderate.	None.
CH	A-7	<0. 20	0. 15-0. 18	5. 6-6. 0	22-28	90-100	High	High	Moderate.	
SM-SC, CL	A-6	0. 20-0. 63	0. 14-0. 18	5. 6-6. 0	14-20	105-120	Moderate	Moderate	Moderate.	
GM	A-2, A-4	>6. 3	0. 18-0. 23	4. 5-5. 0	10-18	110-125	Low	Low	High.	None.
GM	A-2	>6. 3	0. 18-0. 23	4. 5-5. 0	10-18	110-125	Low	Low	High.	
ML-CL	A-4	0. 63-2. 0	0. 18-0. 22	4. 5-5. 0	18-22	95-105	Low	Moderate	High.	None, but receives seepage from higher areas.
ML-CL	A-4, A-6	0. 20-2. 0	0. 18-0. 21	4. 5-5. 0	18-22	95-105	Moderate	High	High.	
MH-CH	A-7	<0. 2	0. 15-0. 18	4. 5-5. 0	18-22	95-105	Moderate	High	High.	
MH-CH, CL	A-7	0. 20-0. 63	0. 18-0. 21	4. 5-5. 0	18-22	95-105	Moderate	High	High.	
CL	A-6, A-7	0. 20-2. 0	0. 14-0. 18	4. 5-5. 0	10-20	105-120	Moderate	High	High.	
ML, CL	A-4, A-6	2. 0-6. 3	0. 14-0. 18	5. 1-6. 0	20-24	90-105	Low	Low	Moderate.	None.
ML	A-7	0. 63-2. 0	0. 15-0. 18	5. 1-6. 0	24-30	90-100	Moderate	High	Moderate.	
CL, MH	A-7, A-6	0. 63-2. 0	0. 16-0. 18	5. 1-6. 0	20-24	95-105	Moderate	Moderate	Moderate.	
SM	A-2, A-4	>6. 3	0. 10-0. 14	4. 5-5. 0	10-12	115-125	Low	Low	High.	None.
SM, SC	A-2, A-4	>6. 3	0. 10-0. 14	4. 5-5. 0	10-15	115-125	Low	Low	High.	
SM, ML-CL, SC	A-4. A-7.	2. 0-6. 3	0. 10-0. 18	5. 1-5. 5	20-26	95-105	Low	Low	Moderate.	None.
CL, MH	A-7	0. 63-2. 0	0. 15-0. 18	5. 1-5. 5	24-30	85-100	Moderate	High	Moderate.	
SM, SC	A-4. A-5. A-2	0. 63-2. 0	0. 10-0. 16	5. 1-5. 5	20-24	95-115	Moderate	Moderate	Moderate.	
ML-CL	A-4. A-6	2. 0-6. 3	0. 18-0. 23	5. 5-6. 0	14-20	105-115	Low	Moderate	Moderate.	None, but receives seepage from higher areas.
CL	A-6	0. 63-2. 0	0. 18-0. 21	5. 5-6. 0	14-20	100-110	Moderate	High	Moderate.	
ML-CL, CL	A-4, A-6	0. 63-2. 0	0. 18-0. 21	5. 5-6. 0	14-20	100-115	Low	Moderate	Moderate.	

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification by particle size: USDA texture
	Feet	*Feet*	*Inches*	*Percent*				
Manor (MoD)	10+	6+	0–8	----------	90–100	80–100	65–90	Silt loam
			8–26	----------	90–100	80–100	65–90	Silt loam
			26–60	----------	90–100	80–100	50–85	Micaceous loamy material
Manteo (MrB, MrC, MrD, MrE).	10+	1½	0–6	2	90–100	80–100	65–90	Silt loam
			6–15	10	20–50	20–50	14–45	Very shaly silt loam
			>15	----------	--------	--------	--------	Schist
Masada (MsB, MsB2, MsC2, MtC3).	10+	6+	0–10	----------	90–100	80–100	45–80	Loam
			10–48	----------	90–100	80–100	55–90	Clay loam
			48–90	----------	80–100	80–100	35–60	Sandy clay loam
Mayodan (MuB, MuB2, MuC2).	10+	6+	0–8	----------	85–100	80–100	25–60	Fine sandy loam
			8–39	5	85–100	80–100	70–90	Clay, silty clay loam
			39–56	5	85–100	80–100	30–80	Loamy material
Mecklenburg (MvB2, MvC2).[1]	10+	4+	0–8	----------	95–100	85–100	70–90	Silt loam
			8–33	----------	95–100	85–100	75–95	Clay, clay loam
			33–64	----------	95–100	80–100	30–55	Sandy clay loam, sandy loam
Mixed alluvial land (Mx)	0–2	5+	0–60+	----------	95–100	95–100	20–40	Fine sandy loam, silt loam
Myersville (MyB2, MyC2)	10+	5+	0–8	----------	85–100	80–100	65–85	Silt loam
			8–38	----------	85–100	80–100	65–90	Silty clay loam
			38–70	----------	85–100	80–100	65–80	Silt loam
Nason (NaB2, NaC2, NsB, NsB2, NsC, NsC2, NsD2, NtC3).	10+	4+	0–9	2	85–100	85–100	65–90	Silt loam
			9–38	----------	85–100	85–100	80–95	Silty clay loam
			38–50	----------	85–100	85–100	55–80	Silt loam
Orange (OrA, OrB, OrB2) [2] (For properties of the Iredell soils in these mapping units, refer to the Iredell series.)	2–3	3+	0–16	----------	90–100	90–100	70–95	Silt loam
			16–23	----------	85–100	80–100	55–70	Clay loam
			23–45	----------	90–100	90–100	60–95	Clay
			45–58	----------	90–100	90–100	35–45	Coarse sandy loam
Orange, concretionary variant (OgA. OgB, OgB2, OgC2).	2–3	3+	0–13	----------	85–100	80–100	65–90	Silt loam
			13–24	----------	40–70	40–70	35–65	Silty clay loam (compact)
			24–37	5	85–100	85–100	60–90	Clay
			36–44	----------	85–100	85–100	30–45	Coarse sandy loam
Penn (PeB, PeC)	10+	2–3½	0–11	----------	80–100	80–100	75–85	Shaly silt loam
			11–24	----------	65–100	65–100	50–85	Shaly silt loam
			24–28	----------	20–55	20–50	15–35	Very shaly silt loam

See footnotes at end of table.

properties of the soils—Continued

Classification by particle size—Con.		Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential		Hazard from stream overflow
Unified	AASHO							Steel	Concrete	
		Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lb. per cu. ft.*				
ML	A-4	>6.3	0.18-0.23	4.5-5.5	14-18	100-110	Low	Low	Moderate.	None.
ML	A-4	>6.3	0.18-0.23	4.5-5.5	16-20	95-105	Low	Low	Moderate.	
ML	A-4, A-5	>6.3	0.18-0.23	4.5-5.5	16-20	95-105	Low	Low	Moderate.	
ML	A-4	>6.3	0.18-0.23	<4.5	18-22	95-105	Low	Low	High.	None.
GM	A-4, A-2	>6.3	0.18-0.23	<4.5	18-22	95-105	Low	Low	High.	
SM, SC, ML, CL	A-4	2.0-6.3	0.14-0.18	5.1-5.5	15-20	100-115	Low	Low	Moderate.	None.
CL, MH	A-6, A-7	0.63-2.0	0.16-0.18	5.1-5.5	18-30	90-105	Moderate	Moderate	Moderate.	
SC, CL	A-6, A-7	0.63-2.0	0.12-0.18	5.1-5.5	18-24	95-105	Moderate	High	Moderate.	
SM, SC, ML	A-2, A-4	2.0-6.3	0.12-0.16	5.1-5.5	10-16	110-120	Low	Low	Moderate.	None.
CL-MH	A-6	0.63-2.0	0.15-0.18	5.1-5.5	18-24	95-105	Moderate	High	Moderate.	
SM, ML	A-2, A-4	0.63-2.0	0.14-0.18	5.1-5.5	16-22	95-110	Moderate	Moderate	Moderate.	
ML-CL	A-4, A-6	0.63-2.0	0.18-0.23	5.1-6.0	18-20	100-110	Low	Low	Moderate.	None.
CL, MH	A-7	0.20-0.63	0.15-0.18	5.1-6.0	22-28	90-100	High	Moderate	Moderate.	
SC, CL	A-4, A-6, A-2	0.20-0.63	0.14-0.18	5.1-6.0	14-18	110-120	Moderate	Moderate	Moderate.	
SM, SC	A-2, A-4	2.0-6.3	0.08-0.12	5.1-5.5	14-18	110-125	Low	Moderate	High.	Very frequent flooding.
ML	A-4, A-6	2.0-6.3	0.18-0.23	5.1-6.0	18-34	80-100	Low	Low	Moderate.	None.
ML, CL	A-7, A-6	0.63-2.0	0.18-0.20	5.1-6.0	20-27	90-105	Moderate	Moderate	Moderate.	
ML, CL	A-4	0.63-2.0	0.18-0.23	5.1-6.0	18-27	90-105	Moderate	Low	Moderate.	
ML-CL	A-4	2.0-6.3	0.18-0.23	<4.5	15-20	100-110	Low	Low	High.	None.
MH	A-7	0.63-2.0	0.18-0.20	<4.5	20-28	90-100	Moderate	Moderate	High.	
ML	A-7	0.63-2.0	0.18-0.23	<4.5	18-24	100-110	Low	Low	High.	
ML	A-4	0.63-2.0	0.18-0.23	5.1-6.0	12-16	110-115	Low	Moderate	Moderate.	None.
CL	A-6	0.63-2.0	0.16-0.18	5.1-6.0	12-16	110-120	High	High	Moderate.	
CL, CH	A-7	<0.20	0.15-0.18	5.1-6.0	18-24	90-105	High	Moderate	Moderate.	
SM, SC	A-4	0.63-2.0	0.10-0.14	5.1-6.0	12-18	110-120	Low	Low	Moderate.	
ML	A-4	0.63-2.0	0.18-0.23	5.1-6.0	12-16	110-115	Low	Moderate	Moderate.	None.
CL, GC	A-6, A-7	0.20-0.63	0.10-0.16	5.1-6.0	12-18	100-120	High	High	Moderate.	
CL, CH	A-7	<0.20	0.15-0.18	5.1-6.0	18-24	90-105	High	Moderate	Moderate.	
SM, SC	A-4, A-2	0.63-2.0	0.10-0.14	5.1-6.0	12-18	110-120	Low	Low	Moderate.	
ML	A-4, A-6	2.0-6.3	0.18-0.23	4.5-5.0	12-16	105-115	Low	Low	High.	None.
ML, CL	A-4, A-6	2.0-6.3	0.12-0.18	4.5-5.0	12-18	105-120	Low	Low	High.	
GM, GC	A-2	2.0-6.3	0.08-0.16	4.5-5.0	12-16	100-115	Low	Low	High.	

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification by particle size: USDA texture
	Feet	*Feet*	*Inches*	*Percent*				
Pinkston (PkC, PkD)	10+	3½+	0–8	----------	85–100	80–100	25–45	Fine sandy loam
			8–18	----------	85–100	80–100	25–45	Sandy loam
			18–35	----------	85–100	80–100	25–45	Sandy loam
Rabun (RaB2, RaC2, RaD2, RaE2, RcD3).	10+	4+	0–7	----------	85–100	80–100	55–85	Clay loam
			7–32	----------	85–100	80–100	70–90	Clay, silty clay loam
			32–45	----------	85–100	80–100	65–85	Silt loam (weathered greenstone).
Rapidan (RdB2, RdC2, ReC3)[1]	10+	4+	0–9	----------	90–100	85–100	65–90	Silt loam
			9–18	----------	90–100	85–100	80–95	Silty clay loam
			18–38	----------	75–100	70–100	70–95	Clay
			38–70	----------	65–75	65–75	55–70	Silty clay loam
Roanoke (Rk)[1]	0–1	5+	0–7	----------	90–100	90–100	65–90	Silt loam
			7–75	----------	90–100	90–100	70–90	Clay
			75–90+	----------	80–100	80–100	45–65	Clay, sandy clay loam
Rock land (RnC, RnD, RoC, RoE).	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Rowland (Rw)	1½–2½	4+	0–11	----------	90–100	90–100	65–90	Silt loam
			11–38	----------	90–100	90–100	45–85	Silty clay loam, clay loam, sandy clay loam.
			38–62	----------	--------	--------	--------	Gravel and silt
Seneca (SeB)	2–3	4+	0–14	----------	90–100	90–100	25–55	Fine sandy loam
			14–36	5	80–100	80–100	20–55	Sandy clay loam
			36–45	10	80–100	80–100	55–85	Clay loam
Starr (SrC)	3+	4+	0–18	----------	90–100	90–100	65–90	Silt loam
			18–38	----------	90–100	90–100	55–85	Clay loam, silty clay loam
			38–60	----------	90–100	90–100	80–95	Silty clay loam
State (StA)	4+	10+	0–18	----------	90–100	90–100	35–65	Loam, fine sandy loam
			18–42	----------	95–100	90–100	35–70	Fine sandy clay loam
			42–62	----------	95–100	90–100	80–95	Silty clay loam
Tatum (TaB2, TaC2, TsB, TsB2, TsC, TsC2, TtB3, TtC3).	10+	4+	0–8	----------	85–100	85–100	65–90	Silt loam, loam
			8–45	----------	85–100	85–100	80–95	Silty clay loam, silty clay
			45–47	----------	85–100	85–100	65–90	Silt loam
Turbeville (TuB, TuB2, TuC2)	10+	5+	0–15	----------	85–100	80–100	50–80	Loam, clay loam
			15–49	----------	85–100	80–100	70–95	Clay
			49–64	----------	60–80	60–80	40–65	Clay loam

See footnotes at end of table.

properties of the soils—Continued

Classification by particle size—Con.		Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential		Hazard from stream overflow
Unified	AASHO							Steel	Concrete	
		Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lb. per cu. ft.*				
SM, SC	A-2, A-4	>6. 3	0. 12–0. 16	4. 5–5. 0	8–14	110–120	Low	Low	High.	None.
SM, SC	A-2, A-4	2. 0–6. 3	0. 10–0. 14	4. 5–5. 0	8–12	115–125	Low	Low	High.	
SM, SC	A-2, A-4	2. 0–6. 3	0. 10–0. 14	4. 5–5. 0	8–12	115–125	Low	Low	High.	
CL	A-6	2. 0–6. 3	0. 16–0. 18	5. 6–6. 0	12–16	110–115	Low	Moderate	Moderate.	None.
CL, MH	A-6, A-7	0. 63–2. 0	0. 15–0. 18	5. 6–6. 0	16–22	90–105	Moderate	High	Moderate.	
ML, CL	A-6, A-7	0. 63–2. 0	0. 18–0. 23	5. 6–6. 0	12–16	95–105	Moderate	Moderate	Moderate.	
ML	A-4	2. 0–6. 3	0. 18–0. 23	5. 1–6. 0	14–18	100–115	Low	Low	Moderate.	None.
MH, CL	A-7	0. 63–2. 0	0. 18–0. 21	5. 1–6. 0	16–24	95–105	Moderate	Moderate	Moderate.	
MH	A-7	0. 63–2. 0	0. 15–0. 18	5. 1–6. 0	18–24	90–105	Moderate	High	Moderate.	
MH, CL	A-7	0. 63–2. 0	0. 18–0. 21	5–1–6. 0	18–24	95–105	Moderate	Moderate	Moderate.	
ML-CL	A-4	0. 20–0. 63	0. 18–0. 23	5. 1–5. 5	16–22	95–105	Low	High	Moderate.	Infrequent flooding, but water stays on surface.
MH	A-7	<0. 20	0. 15–0. 18	5. 1–5. 5	18–25	90–105	High	High	Moderate.	
SC, CL	A-4, A-6	0. 20–0. 63	0. 14–0. 18	5. 1–5. 5	16–22	95–105	Moderate	High	Moderate.	
(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3).
ML-CL	A-4	>6. 3	0. 18–0. 23	5. 1–6. 0	14–18	105–115	Low	Moderate	Moderate.	Frequent flooding.
SC, CL	A-6	0. 63–2. 0	0. 15–0. 18	5. 1–6. 0	14–18	105–120	Moderate	High	Moderate.	
SM, SC ML	A-2, A-4	2. 0–6. 3	0. 12–0. 16	4. 5–5. 0	10–14	110–120	Low	Low	High.	None, but receives seepage from higher areas.
SC, CL	A-6, A-2	0. 63–2. 0	0. 14–0. 18	4. 5–5. 0	14–20	100–115	Moderate	High	High.	
CL	A-6	0. 63–2. 0	0. 16–0. 18	4. 5–5. 0	14–20	95–105	Moderate	High	High.	
ML	A-4	2. 0–6. 3	0. 18–0. 23	5. 5–6. 0	14–18	100–115	Low	Moderate	Moderate.	None, but receives seepage from higher areas.
CL	A-6	0. 63–2. 0	0. 16–0. 18	5. 5–6. 0	14–18	100–115	Moderate	High	Moderate.	
CL, MH	A-6, A-7	0. 63–2. 0	0. 18–0. 21	5. 5–6. 0	14–18	100–115	Moderate	High	Moderate.	
SM, SC, ML	A-4	0. 63–6. 0	0. 14–0. 18	5. 1–6. 0	14–20	110–120	Low	Low	Moderate.	Infrequent flooding.
SC, CL	A-4, A-6	0. 63–2. 0	0. 14–0. 18	5. 1–6. 0	14–20	110–120	Low	Moderate	Moderate.	
CL	A-6	0. 63–2. 0	0. 18–0. 21	5. 1–6. 0	16–22	105–115	Moderate	Moderate	Moderate.	
ML	A-4	2. 0–6. 3	0. 18–0. 23	<4. 5–5. 0	14–20	105–115	Low	Low	High.	None.
MH, CL.	A-7	0. 63–2. 0	0. 18–0. 21	<4. 5–5. 0	20–35	85–100	Moderate	High	High.	
ML	A-6	0. 63–2. 0	0. 14–0. 18	<4. 5–5. 0	14–22	100–110	Moderate	Moderate	High.	
ML, CL	A-4	2. 0 –6. 3	0. 14–0. 18	5. 1–5. 5	16–22	105–115	Low	Moderate	Moderate.	None.
MH	A-7	0. 63–2. 0	0. 15–0. 18	5. 1–5. 5	24–30	90–105	Moderate	High	Moderate.	
CL, GC	A-6, A-7	0. 63–2. 0	0. 16–0. 18	5. 1–5. 5	18–24	95–105	Moderate	Moderate	Moderate.	

TABLE 4.—*Estimated engineering*

Soil series and map symbols	Depth to— Seasonal high water table	Depth to— Bedrock	Depth from surface (typical profile)	Coarse fraction (fragments more than 3 inches in diameter)	Percentage passing sieve— No. 4 (4.7 mm.)	Percentage passing sieve— No. 10 (2.0 mm.)	Percentage passing sieve— No. 200 (0.074 mm.)	Classification by particle size: USDA texture
	Feet	*Feet*	*Inches*	*Percent*				
Vance (VaB, VaB2)	10+	6+	0–11		90–100	85–100	25–45	Fine sandy loam
			11–38		90–100	85–100	55–85	Clay loam, clay
			38–62		80–100	80–100	60–85	Clay loam
Wadesboro (WaB2, WaC2, WaD2).	10+	8+	0–6		85–100	85–100	25–45	Fine sandy loam
			6–24		90–100	85–100	50–80	Silty clay loam, clay loam
			24–38		90–100	85–100	70–90	Clay
			38–62		75–100	75–100	30–55	Sandy clay loam
Watt (WbB, WbC, WbD)	10+	3+	0–6		85–100	80–100	65–85	Silt loam
			6–10		85–100	80–100	65–85	Silt loam
			10–20		60–75	60–75	40–65	Silt loam
			20					Schist
Wehadkee (We)	0–1	4+	0–16		90–100	90–100	65–90	Silt loam
			16–34		90–100	90–100	75–95	Silty clay loam
			34–75		90–100	90–100	70–95	Clay
Wilkes (WkC. WkD)	10+	2½+	0–6		80–100	80–100	25–45	Sandy loam
			6–16		80–100	80–100	25–45	Sandy loam
			16–26		60–75	60–75	25–45	Sandy loam
			26					Granite
Worsham (WoB)	0–1	5+	0–9		85–100	80–100	65–90	Silt loam
			9–16		85–100	80–100	80–90	Silty clay loam
			16–52		85–100	80–100	70–95	Clay
York (YoB)	2–3	6+	0–25		80–100	80–100	65–90	Silt loam
			25–40		80–90	80–90	55–90	Loam, silt loam
			40–80		90–100	90–100	70–95	Silt loam, silty clay loam
Zion (ZoB, ZoC2)	3	2½–4	0–10		85–100	85–100	70–90	Silt loam
			10–18		80–100	80–100	70–95	Silty clay loam
			18–32		85–100	85–100	70–90	Clay
			32–40		60–80	60–80	60–80	Loam; partly decomposed basic rock.

[1] Base saturation is higher in these soils than would be expected in this county.
[2] Base saturation is lower in these soils than would be expected in this county.

properties of the soils—Continued

Classification by particle size—Con.		Permeability	Available moisture capacity	Reaction	Optimum moisture for compaction	Maximum dry density	Shrink-swell potential	Corrosion potential		Hazard from stream overflow
Unified	AASHO							Steel	Concrete	
		Inches per hour	*Inches per inch of depth*	*pH*	*Percent*	*Lb. per cu. ft.*				
SM-SC	A-2, A-4	0. 63-2. 0	0. 12-0. 16	4. 5-5. 0	8-14	115-125	Low	Low	High.	None.
CL, MH	A-6, A-7	0. 20-0. 63	0. 15-0. 18	4. 5-5. 0	18-26	95-105	Moderate	High	High.	
CL, MH	A-6, A-7	0. 63-2. 0	0. 16-0. 18	4. 5-5. 0	18-26	95-105	Moderate	Moderate	High.	
SM, SC	A-2, A-4	2. 0 -6. 3	0. 12-0. 16	5. 1-5. 5	8-14	115-125	Low	Low	Moderate.	None.
CL	A-6	0. 63-2. 0	0. 16-0. 20	5. 1-5. 5	18-22	105-115	Moderate	Moderate	Moderate.	
CL	A-6, A-7	0. 63-2. 0	0. 15-0. 18	5. 1-5. 5	18-22	100-110	Moderate	High	Moderate.	
SM, SC, ML, CL	A-2, A-4	0. 63-2. 0	0. 14-0. 18	5. 1-5. 5	12-18	110-120	Moderate	Moderate	Moderate.	
ML-CL	A-4, A-6	2. 0 -6. 3	0. 18-0. 23	4. 5-5. 0	10-16	105-115	Low	Low	High	None.
ML-CL	A-4, A-6, A-7	2. 0 -6. 3	0. 18-0. 23	4. 5-5. 0	10-20	105-120	Low	Low	High.	
ML, CL, GM	A-4, A-6	2. 0 -6. 3	0. 16-0. 18	4. 5-5. 0	10-16	105-115	Low	Low	High.	
ML, ML-CL	A-4	0. 63-2. 0	0. 18-0. 23	5. 1-5. 5	16-25	95-105	Low	High	Moderate.	Very frequent flooding.
CL	A-6, A-7	0. 20-0. 63	0. 18-0. 21	5. 1-5. 5	18-25	95-105	Moderate	High	Moderate.	
CL, MH	A-6, A-7	<0. 20	0. 15-0. 18	5. 1-5. 5	18-25	90-105	Moderate	High	Moderate.	
SM	A-2, A-4	>6. 3	0. 10-0. 14	5. 1-5. 5	12-16	110-120	Low	Low	High.	None.
SM, SC	A-2, A-4	0. 63-2. 0	0. 10-0. 16	5. 1-5. 5	12-16	110-120	Moderate	Low	High.	
SM	A-2, A-4	0. 63-2. 0	0. 10-0. 14	5. 1-5. 5	12-16	110-120	Moderate	Low	High.	
ML	A-4	0. 63-2. 0	0. 18-0. 23	5. 1-5. 5	12-16	110-120	Low	High	Moderate.	None, but receives seepage from higher areas.
CL, MH	A-6, A-7	0. 20-0. 63	0. 18-0. 21	5. 1-5. 5	12-18	95-105	Moderate	High	Moderate.	
MH	A-7	<0. 20	0. 15-0. 18	5. 1-5. 5	16-22	90-105	Moderate	High	Moderate.	
ML, ML-CL	A-4	0. 63-2. 0	0. 18-0. 23	5. 1-5. 5	12-16	110-120	Low	Moderate	Moderate.	None, but receives seepage from higher areas.
ML-CL	A-4	0. 20-0. 63	0. 16-0. 21	5. 1-5. 5	13-18	110-120	Low	Moderate	Moderate.	
CL	A-6	0. 20-0. 63	0. 18-0. 21	5. 1-5. 5	13-18	110-120	Moderate	High	Moderate.	
ML	A-4	0. 63-2. 0	0. 18-0. 23	5. 6-6. 0	10-14	110-120	Low	Moderate	Moderate.	None.
CL	A-6	0. 20-0. 63	0. 18-0. 21	5. 6-6. 0	10-14	110-120	Moderate	High	Moderate.	
CL, MH, CH	A-7	<0. 20	0. 15-0. 18	5. 6-6. 0	10-14	95-110	High	High	Moderate.	
ML-CL	A-6, A-7	<0. 20	0. 16-0. 20	5. 6-6. 0	10-14	110-120	Moderate	Moderate	Moderate.	

[3] The properties are too variable to estimate.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Albano (Ab)	Poor	High	Poor	Unsuitable.	Poor	Seasonal high water table at a depth of 0 to 1½ feet; highly susceptible to frost action.	Seasonal high water table at a depth of 0 to 1½ feet.
Altavista (AlA, AlB, AlC2).	Poor	Moderate	Good	Unsuitable.	Fair	Seasonal high water table at a depth of 2½ to 3½ feet.	Seasonal high water table at a depth of 2½ to 3½ feet; slopes as much as 12 percent.
Appling (ApB, ApB2, ApC2).	Fair	Moderate	Fair	Unsuitable.	Fair	Features generally favorable, except where slopes are as much as 15 percent.	Features generally favorable, except where slopes are as much as 15 percent.
Augusta (AuA, AuB)	Poor	High	Good	Unsuitable.	Poor	Seasonal high water table at a depth of 1 to 1½ feet; contains undesirable clays; highly susceptible to frost action.	Seasonal high water table at a depth of 1 to 1½ feet.
Bermudian (Be)	Poor	High	Good	Unsuitable.	Poor	Very frequent flooding; highly susceptible to frost action.	Very frequent flooding.
Bowmansville (Bo)	Poor	High	Poor	Unsuitable.	Poor	Very frequent flooding; seasonal high water table at a depth of 0 to 1 foot; highly susceptible to frost action.	Very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.
Bremo (BrC, BrD)	Fair	Moderate	Fair	Unsuitable.	Fair	Bedrock at a depth of 2 feet; slopes of 7 to 25 percent.	Bedrock at a depth of 2 feet; slopes of 7 to 25 percent.
Bucks (BsB2, BsC2, BtB2, BtC2, BuC3).	Fair	Moderate	Fair	Unsuitable.	Fair	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Buncombe (Bw)	Good	Low	Poor	Fair for sand.	Fair	Frequent flooding	Frequent flooding
Calverton (CaB, CbB) (For properties of the Creedmoor soil in mapping unit CbB, refer to the Creedmoor series.)	Poor	High	Fair	Unsuitable.	Poor to fair.	Seasonal high water table at a depth of 1 to 2½ feet; seepage on top of fragipan; highly susceptible to frost action.	Seasonal high water table at a depth of 1 to 2½ feet.

engineering properties of soils

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
Slow permeability; bedrock at a depth of 3½ feet.	Poor stability; high content of clay.	Slow permeability; seasonal high water table; outlets difficult to obtain.	Slow permeability; seasonal high water table at a depth of 0 to 1½ feet.	Not applicable	Seasonal high water table at a depth of 0 to 1½ feet.
Moderate permeability; in places substratum consists of sand and gravel.	Fair stability; slow permeability where soil is compacted.	Surface drainage beneficial in nearly level areas or depressions.	Moderately rapid intake rate; moderate permeability.	Vegetation difficult to establish where subsoil is exposed.	Features generally favorable.
Moderate permeability; subject to losses from seepage.	Fair stability; slow permeability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability.	Features generally favorable.	Features generally favorable.
In places substratum consists of sand and gravel.	Fair to poor stability where soil is compacted.	Moderately slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	Moderate intake rate; moderately slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	Not applicable	Seasonal high water table at a depth of 1 to 1½ feet.
Moderately rapid permeability; very frequent flooding.	High in content of silt; poor stability.	Not needed	Rapid intake rate; moderately rapid permeability.	Not applicable	Very frequent flooding.
Moderate permeability; very frequent flooding.	High in content of silt; provides wet borrow material.	Outlets difficult to obtain; seasonal high water table; very frequent flooding.	Seasonal high water table at a depth of 0 to 1 foot; very frequent flooding.	Not applicable	Seasonal high water table at a depth of 0 to 1 foot; very frequent flooding.
Pervious bedrock at a depth of 2 feet; moderate permeability; high seepage losses.	Bedrock at a depth of 2 feet; limited source of borrow material.	Not needed	Low to moderate available moisture capacity; bedrock at a depth of 2 feet.	Bedrock at a depth of 2 feet; slopes of 7 to 25 percent.	Bedrock at a depth of 2 feet; low to moderate available moisture capacity.
Moderate seepage losses; pervious bedrock.	Fair stability; erodible in sloping areas.	Not needed	Moderate intake rate; moderate permeability.	Generally favorable features; some slopes as much as 15 percent.	Generally favorable features.
High seepage losses through porous sand; frequent flooding.	Loose sand; high seepage losses.	Not needed	Low available moisture capacity; frequent flooding.	Not applicable	Loose sand.
Generally favorable features.	Fair to poor stability.	Fragipan; seasonal high water table; slow permeability.	Moderate intake rate; slow permeability in fragipan; seasonal high water table at a depth of 1 to 2½ feet.	Not applicable	Seasonal high water table at a depth of 1 to 2½ feet; contains a fragipan.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Catoctin:							
(CcC, CcD)	Fair	Moderate	Fair	Unsuitable.	Fair	Bedrock at a depth of 2 feet; slopes of 5 to 25 percent; some stones more than 10 inches in diameter; rock outcrops.	Bedrock at a depth of 2 feet; slopes of 5 to 25 percent; rock outcrops; loose stones.
(CdD, CdE)	Fair	Moderate	Poor	Unsuitable.	Fair; some stones.	Bedrock at a depth of 2 feet; slopes of 10 to 45 percent; some stones more than 10 inches in diameter; rock outcrops.	Bedrock at a depth of 2 feet; slopes of 10 to 45 percent; rock outcrops; loose stones.
Cecil:							
(CeB2, CeC2, CmB2, CmC2).	Fair	Moderate	Fair	Unsuitable	Fair	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
(CsC3)	Fair	Moderate	Poor	Unsuitable	Fair	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Chewacla (Cw)	Poor	High	Fair	Unsuitable	Poor	Seasonal high water table at a depth of 1 to 1½ feet; frequent flooding.	Seasonal high water table at a depth of 1 to 1½ feet; frequent flooding.
Colfax (CxB)	Poor	Moderate	Fair	Unsuitable	Poor to fair.	Seasonal high water table at a depth of 1 to 1½ feet; seepage on top of fragipan.	Seasonal high water table at a depth of 1 to 1½ feet.
Comus (Cy, Cz)	Fair	Moderate	Good	Unsuitable	Fair	Infrequent flooding	Seasonal high water table at a depth of 2½ to 4 feet; infrequent flooding.
Creedmoor (Mapped only with soils of the Calverton series.)	Poor	High	Fair	Unsuitable	Poor to fair.	Seasonal high water table at a depth of of 1 to 2½ feet; seepage on top of slowly permeable layer; highly susceptible to frost action.	Seasonal high water table at a depth of 1 to 2½ feet.

engineering properties of soils—Continued

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
Bedrock at a depth of 2 feet; moderate permeability; seepage losses.	Bedrock at a depth of 2 feet; limited source of borrow material; stones and rock outcrops.	Not needed	Bedrock at a depth of 2 feet; slopes of 5 to 25 percent; rock outcrops and stones.	Bedrock at a depth of 2 feet; slopes of 5 to 25 percent; rock outcrops and stones.	Bedrock at a depth of 2 feet; slopes of 5 to 25 percent; rock outcrops and stones.
Bedrock at a depth of 2 feet; moderate permeability; seepage losses.	Bedrock at a depth of 2 feet; limited source of borrow material; stones and rock outcrops.	Not needed	Bedrock at a depth of 2 feet; slopes of 10 to 45 percent; rock outcrops and stones.	Bedrock at a depth of 2 feet; slopes of 10 to 45 percent; rock outcrops and stones.	Bedrock at a depth of 2 feet; slopes of 10 to 45 percent; rock outcrops and stones.
Moderate permeability; some seepage losses.	Fair stability; slow permeability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Slopes as much as 15 percent.	Generally favorable features; erodible in cuts.
Moderate permeability; some seepage losses.	Fair stability; slow permeability where soil is compacted.	Not needed	Severely eroded; reduced intake rate.	Severely eroded; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation.
Frequent flooding; in places sand and gravel in substratum.	Poor to fair stability; seasonal high water table at a depth of 1 to 1½ feet.	Moderate permeability; seasonal high water table at a depth of 1 to 1½ feet; frequent flooding.	Seasonal high water table at a depth of 1 to 1½ feet; frequent flooding.	Not applicable	Seasonal high water table at a depth of 1 to 1½ feet; frequent flooding.
Generally favorable features; contains fragipan.	Fair to poor stability; seasonal high water table at a depth of 1 to 1½ feet.	Slow permeability through fragipan; receives seepage from higher areas.	Moderate available moisture capacity because of fragipan.	Seepage on top of fragipan.	Seepage on top of fragipan; seasonal high water table at a depth of 1 to 1½ feet.
Moderately rapid permeability; high seepage losses.	Fair to good stability where soil is compacted; moderately pervious.	Not needed	Moderately rapid permeability; infrequent flooding.	Not applicable	Generally favorable features; infrequent flooding.
Generally favorable features.	Fair to poor stability.	Slowly permeable subsoil; perched water table.	Moderate intake rate; slow permeability in subsoil; seasonal high water table at a depth of 1 to 2½ feet.	Not applicable	Seasonal high water table at a depth of 1 to 2½ feet; slowly permeable subsoil.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Davidson: (DaB2, DaC2, DaD2).	Fair	High	Poor	Unsuitable	Fair	Generally favorable features; slopes as much as 25 percent.	Generally favorable features; slopes as much as 25 percent.
(DdB3, DdC3, DdD3).	Good	High	Poor	Unsuitable	Fair	General favorable features; slopes as much as 25 percent.	Generally favorable features; slopes as much as 25 percent.
(DcC, DcD, DcE)	Good	Moderate	Poor	Unsuitable	Fair	Loose stones more than 10 inches in diameter; slopes as much as 45 percent.	Loose stones more than 10 inches in diameter; slopes as much as 45 percent.
Dyke (DkB2, DkC2)	Fair	Moderate	Fair	Unsuitable	Fair	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent
Elbert (Eb, Ee)	Poor	High	Poor	Unsuitable	Poor	Seasonal high water table at a depth of 0 to 1 foot; clay has high shrink-swell potential; highly susceptible to frost action.	Seasonal high water table at a depth of 0 to 1 foot; clay has high shrink-swell potential.
Elioak: (ElB2, ElC2)	Fair	Moderate	Fair	Unsuitable	Fair	Highly micaceous substratum; slopes as much as 15 percent.	Deeply weathered micaceous material; slopes as much as 15 percent.
(EmB3, EmC3)	Fair	High	Poor	Unsuitable	Fair to poor.	Highly micaceous substratum; slopes as much as 15 percent.	Deeply weathered micaceous material; slopes as much as 15 percent.
Elsinboro (EsB, EsB2, EsC2).	Good	Moderate	Good	Unsuitable	Fair	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.

engineering properties of soils—Continued

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
High seepage losses; moderately rapid permeability.	Fair to poor stability; moderate to slow permeability where soil is compacted.	Not needed	Rapid intake rate; moderately rapid permeability; slopes as much as 25 percent.	Slopes as much as 25 percent.	Generally favorable features; slopes as much as 25 percent.
High seepage losses; moderately rapid permeability.	Fair to poor stability; moderate to slow permeability where soil is compacted.	Not needed	Severely eroded; reduced intake rate; slopes as much as 25 percent.	Severely eroded; slopes as much as 25 percent.	Severely eroded; difficult to establish vegetation; slopes as much as 25 percent.
High seepage losses; moderately rapid permeability; loose stones.	Fair to poor stability; moderate to slow permeability where soil is compacted; loose stones.	Not needed	Rapid intake rate; moderately rapid permeability; loose stones; slopes as much as 45 percent.	Severely eroded; slopes as much as 45 percent.	Loose stones; slopes as much as 45 percent.
Seepage losses; moderate permeability.	Fair to poor stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Generally favorable features.	Low stability; clay has high shrink-swell potential.	Slow permeability; seasonal high water table at a depth of 0 to 1 foot; outlets difficult to obtain.	Slow permeability; seasonal high water table at a depth of 0 to 1 foot.	Not applicable	Seasonal high water table at a depth of 0 to 1 foot.
High seepage losses; deeply weathered substratum.	Poor compaction; highly micaceous substratum.	Not needed	Rapid intake rate; high available moisture capacity; slopes as much as 15 percent.	Slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
High seepage losses; deeply weathered substratum.	Poor compaction; highly micaceous substratum.	Not needed	Severely eroded; reduced intake rate; slopes as much as 15 percent.	Severely eroded; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation; slopes as much as 15 percent.
Moderate permeability; some seepage losses; substratum porous in places.	Fair to good stability where soil is compacted.	Not needed	Rapid intake rate; high available moisture capacity; slopes as much as 15 percent.	Slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Fauquier: (FaB2, FaC2)	Poor	High	Good	Unsuitable	Fair	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
(FcC3)	Poor	High	Poor	Unsuitable	Fair	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Fluvanna (FlB, FBl2, FlC2).	Poor	Moderate	Fair	Unsuitable	Fair	Fair stability; some plastic material.	Generally favorable features.
Glenelg (GlB2, GlC2)	Fair	Moderate	Fair	Unsuitable	Fair	Elastic soil material; highly micaceous substratum; slopes as much as 15 percent.	Generally favorable features.
Grover: (GrB2, GrC2)	Fair	Moderate	Fair	Unsuitable	Fair	Fair stability; content of mica increases with depth; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
(GsC3)	Fair	High	Poor	Unsuitable	Fair	Fair stability; content of mica increases with depth; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Hazel (HaC, HaD)	Good	Low	Poor	Unsuitable	Fair; limited in quantity.	Fair stability; rock at a depth of 1½ to 4 feet.	Rock at a depth of 1½ to 4 feet.
Helena (HeB, HeC2)	Poor	Moderate	Fair	Unsuitable	Poor	Seasonal high water table at a depth of 1½ to 2½ feet; plastic clay; hard rock at a depth of 3 to 5 feet.	Rock at a depth of 3 to 5 feet; seasonal high water table at a depth of 1½ to 2½ feet.

engineering properties of soils—Continued

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
Moderate permeability; high seepage losses.	Fair stability where soil is compacted.	Not needed	Rapid intake rate; high available moisture capacity; slopes as much as 15 percent.	Slopes as much as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Moderate permeability; high seepage losses.	Fair stability where soil is compacted.	Not needed	Severely eroded; reduced intake rate; slopes as much as 15 percent.	Severely eroded; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation; slopes as much as 15 percent.
Moderate permeability; some seepage losses; underlain by pervious bedrock.	Fair stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability.	Generally favorable features.	Generally favorable features; erodible in cuts.
Permeable substratum; high seepage losses.	Difficult to compaet; subject to piping; micaceous.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	High content of mica in lower part of subsoil and in substratum; erodes easily; slopes as much as 15 percent.	Generally favorable features; erodible in cuts.
Permeable substratum; high seepage losses.	Fair to low stability because of high content of mica.	Not needed	Rapid intake rate; moderate permeability; slopes as much as 15 percent.	High content of mica in subsoil and substratum; erodes easily; slopes as much as 15 percent.	Generally favorable features; erodible in cuts.
Permeable substratum; high seepage losses.	Low stability; high content of mica.	Not needed	Reduced intake rate; severely eroded; slopes as much as 15 percent.	Slopes as much as 15 percent; severely eroded; high content of mica in subsoil and substratum.	Severely eroded; difficult to establish vegetation.
Moderately rapid permeability; rock at a depth of 1½ to 4 feet.	Fair stability; limited in quantity.	Not needed	Low available moisture capacity; slopes as much as 30 percent.	Rock at a depth of 1½ to 4 feet.	Rock at a depth of 1½ to 4 feet; slopes as much as 30 percent.
Slow permeability; rock at a depth of 3 to 5 feet.	Low stability; plastic clay.	Slow permeability; plastic clay.	Slow permeability	Plastic clay subsoil; very erodible where exposed.	Plastic clay subsoil; very erodible where exposed.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Hiwassee: (HsB, HsB2, HsC2)	Fair	Moderate	Good	Unsuitable	Fair	Generally favorable features; slopes as much as 15 percent.	Generally favorable features.
(HwC3)	Fair	High	Poor	Unsuitable	Fair	Fair stability; good source of material; hard rock at a depth of 10 to 30 feet; slopes as much as 15 percent.	Generally favorable features.
Iredell (Mapped only in complexes with the Orange soils.)	Poor	High	Poor	Unsuitable	Poor	Poor stability; clay has high shrink-swell potential; rock is at a depth of 3 to 6 feet.	Plastic clay; rock is at a depth of 3 to 6 feet.
Klinesville (KlD, KlE)	Good	Low	Poor	Unsuitable	Fair; limited in quantity.	Shallow soil material; red shale or conglomerate rock at a depth of 1 to 2 feet; slopes of 15 to 45 percent.	Shale or conglomerate rock at a depth of 1 to 2 feet.
Lignum (LgB)	Poor	Moderate	Fair	Unsuitable	Fair to poor.	Seasonal high water table at a depth of 1½ to 2 feet; rock at a depth of about 4 feet.	Plastic clay; seasonal high water table at a depth of 1½ to 2 feet.
Lloyd: (LlB2, LlC2)	Fair	Moderate	Fair	Unsuitable	Poor	Fair to poor stability; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
(LmB3, LmC3, LmD3).	Poor	High	Poor	Unsuitable	Poor	Fair to poor stability; slopes as much as 25 percent; highly susceptible to frost action.	Generally favorable features; slopes as much as 25 percent.
Louisburg (LoC, LoC2, LoD, LoD2).	Fair	Low	Fair	Unsuitable	Fair	Rock at a depth of 2 to 4 feet; slopes as much as 25 percent.	Rock at a depth of 2 to 4 feet; slopes as much as 25 percent.

engineering properties of soils—Continued

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
Moderate permeability; some seepage losses.	Fair to poor stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Moderate permeability; some seepage losses.	Fair stability where soil is compacted.	Not needed	Severely eroded; reduced intake rate; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation; slopes as much as 15 percent.
Slow permeability; rock is at a depth of 3 to 6 feet.	Low stability; plastic clay material; rock is at a depth of 3 to 6 feet.	Slow permeability; plastic clay.	Moderate available moisture capacity.	Exposed clay in subsoil difficult to till; difficult to establish vegetation.	Exposed clay in subsoil difficult to till; difficult to establish vegetation.
Rapid permeability; rock at a depth of 1 to 2 feet.	High content of silt and shale fragments; very limited source of borrow material.	Not needed	Rapid intake rate; low available moisture capacity; rock at a depth of 1 to 2 feet.	Rock at a depth of 1 to 2 feet; slopes of 15 to 45 percent.	Rock at a depth of 1 to 2 feet; slopes of 15 to 45 percent; very erodible.
Slow permeability	Plastic clay; fair to poor stability.	Seasonal high water table at a depth of 1½ to 2 feet; slow permeability.	Seasonal high water table at a depth of 1½ to 2 feet; moderate intake rate.	Not applicable	Seasonal high water table at a depth of 1½ to 2 feet.
Moderate permeability; some seepage losses.	Fair to poor stability.	Not needed	Moderately rapid intake rate; high available moisture capacity; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Moderate permeability; some seepage losses; underlain by pervious bedrock.	Fair stability	Not needed	Severely eroded; reduced intake rate; slopes as much as 25 percent.	Slopes as much as 25 percent; severely eroded; difficult to establish vegetation.	Slopes as much as 25 percent; severely eroded; difficult to esablish vegetation.
Rapid permeability; pervious rock at a depth of 2 to 4 feet.	Fair stability; limited source of borrow material.	Not needed	Rapid intake rate; low available moisture capacity; slopes as much as 25 percent.	Rock at a depth of 2 to 4 feet; slopes as much as 25 percent.	Rock at a depth of 2 to 4 feet; slopes as much as 25 percent; low available moisture capacity.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Madison: (MaB2, MaC2)	Fair	Moderate	Fair	Unsuitable	Fair	Content of mica increases with depth; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
(MdC3)	Fair	High	Poor	Unsuitable	Fair; limited in quantity.	Content of mica increases with depth; slopes as much as 15 percent; highly susceptible to frost action.	Generally favorable features; slopes as much as 15 percent.
Manassas (MnB)	Poor	Moderate	Good	Unsuitable	Fair	Seasonal high water table at a depth of 2½ feet.	Receives seepage from higher areas.
Manor (MoD)	Fair	Moderate	Fair	Unsuitable	Poor	Highly micaceous material; rock at a depth of 6 to more than 40 feet.	Generally favorable features; slopes of 10 to 25 percent.
Manteo (MrB, MrC, MrD, MrE).	Fair	Moderate	Poor	Unsuitable	Poor	Hard rock at a depth of less than 2 feet; slopes as much as 45 percent.	Hard rock at a depth of less than 2 feet; slopes as as much as 45 percent.
Masada: (MsB, MsB2, MsC2).	Fair	Moderate	Fair	Unsuitable	Fair	Fair stability; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
(MtC3)	Poor	High	Poor	Unsuitable	Fair	Fair stability; slopes of 7 to 15 percent.	Generally favorable features; slopes as much as 15 percent.
Mayodan (MuB, MuB2, MuC2).	Fair	Moderate	Fair	Unsuitable	Fair	Fair stability; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Mecklenburg (MvB2, MvC2).	Poor	High	Fair	Unsuitable	Poor	Rock at a depth of 4 to 8 feet; slopes as much as 15 percent; clay has high shrink-swell potential.	Rock at a depth of 4 to 8 feet; slopes as much as 15 percent.
Mixed alluvial land (Mx)	Poor	High	Poor	Unsuitable	Poor	Very frequent flooding; seasonal high water table at a depth of 0 to 2 feet; stratified material.	Very frequent flooding; seasonal high water table at a depth of 0 to 2 feet.

engineering properties of soils—Continued

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
Moderate permeability; moderate seepage losses.	Fair stability; high content of mica.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Generally favorable features; easily eroded; slopes as much as 15 percent.	Generally favorable features but erodible; slopes as much as 15 percent.
Moderate permeability; moderate seepage losses; underlain by pervious bedrock.	Fair stability; high content of mica.	Not needed	Severely eroded; reduced intake rate; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation; slopes as much as 15 percent.	Slopes as much as 15 percent; severely eroded; difficult to establish vegetation.
Moderate permeability; some seepage losses.	Fair stability; rock at a depth of about 4 feet.	Moderate permeability; seasonal high water table at a depth of 2½ feet.	Moderately rapid intake rate; moderate permeability.	Generally favorable features.	Receives seepage from higher areas.
High seepage losses; permeable substratum.	Low stability; high content of mica.	Not needed	Low available moisture capacity; rapid permeability.	Highly micaceous material near the surface; slopes of 10 to 25 percent.	Highly micaceous; highly erodible.
Rapid permeability; rock at a depth of less than 2 feet.	Low stability; poor source of borrow material.	Not needed	Low available moisture capacity; rapid permeability.	Rock at a depth of less than 2 feet.	Rock at a depth of less than 2 feet; slopes as much as 45 percent.
Moderate permeability; some seepage losses.	Fair stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.	Generally favorable features.
Moderate permeability; some seepage losses.	Fair stability where soil is compacted.	Not needed	Severely eroded; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation.	Difficult to establish vegetation; severely eroded.
Moderate permeability; some seepage losses because of underlying pervious bedrock.	Fair stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Moderately slow permeability; pervious rock at a depth of 4 to 8 feet.	Low stability; heavy clay; rock at a depth of 4 to 8 feet.	Not needed	Moderately slow permeability; slopes as much as 15 percent.	Exposed clay subsoil; difficult to establish vegetation; slopes as much as 15 percent.	Exposed clay subsoil; difficult to establish vegetation; slopes as much as 15 percent.
Moderately rapid permeability.	Variable, permeable material.	Very frequent flooding; seasonal high water table at a depth of 0 2 feet; outlets difficult to obtain.	Seasonal high water table at a depth of 0 to 2 feet; very frequent flooding.	Not applicable	Stratified material; seasonal high water table at a depth of 0 to 2 feet; very frequent flooding.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Myersville (MyB2, MyC2).	Fair	Moderate	Fair	Unsuitable	Fair	Elastic material; hard greenstone at a depth of 3 to 8 feet; slopes as much as 15 percent.	Rock at a depth of 3 to 8 feet; slopes as much as 15 percent.
Nason: (NaB2, NaC2, NsB, NsB2, NsC, NsC2, NsD2).	Fair	Moderate	Fair	Unsuitable	Fair	Fair stability; some elastic material; rock at a depth of 4 to 10 feet; slopes as much as 25 percent.	Rock at a depth of 4 to 10 feet; slopes as much as 25 percent.
(NtC3)	Fair	High	Poor	Unsuitable	Fair	Fair stability; some elastic material; rock at a depth of 4 to 10 feet; slopes as much as 15 percent.	Rock at a depth of 4 to 10 feet; slopes as much as 15 percent.
Orange (OgA, OgB, OgB2, OgC2, OrA, OrB, OrB2). (For properties of the Iredell soils in mapping units OrA, OrB, and OrB2, refer to the Iredell series.)	Poor	High	Poor	Unsuitable	Poor	Poor stability; clay has high shrink-swell potential; rock at a depth of 3 to 6 feet.	Plastic clay; rock at a depth of 3 to 6 feet.
Penn (PeB, PeC)	Fair	Moderate	Fair	Unsuitable	Fair	Rock at a depth of 2 to 3½ feet; slopes as much as 15 percent.	Rock at a depth of 2 to 3½ feet; slopes as much as 15 percent.
Pinkston (PkC, PkD)	Good	Low	Fair	Unsuitable	Good	Rock at a depth of 3½ to 6 feet; slopes as much as 25 percent.	Rock at a depth of 3½ to 6 feet; slopes as much as 25 percent.
Rabun: (RaB2, RaC2, RaD2, RaE2).	Fair	High	Poor	Unsuitable	Fair	Fair to poor stability; rock outcrops; slopes as much as 45 percent.	Rock outcrops; slopes as much as 45 percent.
(RcD3)	Fair	High	Poor	Unsuitable	Fair	Fair to poor stability; slopes as much as 25 percent; rock outcrops.	Slopes as much as 25 percent; rock outcrops.

engineering properties of soils—Continued

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
Moderate permeability; high seepage losses through faults in the rock.	Fair stability where soil is compacted; rock at a depth of 3 to 8 feet.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.	Generally favorable features.
Moderate permeability; seepage losses in substratum.	Fair stability; high content of silt; elastic material.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 25 percent.	Generally favorable features; slopes as much as 25 percent.	Generally favorable features; slopes as much as 25 percent.
Moderate permeability; seepage losses in substratum.	Fair stability; high content of silt; elastic material.	Not needed	Severely eroded; reduced intake rate; slopes as much as 15 percent.	Difficult to establish vegetation; severely eroded; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation; slopes as much as 15 percent.
Slow permeability; rock at a depth of 3 to 6 feet.	Low stability; plastic clay material; rock at a depth of 3 to 6 feet.	Slow permeability; plastic clay.	Moderate available moisture capacity; slow permeability.	Exposed clay subsoil; difficult to till and to establish vegetation.	Exposed clay subsoil; difficult to till and to establish vegetation.
Moderately rapid permeability; high seepage losses in underlying material.	Fair stability; high content of silt; rock at a depth of 2 to 3½ feet.	Not needed	Moderately rapid intake rate; moderate to low available moisture capacity; slopes as much as 15 percent.	Shale rock at a depth of 2 to 3½ feet; slopes as much as 15 percent.	Very erodible; rock at a depth of 2 to 3½ feet.
Rock at a depth of 3½ to 6 feet; porous material; high seepage losses.	Fair stability where soil is compacted; pervious material.	Not needed	Rapid permeability; low available moisture capacity.	Material easily eroded; slopes as much as 25 percent.	Shallow over rock; low available moisture capacity.
Moderate permeability; moderate seepage losses; rock outcrops; underlain by pervious rock.	Fair to poor stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 45 percent.	Slopes as much as 45 percent.	Generally favorable features; slopes as much as 45 percent.
Moderate permeability; moderate seepage losses; rock outcrops; underlain by pervious rock.	Fair to poor stability where soil is compacted.	Not needed	Severely eroded; slopes as much as 25 percent.	Severely eroded; slopes as much as 25 percent.	Severely eroded; difficult to establish vegetation; slopes as much as 25 percent.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Rapidan:							
(RdB2, RdC2)	Fair	Moderate	Fair	Unsuitable	Fair	Fair to poor stability; rock at a depth of 4 to 12 feet; slopes of 2 to 15 percent.	Rock at a depth of 4 to 12 feet; slopes of 2 to 15 percent.
(ReC3)	Fair	High	Poor	Unsuitable	Fair	Fair to poor stability; rock at a depth of 4 to 12 feet; slopes as much as 15 percent.	Rock at a depth of 4 to 12 feet; slopes as much as 15 percent.
Roanoke (Rk)	Poor	High	Poor	Unsuitable	Poor	Seasonal high water table at a depth of 0 to 1 foot; high content of clay; some areas infrequently flooded.	Seasonal high water table at a depth of 0 to 1 foot; some areas infrequently flooded.
Rock land (RnC, RnD, RoC, RoE).	Fair	Moderate	Poor	Unsuitable	Fair	Rock outcrops and loose stones comprise 50 percent of soil mass.	Rock outcrops and stones.
Rowland (Rw)	Poor	High	Fair	Unsuitable	Poor	Seasonal high water table at a depth of 1½ to 2½ feet; frequent flooding; highly susceptible to frost action.	Seasonal high water table at a depth of 1½ to 2½ feet; frequent flooding.
Seneca (SeB)	Fair	Moderate	Fair	Unsuitable	Fair	Seasonal high water table at a depth of 3 feet; some seepage; fair stability.	Seasonal high water table at a depth of 3 feet; receives seepage from higher areas.
Starr (SrC)	Fair	Moderate	Fair	Unsuitable	Fair	Fair stability; receives some seepage from higher areas.	Seasonal high water table at a depth of about 3 feet; some seepage; slopes as much as 10 percent.
State (StA)	Fair	Moderate	Good	Unsuitable	Fair	Fair stability, infrequent flooding.	Generally favorable features; infrequent flooding.
Tatum:							
(TaB2, TaC2, TsB, TsB2, TsC, TsC2).	Good	Moderate	Fair	Unsuitable	Fair	Fair stability; rock at a depth of about 4 feet; slopes as much as 15 percent.	Rock at a depth of about 4 feet; slopes as much as 15 percent.
(TtB3, TtC3)	Good	High	Poor	Unsuitable	Fair	Fair stability; rock at a depth of about 4 feet; slopes as much as 15 percent.	Rock at a depth of about 4 feet; slopes as much as 15 percent.

engineering properties of soils—Continued

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
Moderate permeability; rock at a depth of 4 to 12 feet; some seepage losses.	Fair to poor stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes of 2 to 15 percent.	Generally favorable features.	Generally favorable features.
Moderate permeability; rock at a depth of 4 to 12 feet; some seepage losses through pervious rock.	Fair to poor stability where soil is compacted.	Not needed	Severely eroded; slopes as much as 15 percent.	Severely eroded; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation.
Slow permeability	Poor stability where soil is compacted; seasonal high water table at a depth of 0 to 1 foot.	Slow permeability; difficult to obtain outlets.	Poor drainage; seasonal high water table at a depth of 0 to 1 foot.	Not applicable	Seasonal high water table at a depth of 0 to 1 foot.
Rock outcrops and stones; high seepage losses.	Rock outcrops and stones.	Not needed	Rock outcrops and stones; some steep slopes.	Rock outcrops and stones; some steep slopes.	Rock outcrops and stones.
Moderate permeability; rock at a depth of 4 to 10 feet; seepage losses; frequent flooding.	Fair stability; highly susceptible to frost action.	Seasonal high water table at a depth of 1½ to 2½ feet; frequent flooding.	Seasonal high water table at a depth of 1½ to 2½ feet; frequent flooding.	Not applicable	Seasonal high water table; frequent flooding.
Moderate permeability; moderate to high seepage losses.	Fair stability where soil is compacted.	Seasonal high water table at a depth of 3 feet; seepage; moderate permeability.	Moderately rapid intake rate; seasonal high water table at a depth of 3 feet; some seepage.	Slopes as much as 7 percent; some seepage.	Generally favorable features, but some seepage.
Moderate permeability; high seepage losses.	Fair stability where soil is compacted.	Receives seepage from higher areas.	Moderately rapid intake rate; moderate permeability; some seepage.	Slopes as much as 10 percent; some seepage.	Generally favorable features; some seepage.
Moderate permeability; high seepage losses; infrequent flooding.	Fair stability where soil is compacted.	Not needed	Moderate to rapid intake rate; moderate permeability; infrequent flooding.	Not applicable	Generally favorable features; infrequent flooding.
Moderate permeability; high seepage losses through rock fractures.	Fair stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Rock at a depth of about 4 feet; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Moderate permeability; high seepage losses through rock fractures.	Fair stability where soil is compacted.	Not needed	Severely eroded; slopes as much as 15 percent.	Severely eroded; slopes as much as 15 percent.	Severely eroded; difficult to establish vegetation.

TABLE 5.—*Interpretations of*

Soil series and map symbols	Suitability for winter grading	Susceptibility to frost action	Suitability as source of—			Soil features affecting engineering practices for—	
			Topsoil	Sand and gravel	Road fill	Highway location	Construction and maintenance of pipelines
Turbeville (TuB, TuB2, TuC2).	Good	Moderate	Good	Unsuitable	Fair to poor.	Fair to poor stability; slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Vance (VaB, VaB2)	Fair	Moderate	Fair	Unsuitable	Fair to poor.	Moderately slow permeability in subsoil; fair to poor stability.	Plastic clay subsoil; moderately slow permeability.
Wadesboro (WaB2, WaC2, WaD2).	Fair	Moderate	Fair	Unsuitable	Fair	Generally favorable features; slopes as much as 25 percent.	Generally favorable features; slopes as much as 25 percent.
Watt (WbB, WbC, WbD).	Fair	Moderate	Poor	Unsuitable	Poor	Fair stability; bedrock at a depth of 3 feet; slopes as much as 30 percent.	Bedrock at a depth of 3 feet; slopes as much as 30 percent.
Wehadkee (We)	Poor	High	Poor	Unsuitable	Poor	Seasonal high water table at a depth of 0 to 1 foot; very frequent flooding.	Seasonal high water table; very frequent flooding.
Wilkes (WkC, WkD)	Good	Low	Fair	Unsuitable	Fair	Rock at a depth of 2½ to 4 feet; slopes as much as 25 percent.	Rock at a depth of 2½ to 4 feet; slopes as much as 25 percent.
Worsham (WoB)	Poor	High	Poor	Unsuitable	Poor	Seasonal high water table at a depth of 0 to 1 foot; slow permeability; unstable clay.	Seasonal high water table at a depth of 0 to 1 foot; receives seepage from higher areas.
York (YoB)	Poor	Moderate	Fair	Unsuitable	Fair to poor.	Fragipan and perched water table at a depth of 2 feet.	Fragipan and perched water table at a depth of 2 feet.
Zion (ZoB, ZoC2)	Poor	High	Fair	Unsuitable	Fair to poor.	Slow permeability; plastic clay; rock at a depth of 2½ to 4 feet; slopes as much as 15 percent.	Rock at a depth of 2½ to 4 feet; slopes as much as 15 percent.

engineering properties of soils—Continued

Soil features affecting engineering practices for—					
Impoundments		Agricultural drainage	Irrigation	Terraces or diversions	Waterways
Reservoir area	Embankment				
Moderate permeability; moderate seepage losses.	Poor to fair stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 15 percent.	Slopes as much as 15 percent.	Generally favorable features; slopes as much as 15 percent.
Generally favorable features.	Fair to poor stability where soil is compacted.	Not needed	Moderate intake rate; moderately slow permeability in subsoil.	Difficult to establish vegetation where subsoil is exposed; erodible.	Difficult to establish vegetation where subsoil is exposed; erodible.
Moderate permeability; high seepage losses; underlain by pervious bedrock.	Fair stability where soil is compacted.	Not needed	Moderately rapid intake rate; moderate permeability; slopes as much as 25 percent.	Generally favorable features; slopes as much as 25 percent.	Generally favorable features; slopes as much as 25 percent.
High seepage losses; moderately rapid permeability; bedrock at a depth of 3 feet.	Erodible; poor stability because of graphitic schist material.	Not needed	Moderately rapid permeability; low available moisture capacity; slopes as much as 30 percent.	Bedrock at a depth of 3 feet; slopes as much as 30 percent.	Bedrock at a depth of 3 feet; slopes as much as 30 percent.
Very frequent flooding; slow permeability.	Poor stability; seasonal high water table at a depth of 0 to 1 foot; very frequent flooding.	Seasonal high water table at a depth of 0 to 1 foot; very frequent flooding.	Seasonal high water table at a depth of 0 to 1 foot; very frequent flooding.	Not applicable	Seasonal high water table at a depth of 0 to 1 foot; very frequent flooding.
Moderate permeability; pervious rock at a depth of 2½ to 4 feet; high seepage losses.	Fair stability where soil is compacted; rock at a depth of 2½ to 4 feet.	Not needed	Low available moisture capacity; rock at a depth of 2½ to 4 feet; slopes as much as 25 percent.	Rock at a depth of 2½ to 4 feet; slopes as much as 25 percent.	Low available moisture capacity; shallow over rock; slopes as much as 25 percent.
Generally favorable features; some seepage losses; rock at a depth of 5 feet.	High content of clay; low stability; seasonal high water table at a depth of 0 to 1 foot.	Seasonal high water table at a depth of 0 to 1 foot; slow permeability.	Seasonal high water table at a depth of 0 to 1 foot; slow permeability.	Not applicable	Seasonal high water table at a depth of 0 to 1 foot; receives seepage from higher areas.
Moderately slow permeability; some seepage losses; underlain by pervious bedrock.	Fair stability where soil is compacted; elastic material.	Fragipan; moderately slow permeability.	Fragipan at a depth of 2 feet.	Fragipan at a depth of 2 feet.	Fragipan at a depth of 2 feet.
Slow permeability; pervious rock at a depth of 2½ to 4 feet.	Plastic clay; low stability; rock at a depth of 2½ to 4 feet.	Slow permeability; plastic clay; rock at a depth of 2½ to 4 feet.	Slow permeability; rock at a depth of 2½ to 4 feet; slopes as much as 15 percent.	Rock at a depth of 2½ to 4 feet; plastic clay subsoil; slopes as much as 15 percent.	Plastic clay; rock at a depth of 2½ to 4 feet; slopes as much as 15 percent.

TABLE 6.—*Engineering*

[Tests were performed by the Virginia Department of Highways under a cooperative agreement with the U.S. Department of Commerce (AASHO) (*2*)]

Soil name and location	Parent material	Virginia report No.	Depth from surface	Moisture density [1]		Mechanical analysis [2]		
				Maximum dry density	Optimum moisture	Percentage passing sieve—		
						1½-in.	¾-in.	⅜-in.
		SO-	*Inches*	*Lb. per cu. ft.*	*Percentage*			
Altavista loam: 0.5 mile S. of the junction of State Highways No. 609 and No. 644, along Marsh Run (modal profile).	Alluvium.	47744	0–9	114	15	100	97	96
		47745	16–29	113	15	----------	----------	----------
		47746	35–53	108	18	----------	100	99
Augusta silt loam: 1 mile W. of State Highway No. 626, near State Highway No. 636, along the Rapidan River (modal profile).	Alluvium.	47747	0–8	114	15	----------	----------	----------
		47748	18–35	86	31	----------	----------	----------
		47749	44–94	113	16	----------	----------	----------
Bucks silt loam: 1 mile E. of Somerset and 0.5 mile N. of State Highway No. 655 (modal profile).	Material weathered from shale of Triassic age.	47731	0–9	112	16	----------	----------	----------
		47732	9–22	102	23	----------	----------	----------
		47733	36–67	102	22	----------	----------	----------
Davidson clay loam: 1 mile NE. of Orange at the end of Red Hill Road (modal profile).	Material weathered from greenstone.	47728	3–7	96	22	----------	----------	----------
		47729	31–76	91	31	----------	----------	----------
		47730	114–133	91	31	----------	----------	----------
Grover sandy loam: 2 miles SE. of Thornhill, along State Highway No. 612 (modal profile).	Material weathered from granite gneiss.	47738	0–4	115	13	100	99	99
		47739	17–27	100	21	----------	----------	----------
		47740	35–75	105	18	----------	----------	----------
Lignum silt loam: 0.75 mile E. of Nasons, along State Highway No. 20 (modal profile).	Material weathered from schist.	47725	0–4	99	21	----------	----------	----------
		47726	14–20	98	22	----------	----------	----------
		47727	51–87	120	13	----------	----------	100
Madison sandy loam: 1 mile SW. of Thornhill, along State Highway No. 651 (modal profile).	Material weathered from schist.	47741	3–9	92	26	----------	----------	----------
		47742	14–26	88	29	----------	----------	----------
		47743	49–97	95	22	----------	----------	----------
Nason silt loam: 2 miles N. of Rhoadesville, along State Highway No. 621 (modal profile).	Material weathered from schist.	47722	½–9	108	17	100	96	92
		47723	20–28	94	26	----------	----------	----------
		47724	38–48	105	22	----------	----------	100
Orange silt loam: 1.5 miles N. of Locustgrove, along State Highway No. 614 (modal profile).	Material weathered from diorite.	47734	1–13	112	14	----------	----------	----------
		47735	17–24	119	15	100	97	94
		47736	27–36	97	22	----------	----------	----------
		47737	36–44	120	14	----------	----------	----------
Tatum silt loam: 0.125 mile W. of State Highway No. 602.	Material weathered from schist.	47719	0–6	109	16	----------	99	93
		47720	16–36	85	33	----------	----------	----------
		47721	45–94	100	21	----------	----------	----------
York silt loam: 1.25 miles NE. of Nasons and 0.25 mile N. of junction of State Highways No. 20 and No. 628.	Material weathered from schist.	47716	½–7	115	13	----------	----------	100
		47717	10–25	119	13	----------	100	99
		47718	55–79	115	13	----------	100	99

[1] Based on AASHO Designation T 99–57, Method A (*2*).

[2] Mechanical analysis according to AASHO Designation T 88–57 (*2*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded

test data

Bureau of Public Roads (BPR), in accordance with standard test procedures of the American Association of State Highway Officials

Mechanical analysis [2]—Continued								Liquid limit	Plasticity index	Classification	
Percentage passing sieve—Continued				Percentage smaller than—						AASHO [3]	Unified [4]
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 40 (0.42 mm.)	No. 200 (0.074 mm.)	0.05 mm.	0.02 mm.	0.005 mm.	0.002 mm.				
								Percentage			
96	95	93	53	37	25	9	3	23	5	A-4(4)	ML-CL
---------	100	96	70	61	50	35	28	32	16	A-6(9)	CL
99	98	93	62	53	41	34	32	45	26	A-7-6(13)	CL
---------	100	98	67	54	38	16	9	21	2	A-4(6)	ML
---------	100	99	88	82	77	72	69	84	54	A-7-5(20)	CH
---------	100	98	37	29	20	10	7	24	2	A-4(1)	SM
---------	100	95	79	72	57	34	23	30	10	A-4(8)	CL
---------	100	97	82	77	70	54	45	51	25	A-7-6(16)	CH
---------	100	83	73	56	40	19	11	39	8	A-4(8)	ML
---------	100	95	86	70	52	28	16	42	17	A-7-6(11)	ML-CL
---------	100	99	96	96	92	78	69	80	24	A-7-5(20)	MH
---------	100	97	90	87	76	51	38	66	24	A-7-5(18)	MH
99	97	58	39	34	22	8	4	[5] NP	NP	A-4(1)	SM
100	98	76	64	63	55	44	41	67	29	A-7-5(16)	MH
100	99	65	40	36	26	17	14	NP	NP	A-4(1)	SM
---------	100	96	84	70	52	22	12	35	9	A-4(8)	ML-CL
---------	100	99	92	86	74	52	43	61	30	A-7-5(20)	MH-CH
98	97	89	75	68	52	33	26	33	17	A-6(11)	CL
---------	100	97	78	77	70	58	49	65	28	A-7-5(19)	MH
---------	100	97	73	72	61	51	47	71	29	A-7-5(19)	MH
---------	100	94	36	35	23	13	12	46	NP	A-5(1)	SM
89	87	77	70	66	53	23	12	27	4	A-4(7)	ML-CL
100	99	90	82	76	71	61	53	64	27	A-7-5(20)	MH
99	99	79	62	56	48	35	30	48	13	A-7-5(8)	ML
---------	100	93	76	68	51	22	11	19	NP	A-4(8)	ML
88	81	68	56	48	38	22	15	32	14	A-6(6)	CL
---------	100	97	88	82	71	57	51	67	45	A-7-6(20)	CH
---------	100	81	61	52	39	28	24	39	22	A-6(10)	CL
91	90	81	66	57	39	20	12	23	3	A-4(6)	ML
---------	100	99	96	95	92	80	73	79	31	A-7-5(20)	MH
---------	100	95	83	73	51	28	23	45	10	A-5(9)	ML
97	96	87	72	60	41	17	9	19	1	A-4(7)	ML
97	96	87	73	65	47	24	17	24	7	A-4(8)	ML-CL
97	97	86	69	64	47	30	23	38	16	A-6(9)	CL

from calculations of grain-size fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

[3] Based on AASHO Designation M 145-49 (*2*).

[4] Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1, Corps of Engineers (*11*). SCS and BPR have agreed to consider that all soils having plasticity indexes within two points of the A-line are to be given a borderline classification. An example of a borderline classification obtained by this use is ML-CL.

[5] Nonplastic.

Engineering classification systems

The two systems for classification of soils that are in general use among engineers are the one used by the American Association of State Highway Officials (AASHO) (*2*) and the Unified system (*11*).

In the AASHO system, soil materials are classified in seven groups, ranging from A–1, which consists of gravelly soils of high bearing capacity, to A–7, which consists of clayey soils that have low bearing capacity when wet. The relative engineering value of the soils within each group can be indicated by a group index number, which ranges from 0 for the best materials to 20 for the poorest. The group index number, if it has been determined, is shown in parentheses after the soil group symbol, thus A–4(1).

In the Unified system, soil materials are identified as coarse grained (eight classes), fine grained (six classes), and highly organic (one class).

Estimated engineering properties

Table 4 provides estimates of soil properties that are important in engineering, and it gives estimated AASHO and Unified classifications for the soils. Textural terms used to describe the soil material in the main horizons are those used by the U.S. Department of Agriculture (*8*). The estimates in table 4 are based on the results of tests shown in table 6, on information in other parts of this survey, and on general knowledge of the soils in the county.

In table 4 depth to a seasonal high water table refers to the shallowest depth to which the water table rises in winter and early in spring. This water table may be a perched one or an ordinary ground-water table.

Permeability, as used in table 4, relates only to movement of water downward through an undisturbed and uncompacted soil. It does not include lateral seepage. The estimates are based on structure and porosity of the soil. Plowpans, surface crusts, and other properties resulting from use of the soils are not considered. Terms used to describe permeability, expressed in inches per hour, are given in the Glossary at the back of this survey.

Available moisture capacity, estimated in inches per inch of soil depth, refers to that amount of capillary water in the soil available for the growth of plants after all free water has drained away.

Reaction is the degree of acidity or alkalinity of a soil, expressed as a pH value. The pH values and relative terms used to describe soil reaction are explained in the Glossary.

Maximum dry density, expressed as pounds per cubic foot, refers to the highest density obtained if a soil is compacted at the optimum moisture content, using the prescribed method of compaction. The moisture content that gives the highest dry unit weight is called the optimum moisture content for the specified method of compaction, and it is reported as percentage of the maximum dry density.

Shrink-swell potential is an indication of the volume change to be expected of soil material with changes in moisture content. The shrinking and swelling of soils cause much damage to the foundations of buildings, to roads, and to other structures. If soil material has a high shrink-swell potential, it is normally undesirable for engineering purposes.

Corrosion potential, as used in table 4, refers to the potential danger to uncoated metal or concrete structures from chemical action that dissolves or weakens the structural material. Steel and concrete pipes, for example, may corrode if they are buried in soil, and a given material corrodes more rapidly in some kinds of soil than in others. Pipes that are in more than one kind of soil or that pass through more than one soil horizon are more likely to be damaged by corrosion than pipes that are buried entirely in one kind of soil or that are in only one soil horizon.

Engineering interpretations

In table 5 the soils of the county are rated according to their suitability for winter grading, susceptibility to frost action, and suitability as a source of topsoil, sand and gravel, and road fill. In addition, this table gives soil features that affect suitability of the soils for location of highways and for engineering structures and practices. The suitability ratings and soil features given are based on known data and on estimates of physical properties of the soils.

The ratings given in the column headed "Suitability for winter grading" are based largely on soil texture, natural content of water, and depth to the water table in winter. Clayey soils are difficult to work when wet and must be dried to the proper moisture content for compaction.

Susceptibility to frost action is high for silts and fine sands that, because of seepage or a high water table, are wet most of the time in winter.

In estimating the suitability of soils as a source of topsoil, only the uppermost 10 to 15 inches of soil material was ordinarily considered.

Suitability as a source of road fill depends largely on the texture of the soil, the natural content of water, and the behavior of the soil when compacted and used as a subbase for a highway.

Soil features that affect location of highways include depth to rock, stones on or in the soil, drainage, shrink-swell potential, slope, and susceptibility of the soils to frost heaving. Organic soils are not suitable for highways.

Construction and maintenance of pipelines are affected by depth to bedrock, stones on or in the soil, rock outcrops, a seasonal high water table, a hazard of flooding, and slope.

Soil features that affect use of a soil for the reservoir area where water is impounded are those of a soil that has not been disturbed. Features that affect use of a soil for pond embankments relate to soil material that has been moved from its natural position to a place in the embankment of the pond.

Agricultural drainage depends upon those features and qualities of the soil that affect the installation of a drainage system and the performance of surface or subsurface drains. These are slope, height of the water table, permeability, depth to rock, and availability of suitable outlets.

The rate of water intake, permeability, natural drainage, and the available moisture capacity are properties

of soils that affect irrigation. A high water table, susceptibility to flooding, slopes, the presence of coarse fragments, and depth to rock are also important.

Terraces and diversions are affected by slope, soil stability, and soil depth. Also important are the ease with which the channel can be protected from siltation and a cover of plants established and maintained.

Soil features that affect establishment and maintenance of waterways are similar to those that affect terraces and diversions. The waterway should be grassed. Therefore, features that affect the establishment and maintenance of a cover of grass are especially important.

Soil test data

Table 6 gives the results of laboratory tests of samples of soils from 11 series in Orange County. The tests were performed by the Virginia Department of Highways under a cooperative agreement with the U.S. Department of Commerce, Bureau of Public Roads. They were done in accordance with standard test procedures of the American Association of State Highway Officials to help evaluate the soils for engineering purposes.

The engineering soil classifications given in table 6 are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. Mechanical analyses were made by the combined sieve and hydrometer methods. The percentage of clay obtained by the hydrometer method should not be used in naming textural classes of soils.

Nonfarm Uses of the Soils

Table 7 shows the estimated degree and kinds of limitations of each soil in Orange County for septic tank filter fields, sewage lagoons, building locations, roads, sanitary land fills, cemeteries, lawns, landscaping, and golf fairways, camping, and areas used extensively for play. The degree of limitation is indicated by the words *slight*, *moderate*, and *severe*. A limitation of *slight* indicates that the soil has no important limitation for the specified use. A rating of *moderate* or *severe* means that the site should be inspected to determine its suitability for a particular use.

The ratings in table 7 represent typical conditions for each kind of soil shown on the detailed soil map. The limitation at a particular site or on a particular lot may vary in degree and kind from that listed in table 7 because of the natural variation within any one soil area. A supplementary onsite investigation should be made before using the soils for the purposes listed in table 7, especially where considerable cost is involved.

The degree of limitation for use as a septic tank disposal field are based on depth to rock, slope, permeability, the presence of stones, the hazard of flooding, and the presence or absence of a seasonal high water table. All sites should be inspected before they are used as a disposal field for a septic tank (fig. 8).

The limitations for sewage lagoons are based on permeability and content of organic matter of the soils at the site, and on slope, depth to bedrock, size and amount of coarse fragments, texture of the material that will be used in embankments at the site, and the hazard of flooding.

The column headed "Buildings of 3 stories or less" refers only to the location of buildings that have a basement and that are not more than three stories high. These buildings include dwellings and buildings used by light industrial or commercial establishments and by institutions.

The limitations for roads apply only to hard-surfaced roads similar to those in residential areas or towns. They do not apply to freeways and interstate highways intended for intensive use.

Sanitary land fills are places where garbage, trash, and other ordinary household refuse is dumped and is covered with a thin layer of soil material each day. They consist of excavations generally at least 10 feet wide and 6 feet deep. The limitations considered for a trench-type sanitary land fill are depth to hard rock; depth to a seasonal high water table; permeability, which determines whether pollutants can enter the ground water; dominant texture as it affects workability; presence of stones or rock outcrops; and the hazard of flooding. An onsite investigation is necessary before a site for sanitary land fills is selected.

For use as cemeteries, soils have slight or moderate limitations if they are deep, are well drained or moderately well drained, and have slopes of less than 12 percent. Steeper soils have severe limitations, and so do soils that are somewhat poorly drained to very poorly drained, that have a seasonal high water table at or near the surface, or that are subject to flooding. The use of soils for a cemetery is severely limited by hard bedrock near the surface, but it is only slightly or moderately restricted if the underlying material is soft or rippable. At all periods of the year, ease of excavation is most favorable in the sandier soils.

Soil material suitable for growing grass, shrubs, and trees is necessary for lawns, landscaping, and golf fairways. In most areas developed for homes and golf courses, the natural surface soil, or topsoil, can be used for lawns, flowers, shrubs, and trees and should be saved. It can be removed from the site, stored until construction and grading are completed, and then returned. Among the soil properties that determine whether a good lawn or golf fairway can be established are natural drainage, degree of slope, depth to bedrock or other restrictive layer, texture of the surface soil, stoniness, outcrops of rock, and the hazard of flooding.

Campsites for tents should be located in an area where the landscape is attractive, the trafficability is good, and the soils are moderately well suited or well suited to grass and trees. Soils that are naturally well drained or moderately well drained have less serious limitations than wetter soils. Limitations for campsites are moderate on somewhat poorly drained soils and are severe on poorly and very poorly drained soils. In addition, limitations are severe on muck soils, on soils along streams where flooding is a hazard, and where areas are ponded after heavy rains. As a rule, slopes of more than 12 percent have severe limitations for use as a campsite for tents, and slopes of more than 7 percent have severe limitations as a site for trailers.

Athletic fields should be nearly level when finished because they are intensively used. Transporting fill material or topsoil was not considered in the ratings for estimated degree of limitation. The limitations are based

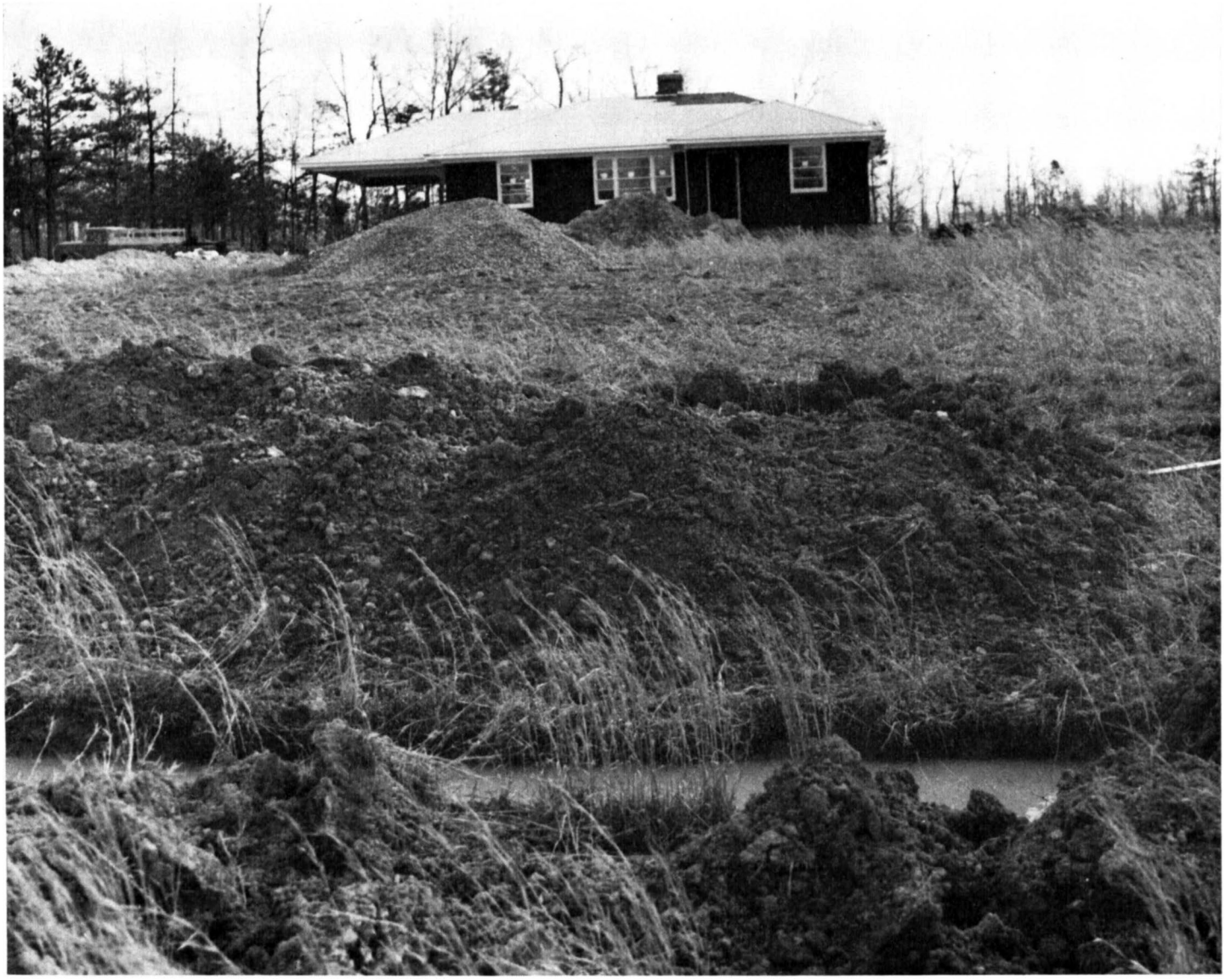

Figure 8.—**Water standing on a somewhat poorly drained Orange silt loam used as a drainage field for a septic tank. This soil is not suited to this use.**

on depth to a seasonal high water table, permeability, slope, depth to bedrock, amount of coarse fragments, and the hazard of flooding.

Picnic grounds (fig. 9) are not used intensively but are used largely by persons walking alone or in small groups. The problems of supplying water and disposing of sewage were not considered. The requirements are the same as for athletic fields but are less exacting.

Formation and Classification of Soils

This section has two main parts. In the first part, factors of soil formation and their effect on the soils in Orange County is discussed. In the second part, the soil series are placed in the higher categories of soil classification.

Formation of the Soils

The environmental factors mainly responsible for the formation of soils are parent material, relief, climate, plants and animals, and time. Each of these factors is discussed and some of the relationships to the kinds of soils in Orange County are explained in the following paragraphs.

Parent material

The two broad classes of parent material in Orange County are residual material and transported material. Residual material has weathered in place from the underlying rocks. Transported material—colluvium and alluvium—was carried by water or was moved by gravity and was laid down as unconsolidated deposits of clay, silt, sand, and large fragments of rock. The

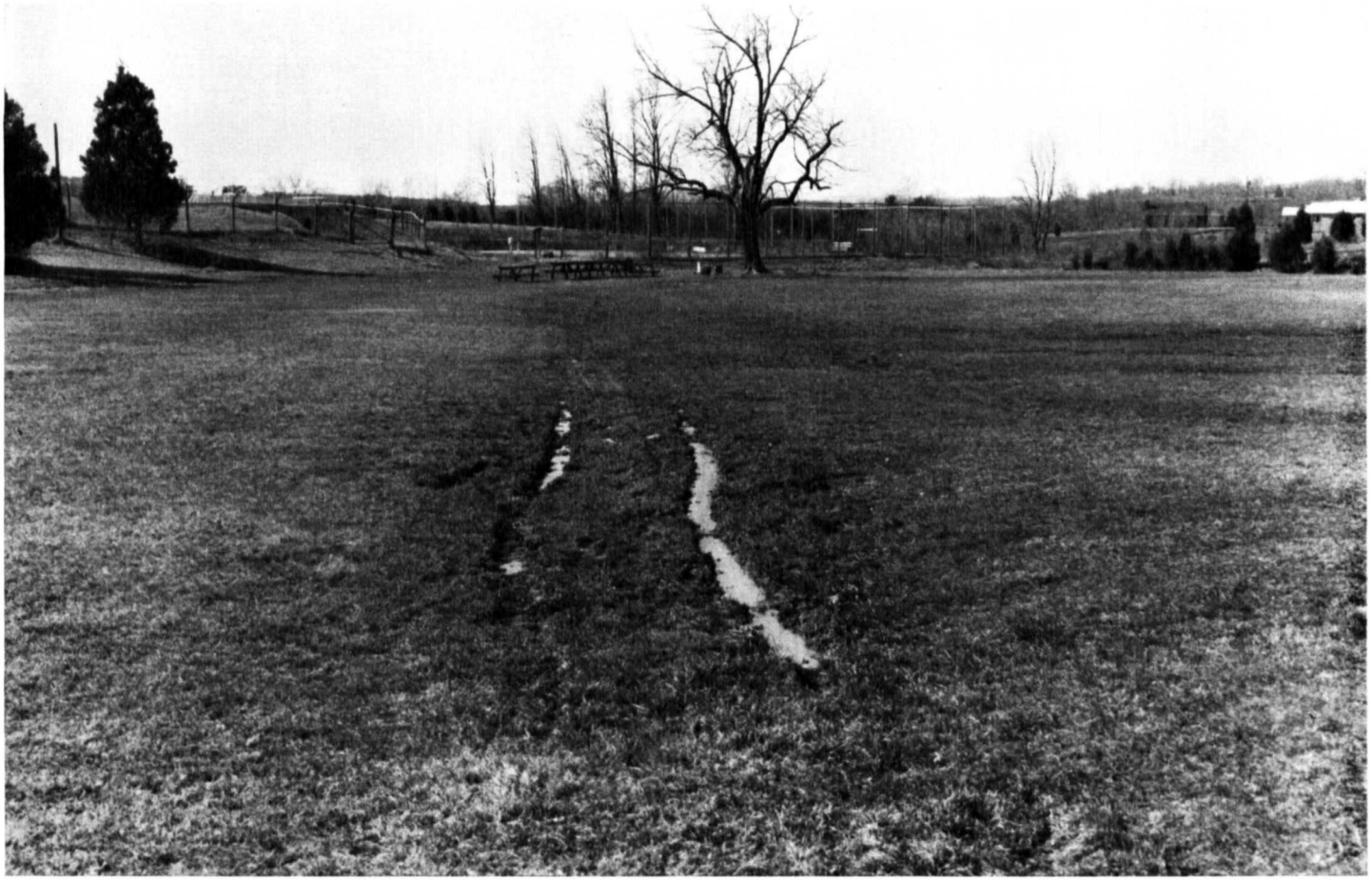

Figure 9.—**Area of Elbert silt loam, overwash, used as a playground and for picnicking. The dark, wet area, crossed by ruts filled with water, does not prohibit use for these purposes.**

characteristics of residual material are related directly to the characteristics of the underlying rocks. Those of the transported material are related to the characteristics of the soils or rocks from which this material was washed or from which it rolled.

The rocks of Orange County are of the Precambrian, Lower Cambrian, Ordovician, and Triassic geologic periods, but for the most part, they are of the Precambrian period. Igneous, metamorphic, and sedimentary rocks occur in this county, and all have been sources of parent material for the soils.

The igneous rocks are hornblende gabbro granite, quartz diorite, diorite, dacite, and diabase. These rocks are the sources of parent material for the Cecil, Appling, Louisburg, Mecklenburg, Colfax, Fauquier, Myersville, Catoctin, Zion, Elbert, Wilkes, Lloyd, Fluvanna, Iredell, Bremo, and Orange soils.

The metamorphic rocks are greenstone schist, sericite-schist, graphite schist, phyllite, gneiss, and quartzite. They are the sources of the parent material for the Elioak, Glenelg, Grover, Madison, Manor, Hazel, Watt, Davidson, Rabun, Tatum, Nason, Manteo, Lignum, and York soils.

The sedimentary rocks are shale, sandstone, conglomerate, and limestone. Shale, sandstone, and conglomerate are sources of parent material for the Albano, Bucks, Calverton, Creedmoor, Klinesville, Mayodan, Penn, Pinkston, Rapidan, and Wadesboro soils. In this county none of the soils formed in material that weathered from limestone, because most of the limestone is covered by old alluvial material on stream terraces. Soils, such as the Masada and Turbeville, have formed in this old alluvium above the limestone.

Soils that formed in transported material on first bottoms are the Bermudian, Bowmansville, Buncombe, Chewacla, Comus, Rowland, and Wehadkee. Those formed in transported material on stream terraces are the Altavista, Augusta, Elsinboro, Hiwassee, Masada, Roanoke, State, and Turbeville. Soils that formed in colluvium are the Dyke, Manassas, Seneca, Starr, and Worsham.

The characteristics of the underlying rock and of the parent material strongly influence the kinds of changes that take place during weathering. Because of differences in these characteristics, the rates of weathering vary. For example, phyllite, which is resistant to weathering, underlies the Hazel soils and is within 1½ feet of the surface. Mica schist, on the other hand, weathers deeply, and it is the parent material of such deep soils as the Elioak and Glenelg. The parent rock underlies these soils at a depth of 6 to more than 20 feet.

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TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Albano (Ab)	*Severe:* seasonal high water table at a depth of 0 to 1½ feet; slow permeability.	*Moderate:* bedrock at a depth of 3½ feet.	*Severe:* seasonal high water table at a depth of 0 to 1½ feet.	*Severe:* seasonal high water table at a depth of 0 to 1½ feet.	*Severe:* seasonal high water table at a depth of 0 to 1½ feet.
Altavista:					
(AlA, AlB)	*Moderate:* moderate permeability; seasonal high water table at a depth of 2 to 3½ feet.	*Moderate:* moderate permeability; unit AlB has slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet.
(AlC2)	*Moderate:* moderate permeability; seasonal high water table at a depth of 2 to 3½ feet; slopes of 2 to 12 percent.	*Moderate* where slopes are between 2 and 7 percent; *severe* where slopes are steeper than 7 percent; moderate permeability.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet; some slopes are steeper than 7 percent.	*Moderate* where slopes are between 2 and 7 percent; *severe* where slopes are steeper than 7 percent; seasonal high water table at a depth of 2 to 3½ feet.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet.
Appling:					
(ApB, ApB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(ApC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Augusta:					
(AuA)	*Severe:* moderately slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Slight*	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.
(AuB)	*Severe:* moderately slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* slopes of 2 to 7 percent.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.
Bermudian (Be)	*Severe:* very frequent flooding.	*Severe:* very frequent flooding; permeability moderate to moderately rapid.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.

nonfarm uses of soils

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: hard rock at a depth of 3½ feet; seasonal high water table at a depth of 0 to 1½ feet.	*Severe:* seasonal high water table at a depth of 0 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 0 to 1½ feet; pan layer.	*Severe:* seasonal high water table at a depth of 0 to 1½ feet; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1½ feet; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1½ fete; slow permeability.	*Moderate:* seasonal high water table at a depth of 0 to 1½ feet.
Moderate: seasonal high water table at a depth of less than 6 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet.	*Slight*	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet; unit A1B has slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet; unit A1B has slopes of 2 to 7 percent.	*Slight.*
Severe: seasonal high water table at a depth of less than 6 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet; some slopes steeper than 7 percent.	*Slight* where slopes are between 2 and 7 percent; *moderate* where slopes are between 7 and 12 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3½ feet.	*Moderate* where slopes are between 2 and 7 percent; *severe* where slopes are between 7 and 12 percent; seasonal high water table at a depth of 2 to 3½ feet.	*Moderate* where slopes are between 2 and 7 percent; *severe* where slopes are between 7 and 12 percent; seasonal high water table at a depth of 2 to 3½ feet.	*Slight* where slopes are between 2 and 7 percent; *moderate* where slopes are between 7 and 12 percent.
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water high at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.
Severe: seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.
Severe: very frequent flooding; seasonal high water table at a depth of 3½ feet.	*Severe:* very frequent flooding.	*Severe:* very freqeunt flooding.	*Severe:* very freuqent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Bowmansville (Bo)	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.
Bremo:					
(BrC)	*Severe:* rock at a depth of 2 feet.	*Severe:* rock at a depth of 2 feet.	*Severe:* rock at a depth of 2 feet.	*Severe:* rock at a depth of 2 feet.	*Severe:* rock at a depth of 2 feet.
(BrD)	*Severe:* slopes of 15 to 25 percent; rock at a depth of 2 feet.	*Severe:* slopes of 15 to 25 percent; rock at a depth of 2 feet.	*Severe:* rock at a depth of 2 feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 2 feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 2 feet; slopes of 15 to 25 percent.
Bucks:					
(BsB2, BtB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(BsC2, BtC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(BuC3)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* of 7 to 15 percent.
Buncombe (Bw)	*Severe:* very frequent flooding.	*Severe:* very frequent flooding; rapid permeability.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.
Calverton (CaB, CbB) (For interpretations of the Creedmoor soils in mapping unit CbB, refer to the Creedmoor series.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* slopes of 2 to 7 percent.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding.
Severe: hard rock at a depth of 2 feet.	*Severe:* rock at a depth of 2 feet.	*Moderate:* rock at a depth of 2 feet.	*Moderate:* rock at a depth of 2 feet.	*Moderate* where slopes are between 4 and 7 percent; *severe* where slopes are between 7 and 15 percent.	*Severe:* rock at a depth of 2 feet.	*Moderate:* rock at a depth of 2 feet.
Severe: hard rock at a depth of 2 feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 2 feet; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* rock at a depth of 2 feet; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 17 to 15 per. cent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: hard rock at a depth of less than 6 feet; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; severely eroded.
Severe: very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.
Severe: seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Catoctin:					
(CcC)	*Severe:* rock at a depth of 1 to 2½ feet.	*Severe:* rock at a depth of 1 to 2½ feet.	*Severe:* rock at a depth of 1 to 2½ feet.	*Severe:* rock at a depth of 1 to 2 2½ feet.	*Severe:* rock at a depth of 1 to 2½ feet.
(CcD)	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.
(CdD)	*Severe:* rock at a depth of 1 to 2½ feet.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 10 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 10 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 10 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet.
(CdE)	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 25 to 45 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 25 to 45 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 25 to 45 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 25 to 45 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 25 to 45 percent.
Cecil					
(CeB2, CmB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(CeC2, CmC2)	*Moderate* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(CsC3)	*Moderate:* moderate permeability; slopes of 4 to 15 percent.	*Severe:* slopes of 4 to 15 percent.	*Slight* where slopes are 4 to 7 percent; *moderate* where slopes are 7 to 15 percent.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 15 percent.	*Slight* where slopes are 4 to 7 percent; *moderate* where slopes are 7 to 15 percent.
Chewacla (Cw)	*Severe:* frequent flooding; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* frequent flooding.	*Severe:* frequent flooding; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* frequent flooding.	*Severe:* frequent flooding.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: hard rock at a depth of 1 to 2½ feet.	*Severe:* rock at a depth of 1 to 2½ feet.	*Severe:* rock at a depth of 1 to 2½ feet.	*Severe:* rock at a depth of 1 to 2½ feet.	*Severe:* slopes of 5 to 15 percent; rock at a depth of 1 to 2½ feet.	*Severe:* slopes of 5 to 15 percent; rock at a depth of 1 to 2½ feet.	*Moderate:* rock at a depth of 1 to 2½ feet.
Severe: hard rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent; some stones.	*Severe:* hard rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 15 to 25 percent.
Severe: hard rock at a depth of 1 to 2½ feet; some stones; slopes of 10 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet.	*Severe:* soil is 15 to 25 percent stones and cobblestones; slopes of 10 to 25 percent.	*Severe:* soil is 15 to 25 percent stones and cobblestones; slopes of 10 to 25 percent.	*Severe:* soil is 15 to 25 percent stones and cobblestones; slopes of 10 to 25 percent.	*Severe:* rock at a depth of 1 to 2½ feet; soil is 15 to 25 percent stones and cobblestones; slopes of 10 to 25 percent.	*Severe:* soil is 15 to 25 percent stones and cobblestones; slopes of 10 to 25 percent.
Severe: hard rock at a depth of 1 to 2½ feet; slopes of 25 to 45 percent; some stones.	*Severe:* rock at a depth of 1 to 2½ feet; slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent; soil is 15 to 25 percent stones and cobblestones.	*Severe:* slopes of 25 to 45 percent; soil is 15 to 25 percent stones and cobblestones.	*Severe:* slopes of 25 to 45 percent; soil is 15 to 25 percent stones and cobblestones.	*Severe:* rock at a depth of 1 to 2½ feet; soil is 15 to 25 percent stones and cobblestones; slopes of 25 to 45 percent.	*Severe:* soil is 15 to 25 percent stones and cobblestones; slopes of 25 to 45 percent.
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: severely eroded; slopes of 4 to 15 percent.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 15 percent; severely eroded.	*Moderate* where slopes are 4 to 6 percent; *severe* where slopes are 7 to 15 percent; severely eroded.	*Moderate:* severely eroded; slopes of 4 to 15 percent.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 15 percent; severely eroded.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 15 percent; severely eroded.	*Moderate:* severely eroded slopes of 4 to 15 percent.
Severe: frequent flooding; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* frequent flooding; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* frequent flooding.	*Severe:* frequent flooding; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* frequent flooding; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* frequent flooding; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* frequent flooding.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Colfax (CxB)	*Severe:* fragipan; slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* slopes of 2 to 7 percent.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.
Comus (Cy, Cz)	*Severe:* infrequent flooding.	*Severe:* infrequent flooding.	*Severe:* infrequent flooding.	*Severe:* infrequent flooding.	*Severe:* infrequent flooding.
Creedmoor (Mapped only with soils of the Calverton series.)	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* slopes of 2 to 7 percent.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.
Davidson:					
(DaB2)	*Slight*	*Severe:* moderately rapid permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(DaC2)	*Moderate:* slopes of 7 to 15 percent.	*Severe:* moderately rapid permeability; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(DaD2)	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent; moderately rapid permeability.	*Severe:* slopes of 15 to 25 percent.[1]	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
(DcC)	*Severe:* stones cover 3 to 15 percent of surface.	*Severe:* moderately rapid permeability; slopes of 7 to 15 percent.	*Severe:* stones cover 3 to 15 percent of surface.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; stones cover 3 to 15 percent of surface.
(DcD)	*Severe:* slopes of 15 to 25 percent; stones cover 3 to 15 percent of surface.	*Severe:* moderately rapid permeability; slopes of 15 to 25 percent.	*Severe:* stones cover 3 to 15 percent of surface; slopes of 15 to 25 surface.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
(DcE)	*Severe:* slopes of 25 to 45 percent; stones cover 3 to 15 percent of surface.	*Severe:* moderately rapid permeability; slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet; slow permeability.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet; slow permeability.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* seasonal high water table at a depth of 1 to 1½ feet; slow permeability.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.
Severe: infrequent flooding; seasonal high water table at a depth of less than 6 feet.	*Moderate:* infrequent flooding; seasonal high water table at a depth of 2½ to 4 feet.	*Slight:* infrequent flooding.	*Moderate:* seasonal high water table at a depth of 2½ to 4 feet; infrequent flooding.	*Moderate:* seasonal high water table at a depth of 2½ to 4 feet; infrequent flooding.	*Moderate:* seasonal high water table at a depth of 2½ to 4 feet; infrequent flooding.	*Moderate:* infrequent flooding.
Severe: seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 1½ feet.	*Moderate:* seasonal high water table at a depth of 1 to 1½ feet.
Moderate: clayey material.	*Moderate:* clay loam surface layer.	*Moderate:* clay loam surface layer.	*Moderate:* clay loam surface layer.	*Moderate:* slopes of 2 to 7 percent; clay loam surface layer.	*Moderate:* slopes of 2 to 7 percent; clay loam surface layer.	*Moderate:* clay loam surface layer.
Moderate: slopes of 7 to 15 percent; clayey material.	*Moderate:* slopes of 7 to 15 percent; clay loam surface layer.	*Moderate:* slopes of 7 to 15 percent; clay loam surface layer.	*Moderate:* slopes of 7 to 15 percent; clay loam surface layer.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; clay loam surface layer.
Severe: slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Moderate: stones cover 3 to 15 percent of surface; clayey material; slopes of 7 to 15 percent.	*Severe:* stones cover 3 to 15 percent of surface.	*Severe:* stones cover 3 to 15 percent of surface.	*Severe:* stones cover 3 to 15 percent of surface.	*Severe:* slopes of 7 to 15 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 7 to 15 percent; stones cover 3 to 15 percent of surface.	*Moderate:* slopes of 7 to 15 percent; stones cover 3 to 15 percent of surface.
Severe: slopes of 15 to 25 percent; stone content of soil variable.	*Severe:* slopes of 15 to 25 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 15 to 25 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 15 to 25 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 15 to 25 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 15 to 25 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 15 to 25 percent.
Severe: slopes of 25 to 45 percent; stone content of soil variable.	*Severe:* slopes of 25 to 45 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 25 to 45 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 25 to 45 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 25 to 45 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 25 to 45 percent; stones cover 3 to 15 percent of surface.	*Severe:* slopes of 25 to 45 percent.

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TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Davidson—Continued					
(DdB3)	*Slight*	*Severe:* moderately rapid permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(DdC3)	*Moderate:* slopes of 7 to 15 percent.	*Severe:* moderately rapid permeability; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(DdD3)	*Severe:* slopes of 15 to 25 percent.	*Severe:* moderately rapid permeability; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.[1]	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Dyke:					
(DkB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(DkC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Elbert (Eb, Ee)	*Severe:* slow permeability; seasonal high water table at a depth of 0 to to 1 foot.	*Moderate:* rock at a depth of 3 to 8 feet.	*Severe:* seasonal high water table at a depth of 0 to 1 foot.	*Moderate:* seasonal high water table at a depth of 0 to 1 foot.	*Moderate:* seasonal high water table at a depth of 0 to 1 foot.
Elioak:					
(ElB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(ElC2	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(EmB3)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(EmC3)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Moderate: clayey material; severely eroded.	*Severe:* severely eroded.	*Severe:* severely eroded.	*Severe:* severely eroded.	*Severe:* severely eroded.	*Severe:* severely eroded.	*Severe:* severely eroded.
Moderate: clayey material; severely eroded; slopes of 7 to 15 percent.	*Severe:* severely eroded; slopes of 7 to 15 percent.	*Severe:* severely eroded; slopes of 7 to 15 percent.	*Severe:* severely eroded.	*Severe:* severely eroded; slopes of 7 to 15 percent.	*Severe:* severely eroded; slopes of 7 to 15 percent.	*Severe:* severely eroded.
Severe: severely eroded; slopes of 15 to 25 percent.	*Severe:* severely eroded; slopes of 15 to 25 percent.	*Severe:* severely eroded; slopes of 15 to 25 percent.	*Severe:* severely eroded; slopes of 15 to 25 percent.	*Severe:* severely eroded; slopes of 15 to 25 percent.	*Severe:* severely eroded; slopes of 15 to 25 percent.	*Severe:* severely eroded; slopes of 15 to 25 percent.
Severe: high content of plastic clay material.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Severe: high content of plastic clay material	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes 7 to 15 percent.	*Severe:* slopes 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: seasonal high water table at a depth of 0 to 1 foot; plastic clay.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; slow permeability.	*Moderate:* seasonal high water table at a depth of 0 to 1 foot.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; slow permeability.	*Moderate:* seasonal high water table at a depth of 0 to 1 foot.
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Slight	*Moderate:* severely eroded.	*Moderate:* severely eroded.	*Moderate:* severely eroded.	*Moderate:* slopes of 2 to 7 percent; severely eroded.	*Moderate:* slopes of 2 to 7 percent; severely eroded.	*Moderate:* severely eroded.
Moderate: slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; severely eroded.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Elsinboro:					
(EsB, EsB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(EsC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Fauquier:					
(FaB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(FaC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(FcC3)	*Moderate* where slopes are 4 to 15 percent; *severe* where slopes are between 15 and 20 percent; moderate permeability.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 20 percent; moderate permeability.	*Moderate* where slopes are 4 to 15 percent; *severe* where slopes are 15 to 20 percent.[1]	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 20 percent.	*Slight* where slopes are 4 to 7 percent; *moderate* where slopes are 7 to 15 percent; *severe* where slopes are 15 to 20 percent.
Fluvanna:					
(FlB, FlB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(FlC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Glenelg:					
(GlB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(GlC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: stratified sand and gravel within 6 feet of surface.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Severe: stratified sand and gravel within 6 feet of surface.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: hard rock at a depth of 5 to 7 feet; clayey material.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent; hard rock at a depth of 5 to 7 feet; clayey material.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: hard rock at a depth of 5 to 7 feet; slopes 4 to 20 percent; severely eroded.	*Moderate* where slopes are 4 to 15 percent; *severe* where slopes are 15 to 20 percent; severely eroded.	*Moderate* where slopes are 4 to 15 percent; *severe* where slopes are 15 to 20 percent; severely eroded.	*Moderate* where slopes are 4 to 15 percent; *severe* where slopes are 15 to 20 percent; severely eroded.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 20 percent; severely eroded.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 20 percent; severely eroded.	*Moderate* where slopes are 4 to 15 percent; *severe* where slopes are 15 to 20 percent; severely eroded.
Moderate: hard rock at a depth of 5 to 8 feet; clayey material.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent; hard rock at a depth of 5 to 8 feet; clayey material.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Grover:					
(GrB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent	*Slight*
(GrC2)	*Moderate:* Moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(GsC3)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Hazel:					
(HaC)	*Severe:* hard rock at a depth of 1½ feet.	*Severe:* hard rock at a depth of 1½ feet; slopes of 7 to 15 percent.	*Severe:* hard rock at a depth of 1½ feet.	*Severe:* hard rock at a depth of 1½ feet.	*Severe:* hard rock at a depth of 1½ feet.
(HaD)	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.
Helena:					
(HeB)	*Severe:* slow permeability; seasonal high water table at a depth of 1½ to 2½ feet.	*Moderate:* slopes of 2 to 7 percent; rock at a depth of 3 to 5 feet.	*Moderate:* seasonal high water table at a depth of 1½ to 2½ feet.	*Moderate:* slopes of 2 to 7 percent; seasonal high water table at a depth of 1½ to 2½ feet.	*Moderate:* seasonal high water table at a depth of 1½ to 2½ feet.
(HeC2)	*Severe:* slow permeability; seasonal high water table at a depth of 1½ to 2½ feet.	*Moderate:* slopes of 2 to 10 percent; rock at a depth of 3 to 5 feet.	*Moderate:* seasonal high water table at a depth of 1½ to 2½ feet.	*Moderate:* slopes of 2 to 10 percent; seasonal high water table at a depth of 1½ to 2½ feet.	*Moderate:* seasonal high water table at a depth of 1½ to 2½ feet.
Hiwassee:					
(HsB, HsB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(HsC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Slight	*Moderate:* sandy loam surface layer.	*Moderate:* sandy loam surface layer.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; sandy loam surface layer.	*Moderate:* slopes of 7 to 15 percent; sandy loam surface layer.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; severely eroded.
Severe: hard rock at a depth of 1½ feet.	*Severe:* hard rock at a depth of 1½ feet.	*Severe:* hard rock at a depth of 1½ feet.	*Severe:* hard rock at a depth of 1½ feet.	*Severe:* hard rock at a depth of 1½ feet; slopes of 7 to 15 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 7 to 15 percent.	*Moderate:* hard rock at a depth of 1½ feet; slopes of 7 to 15 percent.
Severe: hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.	*Severe:* hard rock at a depth of 1½ feet; slopes of 15 to 30 percent.
Severe: hard rock at a depth of 3½ to 5 feet.	*Severe:* slow permeability.	*Slight*	*Severe:* slow permeability.	*Severe:* slow permeability.	*Severe:* slow permeability.	*Slight.*
Severe: hard rock at a depth of 3½ to 5 feet.	*Severe:* slow permeability.	*Slight* where slopes are 2 to 7 percent; *moderate* where slopes are 7 to 10 percent.	*Severe:* slow permeability.	*Severe:* slow permeability.	*Severe:* slow permeability.	*Slight.*
Severe: plastic, sticky, clay material; commonly underlain by porous gravel.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Severe: plastic, sticky, clay material; commonly underlain by porous gravel.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Hiwassee—Continued (HwC3)	*Moderate:* moderate permeability.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 15 percent; moderate permeability.	*Slight* where slopes are 4 to 7 percent; *moderate* where slopes are 7 to 15 percent.	*Moderate* where slopes are 4 to 7 percent; *severe* where slopes are 7 to 15 percent.	*Slight* where slopes are 4 to 7 percent; *moderate* where slopes are 7 to 15 percent.
Iredell (Mapped only with soils of the Orange series.)	*Severe:* slow permeability.	*Slight* where slopes are less than 2 percent; *moderate* where slopes are 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; slopes as much as 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.
Klinesville: (KlD)	*Severe:* rock at a depth of 1½ feet; slopes of 15 to 25 percent.	*Severe:* rock at a depth of 1½ feet; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.[1]	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
(KlE)	*Severe* rock at a depth of 1½ feet; slopes of 25 to 45 percent.	*Severe:* rock at a depth of 1½ feet; slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.
Lignum (LgB)	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 2 feet.	*Moderate:* slopes of 2 to 7 percent.	*Severe:* seasonal high water table at a depth of 1 to 2 feet.	*Moderate:* slopes of 2 to 7 percent; seasonal high water table at a depth of 1 to 2 feet.	*Moderate:* seasonal high water table at a depth of 1 to 2 feet.
Lloyd (LlB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(LlC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(LmB3)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: plastic, sticky, clay material; commonly underlain by porous gravel.	*Moderate:* severely eroded; slopes of 4 to 15 percent.	*Moderate:* severely eroded; slopes of 4 to 15 percent.	*Moderate:* severely eroded; slopes of 4 to 15 percent.	*Moderate* where slopes are 4 to 15 percent; *severe* where slopes are 7 to 15 percent; severely eroded.	*Moderate* where slopes are 4 to 15 percent; *severe* where slopes are 7 to 15 percent; severely eroded.	*Moderate:* severely eroded; slopes of 4 to 15 percent percent.
Severe: plastic clay.	*Severe:* slow permeability.	*Slight*	*Severe:* slow permeability.	*Severe:* slow permeability.	*Severe:* slow permeability.	*Slight.*
Severe: hard rock at a depth of 1 to 2 feet; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Severe: hard rock at a depth of 1 to 2 feet; slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.
Severe: seasonal high water table at a depth of 1 to 2 feet.	*Severe:* seasonal high water table at a depth of 1 to 2 feet; slow permeability.	*Moderate:* seasonal high water table at a depth of 1 to 2 feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 2 feet.	*Severe:* slow permeability; seasonal high water table at a depth of 1 to 2 feet.	*Moderate:* seasonal high water table at a depth of 1 to 2 feet.
Moderate: hard rock at a depth of 5 to more than 10 feet; clayey material.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: hard rock at a depth of 5 to more than 10 feet; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: hard rock at a depth of 5 to more than 10 feet; clayey material; severely eroded.	*Moderate:* severely eroded.	*Moderate:* severely eroded.	*Moderate:* severely eroded.	*Moderate:* slopes of 2 to 7 percent; severely eroded.	*Moderate:* slopes of 2 to 7 percent; severely eroded.	*Moderate:* severely eroded.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Lloyd—Continued (LmC3)	*Moderate:* moderate permeability.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(LmD3)	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Louisburg: (LoC, LoC2)	*Severe:* hard rock at a depth of 2 to 4 feet.	*Severe:* rapid permeability; slopes of 5 to 15 percent; hard rock at a depth of 2 to 4 feet.	*Severe:* hard rock at a depth of 2 to 4 feet.	*Moderate* where slopes are 5 to 7 percent; *severe* where slopes are 7 to 15 percent.	*Moderate:* slopes of 5 to 15 percent.
(LoD, LoD2)	*Severe:* hard rock at a depth of 2 to 4 feet; slopes of 15 to 25 percent.	*Severe:* rapid permeability; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent; hard rock at a depth of 2 to 4 feet.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Madison: (MaB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(MaC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(MdC3)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Manassas (MnB)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2½ feet.	*Moderate:* seasonal high water table at a depth of 2½ feet.	*Moderate:* seasonal high water table at depth of 2½ fea et.
Manor (MoD)	*Moderate* where slopes are 10 to 15 percent; *severe* where slopes are 15 to 25 percent.	*Severe:* rapid permeability; slopes of 10 to 25 percent.	*Moderate* where slopes are 10 to 15 percent; *severe* where slopes are 15 to 25 percent.	*Severe:* slopes of 10 to 25 percent.	*Moderate* where slopes are 10 to 15 percent; *severe* where slopes are 15 to 25 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Moderate: hard rock at a depth of 5 to more than 6 feet; slopes of 7 to 15 percent; clayey material; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.
Severe: slopes of 15 to 25 percent; severely eroded.	*Severe:* severely eroded; slopes of 15 to 25 percent.	*Severe:* severely. eroded; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent; severely eroded.	*Severe:* slopes of 15 to 25 percent; severely eroded.	*Severe:* slopes of 15 to 25 percent; severely eroded.	*Severe:* slopes of 15 to 25 percent; severely eroded.
Severe: hard rock at a depth of 2 to 4 feet.	*Severe:* hard rock at a depth of 2 to 4 feet.	*Moderate:* sandy loam surface layer; hard rock at a depth of 2 to 4 feet.	*Moderate:* slopes of 5 to 15 percent.	*Moderate* where slopes are 5 to 7 percent; *severe* where slopes are 7 to 15 percent.	*Severe:* hard rock at a depth of 2 to 4 feet.	*Moderate:* slopes of 5 to 15 percent; hard rock at a depth of 2 to 4 feet.
Severe: hard rock at a depth of 2 to 4 feet; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent; hard rock at a depth of 2 to 4 feet.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Slight	*Moderate:* sandy loam surface layer.	*Moderate:* sandy loam surface layer.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; sandy loam surface layer.	*Moderate:* slopes of 7 to 15 percent; sandy loam surface layer.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.
Severe: seasonal high water table at a depth of 2½ feet; receives seepage from higher areas.	*Moderate:* seasonal high water table at a depth of 2½ feet.	*Slight*	*Moderate:* seasonal high water table at a depth of 2½ feet.	*Moderate:* seasonal high water table at a depth of 2½ feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2½ feet; slopes of 2 to 7 percent.	*Slight.*
Severe: slopes of 10 to 25 percent.	*Moderate* where slopes are 10 to 15 percent; *severe* where slopes are 15 to 25 percent.	*Moderate* where slopes are 10 to 15 percent; *severe* where slopes are 15 to 25 percent.	*Moderate* where slopes are 10 to 15 percent; *severe* where slopes are 15 to 25 percent.	*Severe:* slopes of 10 to 25 percent.	*Severe:* slopes of 10 to 25 percent.	*Moderate* where slopes are 10 to 15 percent; *severe* where slopes are 15 to 25 percent.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Manteo:					
(MrB)	*Severe:* hard rock at a depth of 20 inches.	*Severe:* rapid permeability.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.
(MrC)	*Severe:* hard rock at a depth of 20 inches.	*Severe:* rapid permeability; slopes of 7 to 15 percent.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches; slopes of 7 to 15 percent.	*Severe:* hard rock at a depth of 20 inches.
(MrD)	*Severe:* rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* rapid permeability; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.
(MrE)	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* rapid permeability; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.
Masada:					
(MsB, MsB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(MsC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(MtC3)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Mayodan:					
(MuB, MuB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(MuC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.
Severe: hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches.	*Severe:* hard rock at a depth of 20 inches; slopes of 7 to 15 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 7 to 15 percent.	*Severe:* hard rock at a depth of 20 inches.
Severe: hard rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 15 to 25 percent.
Severe: hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.	*Severe:* hard rock at a depth of 20 inches; slopes of 25 to 45 percent.
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: hard rock generally at a depth of 6 to 8 feet; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: hard rock generally at a depth of 6 to 8 feet; slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.
Moderate: clayey material generally at a depth of 6 to 12 feet.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent; clayey material generally at a depth of 6 to 12 feet.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Mecklenburg:					
(MvB2)	*Severe:* moderately slow permeability.	*Moderate:* slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(MvC2)	*Severe:* moderately slow permeability.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Mixed alluvial land (Mx)	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.
Myersville:					
(MyB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(MyC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Nason:					
(NaB2, NsB, NsB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(NaC2, NsC, NsC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(NsD2)	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
(NtC3)	*Moderate:* moderate permeability; slopes of 5 to 15 percent.	*Severe:* slopes 5 to 15 percent.	*Moderate:* slopes of 5 to 15 percent.	*Moderate* where slopes are 5 to 7 percent; *severe* where slopes are 7 to 15 percent.	*Slight* where slopes are 5 to 7 percent; *moderate* where slopes are 7 to 15 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: hard rock at a depth of 4 to 8 feet; plastic, sticky clay material.	*Moderate:* moderately slow permeability.	*Slight*	*Moderate:* moderately slow permeability.	*Moderate:* moderately slow permeability.	*Moderate:* moderately slow permeability.	*Slight.*
Severe: hard rock at a depth of 4 to 8 feet; plastic, sticky clay material; slopes of 7 to 15 percent.	*Moderate:* moderately slow permeability; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* moderately slow permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: seasonal high water table at a depth of 0 to 2 feet; very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.
Moderate: clayey material at a depth of 5 to 8 feet.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent; clayey material at a depth of 5 to 8 feet.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Moderate: slopes of 5 to 15 percent.	*Moderate:* slopes of 5 to 15 percent; severely eroded.	*Moderate:* slopes of 5 to 15 percent; severely eroded.	*Moderate:* slopes of 5 to 15 percent; severely eroded.	*Moderate* where slopes are 5 to 7 percent; *severe* where slopes are 7 to 15 percent; severely eroded.	*Moderate* where slopes are 5 to 7 percent; *severe* where slopes are 7 to 15 percent; severely eroded.	*Moderate:* slopes of 5 to 15 percent; severely eroded.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Orange:					
(OgA, OrA)	*Severe:* slow permeability.	*Slight*	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.
(OgB, OgB2, OrB, OrB2). (For interpretations of the Iredell soils in mapping units OrA, OrB, and OrB2, refer to the Iredell series.)	*Severe:* slow permeability.	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.
(OgC2)	*Severe:* slow permeability.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; slopes of 7 to 15 percent.
Penn:					
(PeB)	*Severe:* porous rock at a depth of 2 to 3½ feet.	*Severe:* moderately rapid permeability; porous rock at a depth of 2 to 3½ feet.	*Moderate:* porous rock at a depth of 2 to 3½ feet.	*Moderate:* porous rock at a depth of 2 to 3½ feet.	*Moderate:* porous rock at a depth of 2 to 3½ feet.
(PeC)	*Severe:* porous rock at a depth of 2 to 3½ feet.	*Severe:* moderately rapid permeability; porous rock at a depth of 2 to 3½ feet; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* porous rock at a depth of 2 to 3½ feet.
Pinkston:					
(PkC)	*Moderate:* hard rock at a depth of 3½ to 6 feet.	*Severe:* moderately rapid permeability; slopes of 7 to 15 percent.	*Moderate:* hard rock at a depth of 3½ to 6 feet; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(PkD)	*Severe:* slopes of 15 to 25 percent.	*Severe:* moderately rapid permeability; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.[1]	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.

See footnote at end of table.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: hard rock at a depth of 3 to 6 feet; seasonal high water table at a depth of 2 to 3 feet; plastic clay.	*Severe:* slow permeability.	*Slight*	*Severe:* slow permeability.	*Severe:* slow permeability.	*Severe:* slow permeability.	*Slight.*
Severe: hard rock at a depth of 3 to 6 feet; seasonal high water table at a depth of 2 to 3 feet; plastic clay.	*Severe:* slow permeability.	*Slight*	*Severe:* slow permeability.	*Severe:* slow permeability.	*Severe:* slow permeability.	*Slight.*
Severe: hard rock at a depth of 3 to 6 feet; seasonal high water table at a depth of 2 to 3 feet; plastic clay.	*Severe:* slow permeability.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slow permeability.	*Severe:* slow permeability; slopes of 7 to 15 percent.	*Severe:* slow permeability; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: porous rock at a depth of 2 to 3½ feet.	*Moderate:* porous rock at a depth of 2 to 3½ feet.	*Moderate:* porous rock at a depth of 2 to 3½ feet.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent; porous rock at a depth of 2 to 3½ feet.	*Slight.*
Severe: porous rock at a depth of 2 to 3½ feet; slopes of 7 to 15 percent.	*Moderate:* porous rock at a depth of 2 to 3½ feet.	*Moderate:* porous rock at a depth of 2 to 3½ feet.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: hard rock at a depth of 3½ to 6 feet.	*Moderate:* slopes of 7 to 15 percent; hard rock at a depth of 3½ to 6 feet.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: hard rock at a depth of 3½ to 6 feet; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Rabun:					
(RaB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(RaC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(RaD2)	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.[1]	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
(RaE2)	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.
(RcD3)	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.[1]	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Rapidan:					
(RdB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(RdC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(ReC3)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Roanoke (Rk)	*Severe:* seasonal high water table at a depth of 0 to 1 foot; slow permeability.	*Severe:* infrequent flooding.	*Severe:* infrequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; ponding.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; ponding.
Rock land (RnC, RnD, RoC, RoE)	*Severe:* stones and bedrock.	*Severe:* stones and bedrock; slopes more than 7 percent.	*Severe:* stones and bedrock.	*Severe:* stones and bedrock.	*Severe:* stones and bedrock.

See footnote at end of table.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Moderate: hard rock at a depth of 4 to 10 feet; rock outcrops; sticky clay.	*Moderate:* clay loam surface layer.	*Moderate:* clay loam surface layer.	*Moderate:* clay loam surface layer.	*Moderate:* clay loam surface layer.	*Moderate:* slopes of 2 to 7 percent; clay loam surface layer.	*Moderate:* clay loam surface layer.
Moderate: hard rock at a depth of 4 to 10 feet; slopes of 7 to 15 percent; sticky clay.	*Moderate:* clay loam surface layer; slopes of 7 to 15 percent.	*Moderate:* clay loam surface layer; slopes of 7 to 15 percent.	*Moderate:* clay loam surface layer; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* clay loam surface layer; slopes of 7 to 15 percent.
Severe: slopes of 15 to 25 percent; rock outcrops.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Severe: slopes of 25 to 45 percent; rock outcrops.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.	*Severe:* slopes of 25 to 45 percent.
Severe: slopes of 15 to 25 percent; rock outcrops; severely eroded.	*Severe:* slopes of 15 to 25 percent; severely eroded.	*Severe:* slopes of 15 to 25 percent; severely eroded.	*Severe:* slopes 15 to 25 percent; severely eroded.	*Severe:* slopes of 15 to 25 percent; severely eroded.	*Severe:* slopes of 15 to 25 percent; severely eroded.	*Severe:* slopes of 15 to 25 percent; severely eroded.
Moderate: hard rock at a depth of 4 to 12 feet; sticky clay.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: hard rock at a depth of 4 to 12 feet; slopes of 7 to 15 percent; sticky clay.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: hard rock at a depth of 4 to 12 feet; slopes of 7 to 15 percent; sticky clay.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Severe:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.
Severe: seasonal high water table at a depth of 0 to 1 foot; infrequent flooding in some areas.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; ponding; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; ponding; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; ponding; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; ponding; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; ponding; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; ponding.
Severe: stones and bedrock.	*Severe:* stones and bedrock.	*Severe:* stones and bedrock.	*Severe:* stones and bedrock.	*Severe:* stones and bedrock.	*Severe:* stones and bedrock.	*Severe:* stones and bedrock.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Rowland (Rw)	*Severe:* frequent flooding.	*Severe:* frequent flooding.	*Severe:* frequent flooding.	*Severe:* frequent flooding.	*Severe:* frequent flooding.
Seneca (SeB)	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.
Starr (SrC)	*Moderate:* seasonal high water table at a depth of 3 feet.	*Moderate:* moderate permeability; slopes of 2 to 10 percent.	*Moderate:* seasonal high water table at a depth of 3 feet.	*Moderate:* seasonal high water table at a depth of 3 feet; slopes of 2 to 10 percent.	*Moderate:* seasonal high water table at a depth of 3 feet.
State (StA)	*Severe:* infrequent flooding.	*Severe:* infrequent flooding.	*Severe:* infrequent flooding.	*Severe:* infrequent flooding.	*Severe:* infrequent flooding.
Tatum:					
(TaB2, TsB, TsB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(TtB3)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(TaC2, TsC, TsC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(TtC3)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Turbeville:					
(TuB, TuB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(TuC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: frequent flooding; seasonal high water table at a depth of 1½ to 2½ feet.	*Severe:* frequent flooding.	*Severe:* frequent flooding.	*Severe:* frequent flooding.	*Severe:* frequent flooding.	*Severe:* frequent flooding.	*Severe:* frequent flooding.
Severe: seasonal high water table at a depth of 2 to 3 feet; seepage from higher areas.	*Moderate:* seasonal high water at a depth of 2 to 3 feet.	*Slight*	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at at a depth of 2 to 3 feet.	*Slight.*
Severe: seasonal high water table at a depth of 3 feet; seepage from higher areas.	*Moderate:* seasonal high water table at a depth of 3 feet.	*Slight*	*Moderate:* seasonal high water table at a depth of 3 feet.	*Moderate:* seasonal high water table at a depth of 3 feet; slopes of 2 to 10 percent.	*Moderate:* seasonal high water table at a depth of 3 feet; slopes of 2 to 10 percent.	*Slight.*
Severe: infrequent flooding.	*Moderate:* infrequent flooding.	*Slight*	*Moderate:* infrequent flooding.	*Moderate:* infrequent flooding.	*Slight*	*Slight.*
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Slight	*Moderate:* severely eroded.	*Moderate:* severely eroded.	*Moderate:* severely eroded.	*Moderate:* slopes of 2 to 7 percent; severely eroded.	*Moderate:* slopes of 2 to 7 percent; severely eroded.	*Moderate:* severely eroded.
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Moderate: slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Moderate:* slopes of 7 to 15 percent; severely eroded.	*Swvere:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; severely eroded.
Severe: plastic, sticky clay material; underlain by porous gravel.	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Severe: plastic, sticky clay material; underlain by porous gravel.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Vance (VaB, VaB2)	*Severe:* moderately slow permeability.	*Moderate:* slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
Wadesboro:					
(WaB2)	*Moderate:* moderate permeability.	*Moderate:* moderate permeability; slopes of 2 to 7 percent.	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Slight*
(WaC2)	*Moderate:* moderate permeability; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(WaD2)	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.[1]	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Watt:					
(WbB)	*Moderate:* hard rock at a depth of 3 feet.	*Severe:* moderately rapid permeability.	*Moderate:* hard rock at a depth of 3 feet.	*Moderate:* hard rock at a depth of 3 feet; slopes of 2 to 7 percent.	*Moderate:* hard rock at a depth of 3 feet.
(WbC)	*Moderate:* hard rock at a depth of 3 feet; slopes of 7 to 15 percent.	*Severe:* moderately rapid permeability; slopes of 7 to 15 percent.	*Moderate:* hard rock at a depth of 3 feet; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
(WbD)	*Severe:* slopes of 15 to 30 percent.	*Severe:* moderately rapid permeability; slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.
Wehadkee (We)	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.	*Severe:* very frequent flooding.
Wilkes:					
(WkC)	*Severe:* hard rock at a depth of 2½ feet.	*Severe:* slopes of 7 to 15 percent; hard rock at a depth of 2½ feet.	*Severe:* hard rock at a depth of 2½ feet.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent; hard rock at a depth of 2½ feet.
(WkD)	*Severe:* hard rock at a depth of 2½ feet; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 2½ feet; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 2½ feet; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: plastic clay material.	*Moderate:* moderately slow permeability.	*Slight*	*Moderate:* moderately slow permeability.	*Moderate:* slopes of 2 to 7 percent; moderately slow permeability.	*Moderate:* moderately slow permeability; slopes of 2 to 7 percent.	*Slight.*
Slight	*Slight*	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* slopes of 2 to 7 percent.	*Slight.*
Moderate: slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.
Severe: hard rock at a depth of 3 feet.	*Moderate:* hard rock at a depth of 3 feet.	*Slight*	*Slight*	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* hard rock at a depth of 3 feet; slopes of 2 to 7 percent.	*Slight.*
Severe: hard rock at a depth of 3 feet.	*Moderate:* hard rock at a depth of 3 feet; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: hard rock at a depth of 3 feet; slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.	*Severe:* slopes of 15 to 30 percent.
Severe: very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.	*Severe:* very frequent flooding; seasonal high water table at a depth of 0 to 1 foot.
Severe: hard rock at a depth of 2½ feet.	*Severe:* hard rock at a depth of 2½ feet; slopes of 7 to 15 percent.	*Moderate:* hard rock at a depth of 2½ feet; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.
Severe: hard rock at a depth of 2½ feet; slopes of 15 to 25 percent.	*Severe:* hard rock at a depth of 2½ feet; slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.	*Severe:* slopes of 15 to 25 percent.

TABLE 7.—*Interpretations for*

Soil series and map symbol	Estimated degree of limitation and kind of limitation for—				
	Disposal of effluent from septic tanks	Sewage lagoons	Buildings of 3 stories or less (with basements)	Roadways	
				Streets and parking lots	Town and county roads
Worsham (WoB)	*Severe:* seasonal high water table at a depth of 0 to 1 foot.	*Moderate:* slopes of 2 to 7 percent.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; seepage.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; seepage.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; seepage.
York (YoB)	*Severe:* moderately slow permeability.	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet.
Zion:					
(ZoB)	*Severe:* slow permeability.	*Moderate:* slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 3 feet; hard rock at a depth of 2½ to 4 feet.	*Moderate:* seasonal high water table at a depth of 3 feet; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 3 feet.
(ZoC2)	*Severe:* slow permeability.	*Severe:* slopes of 7 to 15 percent.[1]	*Moderate:* seasonal high water table at a depth of 3 feet; hard rock at a depth of 2½ to 4 feet; slopes of 7 to 15 percent.	*Severe:* slopes of 7 to 15 percent.	*Moderate:* seasonal high water table at a depth of 3 feet; slopes of 7 to 15 percent.

[1] In areas other than subdivisions, slope is only a moderate limitation.

nonfarm uses of soils—Continued

Estimated degree of limitation and kind of limitation for—Continued						
Sanitary land fills (trench type)	Cemeteries	Lawns, landscaping, and golf fairways	Intensively used— Campsites: Tents	Intensively used— Campsites: Trailers	Intensively used— Athletic fields	Extensively used playgrounds and picnic areas
Severe: seasonal high water table at a depth of 0 to 1 foot; seepage from higher areas; sticky, plastic clay material.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; seepage; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; seepage.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; seepage.	*Severe:* seasonal high water table at a depth of 0 to 1 foot.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; slow permeability.	*Severe:* seasonal high water table at a depth of 0 to 1 foot; seepage.
Severe: seasonal high water table at a depth of 2 to 3 feet.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; moderately slow permeability.	*Slight*	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; moderately slow permeability.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; moderately slow permeability; slopes of 2 to 7 percent.	*Moderate:* seasonal high water table at a depth of 2 to 3 feet; moderately slow permeability; slopes of 2 to 7 percent.	*Slight.*
Severe: hard rock at a depth of 2½ to 4 feet; seasonal high water table at a depth of 3 feet.	*Severe:* slow permeability; hard rock at a depth of 2½ to 4 feet.	*Slight*	*Severe:* slow permeability.	*Severe:* slow permeability.	*Severe:* slow permeability.	*Slight.*
Severe: hard rock at a depth of 2½ to 4 feet; seasonal high water table at a depth of 3 feet.	*Severe:* slow permeability; rock at a depth of 2½ to 4 feet.	*Moderate:* slopes of 7 to 15 percent.	*Severe:* slow permeability.	*Severe:* slow permeability; slopes of 7 to 15 percent.	*Severe:* slow permeability; slopes of 7 to 15 percent.	*Moderate:* slopes of 7 to 15 percent.

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Differences in parent material are reflected in the texture and mineral content of the soils. Granite, for example, was the source of parent material for the Appling and Cecil soils. Because of the characteristics of the granite, Appling and Cecil soils have a sandy surface layer and a large amount of potash in the subsoil. As another example, base saturation is greater than 35 percent in the Bremo, Elbert, Fauquier, Iredell, Myersville, and Orange soils because those soils were derived from basic rocks. Other characteristics of the parent material are reflected in the color, type, content of clay, drainage, natural fertility, and workability of the soils.

Relief

Relief, or lay of the land, affects the formation of soils by causing differences in internal drainage, runoff, and geologic erosion. It can alter the effects of parent material on the development of soils to the extent that several different kinds of soils may form from the same kind of parent material.

In this county relief ranges from nearly level to undulating or steep. Where the relief is undulating and the area is fairly smooth, deep, well-drained soils, for example the Tatum, may develop after enough time has elapsed for the factors of soil formation to have acted. Where the relief is steep, the soil material is removed almost as fast as it forms, and excessively drained, shallow soils, such as the Manteo, are formed.

Where the relief is so nearly level that little water runs off, a large part of the water from precipitation percolates downward through the soil. This water carries with it the clay that has formed as a result of the weathering processes. It deposits the clay at a lower depth in the soil, filling the spaces between the granules of soil material. As a result, a claypan develops and the soil becomes moderately well drained or somewhat poorly drained. Lignum soils have formed in this kind of environment.

In depressions, silt and clay accumulate in the subsoil, and soil material from surrounding areas washes in and accumulates on the surface. Where the depression is so pronounced that ponding occurs in wet seasons and little water drains from the surface, the vegetation consists of plants that can tolerate a large amount of moisture. After these plants die, they do not completely decay, because the soil is too wet for good aeration. As a result, organic material accumulates and the soils that form are poorly drained or very poorly drained. Worsham soils formed in this kind of environment.

Climate

Orange County has a warm, humid, continental type of climate. The average temperature in summer is 75° F., and the average temperature in winter is 35° F. The average amount of rainfall received annually is about 42 inches. Rainfall is well distributed throughout the year, but a slightly greater amount is received in spring and summer than in fall and winter. The county is a transitional area in which both thermic and mesic soils occur. (See discussion of families under "Classification of Soils.")

The climate typical of this county favors intense leaching of soluble material and colloidal material downward in such soils as the Cecil, Appling, and Tatum. Because the soils are frozen for only short periods and to no great depth, the amount of weathering and the translocation of material are further increased. Leaching has kept free carbonates of lime from accumulating in the soils, though calcium is a part of the mineral components of many of the underlying rocks.

Weathering breaks down the rocks so that other forces of soil formation have a chance to act. All of the normal soils have well-developed podzolic features. Practically all of the soils are acid; the degree of acidity ranges from extremely acid to slightly acid.

The climate varies locally as a result of differences in the degree and direction of slope and the position on the slope. Although its effect is modified locally by relief, the climate is nearly uniform throughout the county. Therefore, this factor does not account for significant differences among the soils. A more detailed discussion of the climate of Orange County is given in the section "Climate," near the back of this survey.

Plants and animals

Active and important agents in the formation of soils are trees, shrubs, grasses, and micro-organisms, earthworms, animals, and other forms of plant and animal life that live on and in the soils. The kinds of plants and animals that live on and in the soils are determined by environmental factors, including climate, parent material, relief, and age of the soil, and the associated organisms. Where the variation either in climate or in vegetation is great enough to be significant, the general type of soil varies accordingly.

Plants supply organic matter, and they transfer moisture and plant nutrients from the lower horizons to the upper horizons. Organic matter decomposes and is mixed into the soils by the action of micro-organisms and earthworms or by chemical reaction. The rate of decomposition is fairly rapid because of the favorable temperature, generally abundant moisture, condition of the organic matter, and favorable population of micro-organisms in the soils. In this county organic matter has not accumulated in the soils to any great extent, but it ranges from 1 to 3 percent, by volume.

The dominant vegetation during the period when the soils were forming was a forest of hardwoods or of hardwoods and pines. The density of the stands, the proportion of different species, and the kind of ground cover vary to some extent. The forests were so nearly uniform in density, composition, and ground cover, however, that this factor would not likely account for differences in properties of the well-drained soils that have a well-developed profile.

At present, most of the native trees are deciduous and have moderately deep or deep roots. Their leaves vary in content of plant nutrients, but they generally return more bases and more phosphorus to the soils than do the needles of coniferous trees.

Specific information about the effects on the formation of soils of the activities of the micro-organisms, earthworms, and larvae that inhabit the soils has not been precisely determined. It is unlikely, however, that in this county micro-organisms, earthworms, and larvae have been a major factor in the development of many different kinds of soils.

Time

The length of time that soil material has been exposed to soil-forming processes accounts for some differences in the soils, for time is necessary for the development of distinct genetic horizons in the soil profile. In soil genesis time refers to the degree of development of the soil profile rather than to the actual length of time the soil has undergone the processes that lead to the development of a profile. Soils are considered either mature or immature. If a soil is considered mature, or old, it has well-defined genetic horizons, regardless of drainage. An example of soils that are considered mature are the Cecil, for those soils have well-defined genetic horizons and are said to be in equilibrium with their environment. Immature, or young, soils, on the other hand, for example the Comus soils, show little or no development of genetic horizons.

Although time determines the degree of maturity of a soil to a great extent, relief and the kind of parent material also greatly influence maturity, as do climate and plants and animals. For example, the Manteo soils and other shallow, moderately steep or steep soils show little or no development of a subsoil, and those soils are said to be immature, or young, because natural erosion has removed the soil material almost as fast as it has accumulated. Likewise, soils on first bottoms and on recent colluvium are immature because their parent material is young; new material is added by periodic deposition. All of the soils of this county, except the shallow soils on uplands, the well-drained soils on first bottoms, and the soils in recent colluvium, are considered mature or nearly mature.

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.

Thus in classification, soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used 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.

Two systems of classifying soils have been used in the United States in recent years. The older system was adopted in 1938 (*7*) and later revised (*6*). The system currently used was adopted for general use by the National Cooperative Soil Survey in 1965. The current system is under continual study (*5*, *9*). Therefore, readers interested in developments of the current system should search the latest literature available. In table 8 the soil series of Orange County are placed in some categories of the current system and in great soil groups of the 1938 system.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system the 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 origin are grouped together. The classes of the current system are briefly discussed in the following paragraphs.

Order. Ten soil orders are recognized. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these soil orders are those that tend to give broad climatic groupings of soils. Three exceptions, the Entisols, Inceptisols, and Histosols, occur in many different kinds of climate. The four orders in Orange County are Alfisols, Entisols, Inceptisols, and Ultisols.

Alfisols have formed mostly under trees, but some have formed under grass. These soils are light colored and have a base saturation of more than 35 percent. The base saturation increases with increasing depth.

Entisols are mineral soils that have changed little from the geologic parent material in which they are forming. The main change is the accumulation of organic matter in the surface layer.

Inceptisols are mineral soils in which horizons have definitely started to develop. They generally are on young, but not recent, land surfaces.

Ultisols are mineral soils that have horizons of clay accumulation and a base saturation of less than 35 percent.

Suborder. Each order is subdivided into groups (suborders) that are based mostly on soil characteristics that seem to produce classes having the greatest similarity from the standpoint of their genesis. Suborders narrow the broad climatic range of soils that are in the orders.

Soil characteristics used to separate suborders mainly reflect either the presence or absence of waterlogging or soil differences produced through the effects of climate or vegetation. The names of suborders have two syllables, the last syllable of which indicates the order. An example is Udalf (Ud, meaning humid, and alf, from Alfisol).

Great Groups. Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and other features. The horizons used as a basis for distinguishing between great groups are those in which (1) clay, iron, or humus have accumulated; (2) a pan has formed that interferes with growth of roots, movement of water, or both; or (3) a thick, dark-colored surface horizon has formed. The other features commonly used are the self-mulching properties of clay, temperature of the soil, major differences in chemical composition (mainly the bases calcium, magnesium, sodium, and potassium), or the dark-red or dark-brown colors associated with soils formed in material weathered from basic rocks.

Names of the great groups have three or four syllables. They are made by adding a prefix to the name of the suborder. An example is Hapludalf (Hapl, meaning usual; ud, for humid; and alf, from Alfisol). The great group is not shown separately in table 8, because it is the last word in the name of the subgroup.

TABLE 8.—*Classification of soil series into higher categories*

Series	Current classification [1]			Great soil group of the 1938 classification
	Family	Subgroup	Order	
Albano	Fine, mixed, mesic	Typic Ochraqualfs	Alfisols	Planosols.
Altavista	Fine-loamy, mixed, thermic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Appling	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Augusta	Fine-loamy, mixed, thermic	Aeric Ochraquults	Ultisols	Planosols.
Bermudian	Fine-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Bowmansville	Fine-loamy, mixed, nonacid, mesic	Aeric Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Bremo	Loamy-skeletal, mixed, thermic	Typic Dystrochrepts	Inceptisols	Lithosols.
Bucks	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils intergrading toward Reddish-Brown Lateritic soils.
Buncombe	Mixed, thermic	Typic Udipsamments	Entisols	Alluvial soils.
Calverton	Fine-loamy, mixed, mesic	Aquic Fragiudults	Ultisols	Red-Yellow Podzolic soils intergrading toward Planosols.
Catoctin	Loamy-skeletal, mixed, mesic	Ruptic-Alfic Dystrochrepts	Inceptisols	Lithosols.
Cecil	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Chewacla	Fine-loamy, mixed, thermic	Aquic Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Colfax	Fine-loamy, mixed, thermic	Aquic Fragiudults	Ultisols	Planosols.
Comus	Coarse-loamy, mixed, mesic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Creedmoor	Clayey, mixed, thermic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils intergrading toward Planosols.
Davidson	Clayey, kaolinitic, thermic	Rhodic Paleudults	Ultisols	Reddish-Brown Lateritic soils.
Dyke	Clayey, mixed, mesic	Typic Rhodulults	Ultisols	Reddish-Brown Lateritic soils.
Elbert	Fine, montmorillonitic, mesic	Typic Ochraqualfs	Alfisols	Planosols.
Elioak	Clayey, kaolinitic, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Elsinboro	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils.
Fauquier	Fine, mixed, mesic	Ultic Hapludalfs	Alfisols	Red-Yellow Podzolic soils intergrading toward Reddish-Brown Lateritic soils.
Fluvanna	Clayey, mixed, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils.
Glenelg	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Grover	Fine-loamy, micaceous, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Hazel	Coarse-loamy, mixed, mesic	Typic Dystrocherpts	Inceptisols	Lithosols.
Helena	Clayey, mixed, thermic	Aquic Hapludults	Ultisols	Red-Yellow Podzolic soils intergrading toward Planosols.
Hiwassee	Clayey, kaolinitic, thermic	Typic Rhodudults	Ultisols	Reddish-Brown Lateritic soils.
Iredell	Fine, montmorillonitic, thermic	Vertic Hapludalfs	Alfisols	Planosols.
Klinesville	Loamy-skeletal, mixed, mesic	Lithic Dystrochrepts	Inceptisols	Lithosols.
Lignum	Clayey, mixed, thermic	Aquic Hapludults	Ultisols	Planosols.
Lloyd	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils intergrading toward Reddish-Brown Lateritic soils.
Louisburg	Coarse-loamy, siliceous, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols	Lithosols.
Madison	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Manassas	Fine-loamy, mixed, mesic	Typic Hapludults	Ultisols	Alluvial soils intergrading toward Red-Yellow Podzolic soils.
Manor	Coarse-loamy, micaceous, mesic	Typic Dystrochrepts	Inceptisols	Sols Bruns Acides.
Manteo	Loamy-skeletal, mixed, thermic	Lithic Dystrochrepts	Inceptisols	Lithosols.
Masada	Fine-loamy, mixed, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Mayodan	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Mecklenburg	Fine, mixed, thermic	Ultic Hapludulfs	Alfisols	Gray-Brown Podzolic soils.
Myersville	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Red-Yellow Podzolic soils intergrading toward Gray-Brown Podzolic soils.
Nason	Clayey, mixed, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Orange	Fine, montmorillonitic, thermic	Albaquic Hapludalfs	Alfisols	Planosols.
Orange, concretionary variant.	Fine, mixed, thermic	Aquic Hapludalfs	Alfisols	Planosols.

See footnote at end of table.

TABLE 8.—*Classification of soil series into higher categories*—Continued

Series	Current classification [1]			Great soil group of the 1938 classification
	Family	Subgroup	Order	
Penn	Fine-loamy, mixed, mesic	Ultic Hapludalfs	Alfisols	Lithosols.
Pinkston	Coarse-loamy, mixed, thermic	Ruptic-Ultic Dystrochrepts	Inceptisols	Lithosols.
Rabun	Clayey, kaolinitic, mesic	Typic Rhodudults	Ultisols	Reddish-Brown Latertitic soils.
Rapidan	Clayey, kaolinitic, mesic	Typic Rhodudults	Ultisols	Red-Yellow Podzolic soils intergrading toward Reddish-Brown Lateritic soils.
Roanoke	Clayey, mixed, thermic	Typic Ochraquults	Ultisols	Planosols.
Rowland	Fine-loamy, mixed, mesic	Aquic Fluventic Dystrochrepts	Inceptisols	Alluvial soils.
Seneca	Fine-loamy, mixed, thermic	Typic Hapludults	Ultisols	Alluvial soils intergrading toward Red-Yellow Podzolic soils.
Starr	Fine-loamy, mixed, thermic	Fluventic Dystrochrepts	Inceptisols	Alluvial soils intergrading toward Red-Yellow Podzolic soils.
State	Fine-loamy, mixed, thermic	Typic Hapludults	Ultisols	Gray-Brown Podzolic soils.
Tatum	Clayey, mixed, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Turbeville	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Vance	Clayey, mixed, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils intergrading toward Planosols.
Wadesboro	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols	Red-Yellow Podzolic soils.
Watt	Loamy-skeletal, mixed, mesic	Umbric Dystrochrepts	Inceptisols	Lithosols.
Wehadkee	Fine-loamy, mixed, nonacid, thermic.	Fluventic Haplaquepts	Inceptisols	Low-Humic Gley soils.
Wilkes	Loamy, mixed, thermic, shallow	Typic Hapludalfs	Alfisols	Lithosols.
Worsham	Clayey, mixed, thermic	Typic Ochrequults	Ultisols	Planosols.
York	Fine-loamy, mixed, thermic	Typic Fragiudults	Ultisols	Red-Yellow Podzolic soils intergrading toward Planosols.
Zion	Fine, mixed, thermic	Ultic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading toward Planosols.

[1] Placement of some soil series in the current system of classification, especially in families, may change as more precise information becomes available.

SUBGROUP. Great soil groups are subdivided into subgroups. One of these represents the central, or typic, segment of the group. Other subgroups have properties of the group but have one or more properties of another great group, suborder, or order, and these are called intergrades. Also, subgroups may be established for soils having properties that intergrade outside the range of any other great group, suborder, or order. The names of subgroups are formed by placing one or more adjectives before the name of the great group. An example is Typic Hapludalf.

FAMILIES. Families are separated within a subgroup, primarily on the basis of properties that are important to the growth of plants or to the behavior of soils used for engineering. The main properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. The names of families consist of a series of adjectives that precede the name of a subgroup. The adjectives used are the class names for soil texture, mineralogy, and so on (see table 8). An example is the fine-loamy, mixed, mesic family of Typic Hapludalfs.

SERIES. The series consists of a group of soils that formed from a particular kind of parent material and that have genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile. Among these characteristics are color, structure, reaction, consistence, and mineralogical and chemical composition.

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Additional Facts About the County

This section provides general information about the physiography, geology, and drainage of the county. It also gives facts about the climate and water supply.

The area that is now Orange County was first settled by Governor Alexander Spotswood and his followers and by German families in 1714. The German families had been brought from Germany by Governor Spotswood to operate his iron mines and furnaces, located in the area. They established a settlement, called Germanna, on the Rapidan River.

Orange County was formed in 1734 from Spotsylvania County and was named for William III of England, the Prince of Orange. It was much larger originally than it is at the present time. The size of this county diminished as parts of it were taken to form other counties. The last change in the boundaries of Orange County was made in 1838, when Greene County was formed from part of Orange County. Originally, the courthouse was established at a place near Raccoon Ford along the Rapidan River. It was later moved to the present town of Orange.

Physiography, Geology, and Drainage

Orange County is on the upper part of the Piedmont Plateau and is wholly within the Piedmont physiographic province (*4*). In Virginia this province lies between the Blue Ridge province on the west and the Coastal Plain province on the east.

The county is well dissected and is mostly rolling. The interstream divides are fairly wide and are sloping or rolling, except in areas along the lower tributaries of large streams. Along the lower tributaries of the major streams, entrenchment has been rapid and bluffs and V-shaped valleys are common. The walls of the valleys are steep, and they rise abruptly from the flood plains. The steepest parts of the county are the areas underlain by greenstone and sandstone.

Elevations range from 200 to about 500 feet, except for some higher areas in the southwestern part of the county. Elevations are lowest in the basin of the Rapidan River, along the northern border of the county. Some of the highest points in the county are Cowherd Mountain, 1,197 feet; Merry Mountain, 1,109 feet; Clark Mountain, 1,082 feet; Scott Mountain, 973 feet; Gibson Mountain, 960 feet; and Haudricks Mountain, 916 feet.

The county is underlain by many complex rocks and rock formations. Three groups of rock are present—igneous, metamorphic, and sedimentary. Granite, diorite, dacite, and diabase are the igneous rocks; greenstone schist, sericite-schist, graphitic schist, phyllite, gneiss, and Everona limestone are the metamorphic rocks; and shale, sandstone, and conglomerate are the sedimentary rocks.

The county contains nine different rock formations, according to the geologic map of Virginia (*3*). Of these, the Lynchburg formation is on the western side of the county, adjacent to Greene County. It is composed of phyllite, quartzite, graywacke, conglomerate, and schist. This area is highly dissected by intermittent and permanent streams, has a well-defined drainage pattern, and ranges from gently sloping to steep. Elevations range from 400 to 600 feet.

East of the Lynchburg formation is the Newark group of rocks, which underlies the communities of Barboursville and Somerset. This formation also occupies small areas along the east side of the Rapidan River and extending to Raccoon Ford. All the rocks of Triassic age, namely sandstone, red shale, and conglomerate, are in this group. The areas are composed of wide, sloping ridges and of small hilly and steep places along the larger streams. The drainage pattern is dendritic, but it is less well developed than the drainage pattern in other parts of the county. The smoothest areas are those underlain by red shale, and the roughest ones are those underlain by sandstone. Elevations range from 340 to 916 feet. Haudricks Mountain is in this part of the county.

North of the Newark group is an area of igneous rocks that include sills, dikes, and diabase gabbro. This area is small and is gently sloping to moderately steep. Elevations in the area range from 400 to 560 feet.

East of the Newark group is the Catoctin formation in an area known as the Southwestern Mountain Range. This mountain extends to Clark Mountain, which lies northeast of the town of Orange. The Catoctin formation consists of basic lava flows and includes greenstone schist and gneiss composed of chlorite, plagioclase, amphibole, and epidote. The drainage pattern in the area is well defined, and this area ranges from gently sloping to steep. Elevations range from 500 to 1,197 feet.

East of the Catoctin formation is the largest formation in the county, consisting of metamorphosed sedimentary rocks. In this area are metamorphosed sedimentary and interlayered igneous rocks that overlie the Virginia Blue Ridge complex, previously mapped as Wissahickon schist and Wissahickon granite gneiss, phyllite, and schist. The area is dissected by intermittent and permanent streams and has a well-defined drainage pattern. It ranges from nearly level to steep. Elevations range from 275 to 525 feet.

A narrow strip underlain by limestone and marble crosses the county from Gordonsville to the Rapidan River. Everona limestone is also in this strip. Much of this area has been covered by terraces. Elevations range from 300 to 450 feet.

Two areas underlain by granite are in the communities of Thornhill and Locustgrove. Rocks in these areas include biotite and muscovite granite, granodiorite, monzonite, and Columbia granite, and some mica schist and gneiss. These areas range from nearly level to steep. Elevations range from 300 to 475 feet.

An area underlain by quartz diorite and some blue quartz is west of Locustgrove. Most of this area is nearly flat, but it ranges from nearly level to sloping and has a drainage pattern that is not well defined. Elevations in this area range from 300 to 420 feet.

Between Ridge Run and Terrys Run is a small area underlain by hornblende gabbro, gneiss, and talc. Included in this area are amphibole chlorite schist, chloritic hornblende gneiss, some amphibolite chloritic diorite, hornblende diorite, kyanite schist, and kyanite quartzite. This area ranges from nearly level to moderately steep. Elevations range from 300 to 500 feet.

Important minerals that have been mined in this county are gold, iron, limestone, soapstone, talc, copper, manganese, and shale. Other known minerals are asbestos, barite, graphite, sulfur, and galena, in addition to one diamond that was found in 1836. In the past, greenstone and granite were used for construction in this county.

The Rapidan, North Anna, and Rivanna Rivers supply surface drainage in Orange County. In many small areas, totaling about 10,000 acres, drainage is poor. The Bowmansville, Albano, Elbert, Roanoke, Wehadkee, and Worsham soils are among those that are poorly drained, and the Bowmansville and Wehadkee soils are on flood plains and are subject to flooding. Many areas of the poorly drained soils can be improved by artificial drainage.

Climate [5]

Orange County has a mild, continental climate characterized by well-defined seasons. Spring and summer generally arrive on about the calendar dates for those

[5] By Daniel L. Sala, State climatologist, U.S. Weather Bureau, assisted by Fred A. Davis, meteorologist, U.S. Weather Bureau.

seasons, but fall extends well into November. As a result, winter is not long, and it is not especially severe, because of the protection provided by the mountains to the west.

Tables 9, 10, 11, and 12 give detailed information about the climate of the county. Table 9 gives a summary of facts about temperature and precipitation; table 10 shows the probabilities of the last freezing temperatures in spring and the first in fall; table 11 shows the approximate frequency of rains of stated duration and intensity; and table 12 shows the probabilities of drought days.

The temperature and precipitation data shown in tables 9 and 10 are from records of the Virginia Agricultural Experiment Station at Orange. The averages and probabilities are representative of most of the county. In the extreme southwestern part, however, where the Southwestern Mountain Range touches the border of the county, no data are available. Considering the normal drop in temperature of about 3 degrees per thousand feet of rise in ground elevation, the differences in temperature between the southwestern part of the county (elevation of about 1,200 feet) and the rest of the county (elevations of 200 to 300 feet) would not be great.

TABLE 9.—*Temperature and precipitation data*

[Data from records of Virginia Agricultural Experiment Station at Orange]

Month	Average daily maximum	Average daily minimum	2 years in 10 will have at least 4 days with— Maximum temperature equal to or higher than—	2 years in 10 will have at least 4 days with— Minimum temperature equal to or lower than—	Average total	1 year in 10 will have— Less than—	1 year in 10 will have— More than—	Days with snow cover 1 inch or more in depth	Average depth of snow on days with snow cover
	° F.	*° F.*	*° F.*	*° F.*	*In.*	*In.*	*In.*	*Number*	*In.*
January	49	27	66	20	2.9	0.8	4.7	4	4
February	51	29	67	21	2.6	1.1	4.5	4	6
March	59	35	74	26	3.6	2.0	5.7	3	5
April	71	45	86	36	3.3	1.4	5.4	(1)	2
May	79	54	90	47	3.5	1.0	5.8	0	0
June	86	62	95	55	3.9	1.8	8.0	0	0
July	90	65	96	62	4.3	1.1	6.6	0	0
August	87	65	96	60	4.5	1.3	11.0	0	0
September	77	58	92	49	4.1	.7	6.5	0	0
October	71	46	84	39	3.1	.7	6.5	0	0
November	60	37	73	27	3.3	.9	6.8	(1)	2
December	49	28	66	18	3.0	.9	5.2	4	3
Year	70	47	[2] 99	[3] 5	42.1	31.6	51.0	15	4

[1] Less than one-half 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 records of Virginia Agricultural Experiment Station at Orange]

Probability	Dates for given probability and temperature				
	16° F. or lower	20° F. or lower	24° F. or lower	28° F. or lower	32° F. or lower
Spring:					
1 year in 10 later than	March 9	April 2	April 8	April 22	April 30
2 years in 10 later than	March 4	March 26	April 1	April 17	April 25
5 years in 10 later than	February 16	March 12	March 20	April 7	April 15
Fall:					
1 year in 10 earlier than	November 24	November 11	November 6	October 26	October 13
2 years in 10 earlier than	November 29	November 16	November 13	October 29	October 18
5 years in 10 earlier than	December 8	November 25	November 16	November 4	October 28

TABLE 11.—*Frequency and intensity of precipitation*

Frequency	Precipitation during period of—									
	5 minutes	10 minutes	15 minutes	30 minutes	1 hour	2 hours	3 hours	6 hours	12 hours	24 hours
	In.	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
Precipitation expected once in:										
1 year	0.4	0.6	0.7	1.0	1.3	1.6	1.7	2.1	2.6	3.0
2 years	.4	.6	.8	1.1	1.4	1.8	1.9	2.3	3.0	3.6
5 years	.6	.9	1.2	1.6	2.0	2.4	2.6	3.3	4.1	4.8
10 years	.7	1.1	1.4	1.9	2.3	2.8	3.2	3.8	4.8	5.6
25 years	.9	1.3	1.7	2.3	2.8	3.4	3.7	4.8	5.7	6.6
50 years	1.0	1.5	1.9	2.8	3.1	3.8	4.2	5.4	6.4	7.4
100 years	1.0	1.6	2.0	2.8	3.4	4.2	4.6	5.9	7.0	8.1

TABLE 12.—*Probability of drought days*

Month	Probability of drought	Minimum number of drought days expected if available moisture capacity within the root zone is—				
		1 inch	2 inches	3 inches	4 inches	5 inches
April.	1 year in 10	13	0	0	0	0
	2 years in 10	10	0	0	0	0
	3 years in 10	8	0	0	0	0
	5 years in 10	5	0	0	0	0
May.	1 year in 10	21	19	10	0	0
	2 years in 10	17	14	6	0	0
	3 years in 10	14	10	0	0	0
	5 years in 10	10	0	0	0	0
June.	1 year in 10	22	20	18	14	9
	2 years in 10	20	16	13	9	0
	3 years in 10	18	14	10	6	0
	5 years in 10	15	10	0	0	0
July.	1 year in 10	22	22	21	20	18
	2 years in 10	19	18	16	14	11
	3 years in 10	17	15	13	10	6
	5 years in 10	13	10	7	0	0
August.	1 year in 10	23	21	20	19	18
	2 years in 10	19	16	14	13	11
	3 years in 10	16	12	9	8	7
	5 years in 10	12	6	0	0	0
September.	1 year in 10	23	20	19	18	18
	2 years in 10	19	15	13	12	11
	3 years in 10	16	12	9	7	6
	5 years in 10	12	5	0	0	0

TEMPERATURE.—In summer the temperature often rises to 90° F. or more, and occasionally it exceeds 100°. Humidity is generally low, and therefore, the heat is not especially oppressive. Subzero temperatures are rare; they occur mostly in December and January.

The general temperature pattern for the county, shown in table 9, can be used for most planning purposes. The average daily maximum temperature, for example, is 90° F. or less during the summer months, and the average daily minimum temperature is only slightly below freezing during the winter months. As an example of the probabilities of very high and very low temperatures, in 2 years in 10 a temperature of 96 degrees or higher will occur on at least 4 days in July and August. At the other extreme, in 2 years in 10, a temperature of 18 degrees or lower will occur on at least 4 days in December. In both these examples, the days on which these extreme temperatures occur are not necessarily consecutive.

The growing season, defined as the length of time between the last freezing temperature in spring and the first freezing temperature in fall, is 196 days. It generally starts about April 15 and extends through October 28. It is long enough that many different crops can mature properly. The grazing season is slightly longer than the growing season. Silos are in general use to supply succulent feed for livestock in winter. Temperatures are low enough in winter that a substantial number of barns and stables are needed to properly care for livestock. The risk of damage to crops from unseasonable freezing temperatures is great enough to be considered by farmers. Freezing temperatures late in spring can occur several weeks after annual crops have started to grow. Freezes early in autumn can shorten the growing season by several weeks, before the general decrease in temperature would normally cause growth to cease.

Knowing the probability that stated critical temperatures will occur on a given date (see table 10) can be helpful in long-range planning for farmers and for operators of commercial and industrial establishments. Calculation of these probabilities was based on the assumption that the dates of the last freezing temperature in spring and the first freezing temperature in fall will generally occur at about the same time in the future as they have in the past. Temperatures of 24° F. or lower will occur later than April 1 in 2 out of 10 years, for example. This means that in the past, temperatures lower than 24° have occurred only 20 percent of the time after April 1. Variances from these average dates do occur, especially in places where the flow of air is blocked, as in narrow, winding valleys and in closed troughs. Areas near Southwestern Mountain are likely to have more variable temperatures than other parts of the county because of the more rugged terrain.

PRECIPITATION.—The average annual precipitation ranges from about 40 inches, in the eastern part of the county, to nearly 45 inches, in the higher areas in the

western part. The monthly precipitation ranges from slightly less than 3 inches in winter to more than 4 inches in summer. More than 60 percent of the total annual precipitation is received during the growing season, when plants need the most moisture. Even where a large amount of precipitation is received, trees and other plants in large areas of the county sometimes require more moisture than is available. Soil moisture occasionally falls below normal, and dry spells and droughts are not uncommon. Though the amount of rainfall is greater during the warmer months than in winter, most of the summer precipitation is in the form of thundershowers. Throughout large areas, these heavy, but brief, showers do little to supply moisture. As a result, soil moisture can range from excessive to deficient within a short distance.

The type of precipitation depends largely on the season. Freezing rain is more likely late in fall and early in spring than at other times, but it does occur in winter. At times in winter, the precipitation consists of rain, freezing rain, sleet, snow, or a mixture of these during one storm. Because temperatures during the day frequently rise above freezing, snow does not remain on the ground for any great length of time. On only 4 days in each month from December through February, on the average, is 1 inch or more of snow on the ground. The average maximum depth of snow is 4 to 6 inches, and the average total annual snowfall is about 17 inches. During the past 40 years, however, the amount has ranged from as much as 40 inches to as little as 1 inch. General precipitation that lasts for 2 or 3 days is usually associated with storms that pass to the south and east of the county. These storms, which carry abundant moisture from the Atlantic Ocean and the Gulf of Mexico, are commonly referred to as easterners and hurricanes, or tropical storms.

The total annual precipitation can range from more than 50 inches to less than 30 inches in Orange County. In all probability, from September through January in 1 year out of 10, less than 1 inch of rainfall will be received, though this does not necessarily mean that this amount will be received during consecutive months of the same year. Intense rainfall of short duration (see table 11) affects the production of crops, and it affects all types of construction.

Drought occurs when the soil does not hold enough available water to supply the needs of growing plants. Knowing how frequently drought days will occur can be helpful for planning purposes, for droughts and prolonged dry spells are not uncommon to the area. Table 12 gives estimates of the frequency of drought days for an area that includes Orange County. The data were taken from studies of agricultural drought in Virginia (*10*). The estimated number of drought days are shown at four different probability levels and at several levels of available soil moisture capacity. During July, for example, table 12 shows that a minimum of 15 drought days can be expected in 3 out of 10 years if the moisture capacity of the root zone is 2 inches.

If a farmer knows when a damaging drought is most likely to occur, and if he knows the kinds of crops that can be grown on a droughty soil, he can plant crops that are least likely to be damaged by drought. Also, if the farmer knows the frequency of dry spells and how long these spells are likely to last, he can estimate the value of irrigation. He can decide whether or not an irrigation system will increase crop yields to the point where the gain will offset the cost.

Storms.—Approximately 40 thunderstorms occur each year in Orange County, and two-thirds of this number occur in summer. Occasionally, these storms are intense and are accompanied by hail, strong winds, and heavy rain. They rarely are severe enough to spawn a tornado. From information obtained in a recent study, only two tornadoes generally occur each year in Virginia. Since the beginning of the 20th century, no tornadoes have been observed in this county.

Hurricanes usually lose their identity and become extratropical storms by the time they reach this county. Inland tropical storms are often accompanied by torrential rainfall, but the velocity of the wind is generally diminished. As a result, little damage is caused by wind. One of the exceptions was Hurricane Hazel, which passed east of this area and within a few miles of the county line on October 15, 1954. During that storm, winds gusted to 80 miles per hour and rainfall was in excess of 3 inches during a 24-hour period.

Water Supply

The northern half of Orange County is in the watershed of the Rapidan River, and the southern half is in the watershed of the North Anna River. Normally, the Rapidan River has a good flow, but the flow is too small during times of drought to yield a large amount of water. Storage reservoirs would provide a sustained yield. If the proposed Salem Church dam is constructed on the Rappahannock River near Fredericksburg, water will be backed up in the Rapidan River to the vicinity of Raccoon Ford.

The North Anna River and its tributaries have their headwaters in Orange County. These streams are not large, and they supply only a small amount of water, Stations where stream flow of the Rapidan River is measured are near Ruckersville and south of Culpeper. Another gaging station is maintained on the Robinson River, just above the confluence of that river with the Rapidan River.

Surface water is soft and of good quality. Water sampling stations are maintained on the Rapidan River south of Culpeper, where chemical quality and sediment load are measured, as well as stream flow.

The availability of ground water in a given area varies as a result of differences in the underlying rock formations. Yields of 2 to 25 gallons per minute have been obtained from sedimentary rocks of Triassic age at depths of 60 to 300 feet. Water obtained from these rocks, however, is likely to contain an objectionable amount of iron. Yields of 1 to 25 gallons of water per minute have been obtained from greenstone at depths of 90 to 350 feet; yields of 1 to 15 gallons per minute have been obtained from granite at depths of 100 to 700 feet; and yields of 3 to 70 gallons per minute have been obtained from arkosic sediment. Water from greenstone and granite is soft; that from the arkosic sediment is relatively soft. Schist is considered to be a poor bearer of water, but the water obtained from it is generally of good quality—soft and low in content of minerals. Water from

schist is generally obtained from shallow wells that are 100 feet or less in depth, and only a small yield can be expected.

In most parts of the county, an adequate supply of water is obtained from springs, wells, and streams. Farm ponds are used to supply water for livestock. A total of 330 farm ponds have been built in the county.

The town of Orange obtains its supply of water from the Rapidan River. The water is filtered, treated, and stored in a storage reservoir that has a capacity of 2 million gallons, and it is also stored in a steel standpipe that has a capacity of 288,000 gallons. About 300,000 gallons of water per day is needed for residential, industrial, and other uses.

The town of Gordonsville obtains its supply of water from several groups of springs. The water is collected at three different points, is chlorinated, and is pumped into a distribution system. The three collecting points have a total capacity of 3 million gallons.

Literature Cited

(1) ALLAN, P. F. GARLAND, L. E., AND DUGAN, R. F.
1963. RATING NORTHEASTERN SOILS FOR THEIR SUITABILITY FOR WILDLIFE HABITAT. N. Am. Wildlife and Natural Res. Trans., pp. 247–261, illus.

(2) AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS.
1961. STANDARD SPECIFICATIONS FOR HIGHWAY MATERIALS AND METHODS OF SAMPLING AND TESTING. Ed. 8, 2 v., illus. Washington, D.C.

(3) COMMONWEALTH OF VIRGINIA.
1963. GEOLOGIC MAP OF VIRGINIA. Dept. of Conserv. and Econ. Develop., Div. of Min. Resources, Charlottesville, Va.

(4) FENNEMAN, N. M.
1938. PHYSIOGRAPHY OF THE EASTERN UNITED STATES. 714 pp., illus. New York and London.

(5) SIMONSON, ROY W.
1962. SOIL CLASSIFICATION IN THE UNITED STATES. Sci. 137: 1027–1034.

(6) THORP, JAMES, AND SMITH, GUY D.
1949. HIGHER CATEGORIES OF SOIL CLASSIFICATION: ORDER, SUBORDER, AND GREAT SOIL GROUPS. Soil Sci. 67: 117–126.

(7) UNITED STATES DEPARTMENT OF AGRICULTURE.
1938. SOILS AND MEN. U.S. Dept. Agr. Ybk. 1232 pp., illus.

(8) _____
1951. SOIL SURVEY MANUAL. U.S. Dept. Agr. Handb. 18, 503 pp. illus. [Replaces U.S. Dept. Agr. Misc. Pub. 274, the Soil Survey Manual published 1937.] [Supplement issued in 1962]

(9) _____
1960. SOIL CLASSIFICATION, A COMPREHENSIVE SYSTEM, 7TH APPROXIMATION. Soil Survey Staff, Soil Cons. Serv. 265 pp., illus. [Supplement issued in March 1967]

(10) VAN BAVAL, C. H. M., AND LILLARD, J. H.
1957. AGRICULTURAL DROUGHT IN VIRGINIA. Va. Agr. Expt. Sta., Tech. Bul. 128, 38 pp., illus.

(11) WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS.
1953. UNIFIED SOIL CLASSIFICATION SYSTEM. Tech. Memo. No. 3–357, 2 v., illus.

Glossary

Acidity. See Reaction, soil.

Alluvium. Soil material, such as silt or clay, that has been deposited on land by streams.

Available moisture capacity. The property of a soil to hold water that will not drain away but can be taken up and used by plant roots.

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 base 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—

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Loose.—Noncoherent; will not hold together in a mass.

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.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Drainage. Drainage that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable, and they have low available moisture capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time. If podzolic, they commonly have mottling below 6 to 16 inches in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and generally are mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Erosion, soil. The wearing away of the land surface by wind, running water, and other geological agents.

Fertility, soil. The quality of a soil that enables it to provide compounds, in adequate amounts and in proper balance, for the growth of specified plants, when other growth factors, such as light, moisture, temperature, and the physical condition (or tilth) of the soil, are favorable.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flooding. Overflowing of a body of water onto normally dry land. The terms used in this survey to describe the hazard of flooding are—

Very frequent flooding	More than once a year.
Frequent flooding	Once in 1 to 5 years.
Infrequent flooding	Once in 5 to 10 years.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Internal soil drainage. The downward movement of water through the soil profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by the height of the water table, either permanent or perched. Relative terms for expressing internal drainage are *none, very slow, slow, medium, rapid,* and *very rapid.*

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

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of 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 these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the production of food and tissue. Nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps other elements obtained from the soil, and carbon, hydrogen, and oxygen, obtained largely from the air and water, are plant nutrients.

Parent material (soil). The horizon of weathered rock or partly weathered soil material from which soil has formed; horizon C in the soil profile.

Permeability. The quality that enables a soil to transmit water and air. Unless otherwise indicated, the terms used in this survey to describe permeability can be expressed in inches per hour as follows:

	Inches per hour
Slow	Less than 0.20
Moderately slow	0.20 to 0.63
Moderate	0.63 to 2.0
Moderately rapid	2.0 to 6.3
Rapid	More than 6.3

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values and in words, as follows:

	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

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

Runoff (hydrology). The part of the precipitation upon a drainage area that is discharged from the area in stream channels. 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 ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz, but sand may be of any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

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

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting upon parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in a mature soil includes 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 characteristic of the soil are largely confined to the solum.

Stone line. A concentration of coarse fragments in soils. In a cross section, the line may be one stone or more thick. The line generally overlies material that weathered in place, and it is ordinarily overlain by sediment of variable thickness.

Stripcropping. Growing crops in a systematic arrangement of strips, or bands, to serve as vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. 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 (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. Stream terraces are frequently called *second bottoms,* as contrasted to *flood plains,* and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both 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. Other information is given in tables as follows:

Acreage and extent, table 1, p. 10.
Estimated yields, table 2, p. 76
Soil interpretations for wildlife habitat, table 3, p. 85.
Engineering uses of the soils, tables 4, 5, and 6, pp. 90 through 123.
Nonfarm uses of the soils, table 7, p. 128.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
Ab	Albano silt loam	12	Vw-1	74	3	81
AlA	Altavista loam, 0 to 2 percent slopes	12	IIw-2	70	12	83
AlB	Altavista loam, 2 to 7 percent slopes	13	IIe-3	69	12	83
AlC2	Altavista loam, 2 to 12 percent slopes, eroded	13	IIe-3	69	12	83
ApB	Appling sandy loam, 2 to 7 percent slopes	13	IIe-3	69	10	83
ApB2	Appling sandy loam, 2 to 7 percent slopes, eroded	13	IIe-3	69	10	83
ApC2	Appling sandy loam, 7 to 15 percent slopes, eroded	14	IIIe-3	71	10	83
AuA	Augusta silt loam, 0 to 2 percent slopes	14	IIIw-2	72	15	84
AuB	Augusta silt loam, 2 to 7 percent slopes	14	IIIw-2	72	15	84
Be	Bermudian silt loam	15	IIw-1	70	1	80
Bo	Bowmansville silt loam	16	IVw-2	74	3	81
BrC	Bremo silt loam, 4 to 15 percent slopes	16	IVe-3	73	4	81
BrD	Bremo silt loam, 15 to 25 percent slopes	16	VIe-2	74	4	81
BsB2	Bucks silt loam, 2 to 7 percent slopes, eroded	17	IIe-1	68	6	82
BsC2	Bucks silt loam, 7 to 15 percent slopes, eroded	17	IIIe-1	70	6	82
BtB2	Bucks silt loam, conglomerate substratum, 2 to 7 percent slopes, eroded	17	IIe-1	68	6	82
BtC2	Bucks silt loam, conglomerate substratum, 7 to 15 percent slopes, eroded	17	IIIe-1	70	6	82
BuC3	Bucks silty clay loam, 7 to 15 percent slopes, severely eroded	17	IVe-1	72	7	82
Bw	Buncombe loamy fine sand	18	IIIs-1	72	1	80
CaB	Calverton loam, 2 to 7 percent slopes	18	IIIw-2	72	15	84
CbB	Calverton-Creedmoor complex, 2 to 7 percent slopes	18	IIIw-2	72	15	84
CcC	Catoctin silt loam, 5 to 15 percent slopes	19	IVe-3	73	4	81
CcD	Catoctin silt loam, 15 to 25 percent slopes	19	VIe-2	74	4	81
CdD	Catoctin stony silt loam, 10 to 25 percent slopes	19	VIIs-1	75	4	81
CdE	Catoctin stony silt loam, 25 to 45 percent slopes	19	VIIs-1	75	4	81
CeB2	Cecil fine sandy loam, 2 to 7 percent slopes, eroded	20	IIe-2	69	8	82
CeC2	Cecil fine sandy loam, 7 to 15 percent slopes, eroded	20	IIIe-2	70	8	82
CmB2	Cecil loam, 2 to 7 percent slopes, eroded	20	IIe-2	69	8	82
CmC2	Cecil loam, 7 to 15 percent slopes, eroded	20	IIIe-2	70	8	82
CsC3	Cecil clay loam, 4 to 15 percent slopes, severely eroded	21	IVe-2	73	9	82
Cw	Chewacla silt loam	21	IIIw-1	72	2	81
CxB	Colfax loam, 2 to 7 percent slopes	22	IIIw-2	72	15	84
Cy	Comus fine sandy loam	22	IIw-1	70	2	81
Cz	Comus silt loam	22	IIw-1	70	2	81
DaB2	Davidson clay loam, 2 to 7 percent slopes, eroded	24	IIe-1	68	6	82
DaC2	Davidson clay loam, 7 to 15 percent slopes, eroded	24	IIIe-1	70	6	82
DaD2	Davidson clay loam, 15 to 25 percent slopes, eroded	24	IVe-1	72	6	82
DcC	Davidson stony clay loam, 7 to 15 percent slopes	24	VIs-1	75	6	82
DcD	Davidson stony clay loam, 15 to 25 percent slopes	24	VIIs-1	75	6	82
DcE	Davidson stony clay loam, 25 to 45 percent slopes	24	VIIs-1	75	6	82
DdB3	Davidson clay, 2 to 7 percent slopes, severely eroded	24	IIIe-1	70	7	82
DdC3	Davidson clay, 7 to 15 percent slopes, severely eroded	25	IVe-1	72	7	82
DdD3	Davidson clay, 15 to 25 percent slopes, severely eroded	25	VIe-1	74	7	82

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
DkB2	Dyke loam, 2 to 7 percent slopes, eroded	25	IIe-1	68	6	82
DkC2	Dyke loam, 7 to 15 percent slopes, eroded	25	IIIe-1	70	6	82
Eb	Elbert silt loam	26	Vw-1	74	16	84
Ee	Elbert silt loam, overwash	27	IVw-2	74	16	84
ElB2	Elioak fine sandy loam, 2 to 7 percent slopes, eroded	27	IIe-3	69	8	82
ElC2	Elioak fine sandy loam, 7 to 15 percent slopes, eroded	27	IIIe-3	71	8	82
EmB3	Elioak clay loam, 2 to 7 percent slopes, severely eroded	28	IIIe-3	71	9	82
EmC3	Elioak clay loam, 7 to 15 percent slopes, severely eroded	28	IVe-2	73	9	82
EsB	Elsinboro loam, 2 to 7 percent slopes	29	IIe-2	69	8	82
EsB2	Elsinboro loam, 2 to 7 percent slopes, eroded	29	IIe-2	69	8	82
EsC2	Elsinboro loam, 7 to 15 percent slopes, eroded	29	IIIe-2	70	8	82
FaB2	Fauquier silt loam, 2 to 7 percent slopes, eroded	30	IIe-1	68	6	82
FaC2	Fauquier silt loam, 7 to 15 percent slopes, eroded	30	IIIe-1	70	6	82
FcC3	Fauquier silty clay loam, 4 to 20 percent slopes, severely eroded	30	IVe-1	72	7	82
FlB	Fluvanna silt loam, 2 to 7 percent slopes	31	IIe-3	69	13	83
FlB2	Fluvanna silt loam, 2 to 7 percent slopes, eroded	31	IIe-3	69	13	83
FlC2	Fluvanna silt loam, 7 to 15 percent slopes, eroded	31	IIIe-3	71	13	83
GlB2	Glenelg loam, 2 to 7 percent slopes, eroded	32	IIe-3	69	10	83
GlC2	Glenelg loam, 7 to 15 percent slopes, eroded	32	IIIe-3	71	10	83
GrB2	Grover sandy loam, 2 to 7 percent slopes, eroded	32	IIe-3	69	10	83
GrC2	Grover sandy loam, 7 to 15 percent slopes, eroded	32	IIIe-3	71	10	83
GsC3	Grover sandy clay loam, 7 to 15 percent slopes, severely eroded	33	IVe-2	73	11	83
HaC	Hazel loam, 7 to 15 percent slopes	33	IVe-3	73	4	81
HaD	Hazel loam, 15 to 30 percent slopes	33	VIe-2	74	4	81
HeB	Helena fine sandy loam, 2 to 7 percent slopes	34	IIIe-5	71	13	83
HeC2	Helena fine sandy loam, 2 to 10 percent slopes, eroded	34	IVe-4	73	13	83
HsB	Hiwassee loam, 2 to 7 percent slopes	35	IIe-1	68	6	82
HsB2	Hiwassee loam, 2 to 7 percent slopes, eroded	35	IIe-1	68	6	82
HsC2	Hiwassee loam, 7 to 15 percent slopes, eroded	35	IIIe-1	70	6	82
HwC3	Hiwassee clay loam, 4 to 15 percent slopes, severely eroded	35	IVe-1	72	7	82
KlD	Klinesville silt loam, 15 to 25 percent slopes	36	VIe-2	74	4	81
KlE	Klinesville silt loam, 25 to 45 percent slopes	36	VIIe-1	75	4	81
LgB	Lignum silt loam, 2 to 7 percent slopes	37	IIIw-2	72	15	84
LlB2	Lloyd loam, 2 to 7 percent slopes, eroded	38	IIe-1	68	6	82
LlC2	Lloyd loam, 7 to 15 percent slopes, eroded	38	IIIe-1	70	6	82
LmB3	Lloyd clay loam, 2 to 7 percent slopes, severely eroded	38	IIIe-1	70	7	82
LmC3	Lloyd clay loam, 7 to 15 percent slopes, severely eroded	38	IVe-1	72	7	82
LmD3	Lloyd clay loam, 15 to 25 percent slopes, severely eroded	38	VIe-1	74	7	82
LoC	Louisburg sandy loam, 5 to 15 percent slopes	39	IVe-3	73	4	81
LoC2	Louisburg sandy loam, 7 to 15 percent slopes, eroded	39	VIe-2	74	5	81
LoD	Louisburg sandy loam, 15 to 25 percent slopes	39	VIe-2	74	4	81
LoD2	Louisburg sandy loam, 15 to 25 percent slopes, eroded	39	VIIe-1	75	5	81
MaB2	Madison sandy loam, 2 to 7 percent slopes, eroded	40	IIe-2	69	8	82
MaC2	Madison sandy loam, 7 to 15 percent slopes, eroded	40	IIIe-2	70	8	82
MdC3	Madison clay loam, 7 to 15 percent slopes, severely eroded	40	IVe-2	73	9	82
MnB	Manassas silt loam, 2 to 7 percent slopes	41	I-1	68	1	80

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
MoD	Manor silt loam, 10 to 25 percent slopes	41	VIe-2	74	4	81
MrB	Manteo silt loam, 2 to 7 percent slopes	42	IIIe-6	72	4	81
MrC	Manteo silt loam, 7 to 15 percent slopes	42	IVe-3	73	4	81
MrD	Manteo silt loam, 15 to 25 percent slopes	42	VIe-2	74	4	81
MrE	Manteo silt loam, 25 to 45 percent slopes	42	VIIe-1	75	4	81
MsB	Masada loam, 2 to 7 percent slopes	43	IIe-3	69	10	83
MsB2	Masada loam, 2 to 7 percent slopes, eroded	43	IIe-3	69	10	83
MsC2	Masada loam, 7 to 15 percent slopes, eroded	43	IIIe-3	71	10	83
MtC3	Masada sandy clay loam, 7 to 15 percent slopes, severely eroded	43	IVe-2	73	11	83
MuB	Mayodan fine sandy loam, 2 to 7 percent slopes	44	IIe-3	69	10	83
MuB2	Mayodan fine sandy loam, 2 to 7 percent slopes, eroded	44	IIe-3	69	10	83
MuC2	Mayodan fine sandy loam, 7 to 15 percent slopes, eroded	44	IIIe-3	71	10	83
MvB2	Mecklenburg silt loam, 2 to 7 percent slopes, eroded	45	IIe-4	69	13	83
MvC2	Mecklenburg silt loam, 7 to 15 percent slopes, eroded	45	IIIe-4	71	13	83
Mx	Mixed alluvial land	45	IIIw-1	72	3	81
MyB2	Myersville silt loam, 2 to 7 percent slopes, eroded	46	IIe-2	69	10	83
MyC2	Myersville silt loam, 7 to 15 percent slopes, eroded	46	IIIe-2	70	10	83
NaB2	Nason loam, 2 to 7 percent slopes, eroded	47	IIe-3	69	10	83
NaC2	Nason loam, 7 to 15 percent slopes, eroded	47	IIIe-3	71	10	83
NsB	Nason silt loam, 2 to 7 percent slopes	47	IIe-3	69	10	83
NsB2	Nason silt loam, 2 to 7 percent slopes, eroded	47	IIe-3	69	10	83
NsC	Nason silt loam, 7 to 15 percent slopes	47	IIIe-3	71	10	83
NsC2	Nason silt loam, 7 to 15 percent slopes, eroded	47	IIIe-3	71	10	83
NsD2	Nason silt loam, 15 to 25 percent slopes, eroded	48	IVe-2	73	10	83
NtC3	Nason silty clay loam, 5 to 15 percent slopes, severely eroded	48	IVe-2	73	11	83
OgA	Orange silt loam, concretionary variant, 0 to 2 percent slopes	49	IVw-1	74	14	83
OgB	Orange silt loam, concretionary variant, 2 to 7 percent slopes	49	IIIe-5	71	14	83
OgB2	Orange silt loam, concretionary variant, 2 to 7 percent slopes, eroded	50	IVe-4	73	14	83
OgC2	Orange silt loam, concretionary variant, 7 to 15 percent slopes, eroded	50	VIe-3	74	14	83
OrA	Orange-Iredell silt loams, 0 to 2 percent slopes	48	IVw-1	74	14	83
OrB	Orange-Iredell silt loams, 2 to 7 percent slopes	49	IIIe-5	71	14	83
OrB2	Orange-Iredell silt loams, 2 to 7 percent slopes, eroded	49	IVe-4	73	14	83
PeB	Penn silt loam, 2 to 7 percent slopes	50	IIIe-6	72	4	81
PeC	Penn silt loam, 7 to 15 percent slopes	50	IVe-3	73	4	81
PkC	Pinkston fine sandy loam, 7 to 15 percent slopes	52	IVe-3	73	4	81
PkD	Pinkston fine sandy loam, 15 to 25 percent slopes	52	VIe-2	74	4	81
RaB2	Rabun clay loam, 2 to 7 percent slopes, eroded	52	IIe-1	68	6	82
RaC2	Rabun clay loam, 7 to 15 percent slopes, eroded	52	IIIe-1	70	6	82
RaD2	Rabun clay loam, 15 to 25 percent slopes, eroded	53	IVe-1	72	6	82
RaE2	Rabun clay loam, 25 to 45 percent slopes, eroded	53	VIe-1	74	6	82
RcD3	Rabun clay, 15 to 25 percent slopes, severely eroded	53	VIe-1	74	7	82
RdB2	Rapidan silt loam, 2 to 7 percent slopes, eroded	54	IIe-1	68	6	82
RdC2	Rapidan silt loam, 7 to 15 percent slopes, eroded	54	IIIe-1	70	6	82
ReC3	Rapidan silty clay loam, 7 to 15 percent slopes, severely eroded	54	IVe-1	72	7	82
Rk	Roanoke silt loam	55	Vw-1	74	3	81

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland group	
			Symbol	Page	Number	Page
RnC	Rock land, acidic, sloping	55	VIs-1	75	17	84
RnD	Rock land, acidic, moderately steep	55	VIIs-1	75	17	84
RoC	Rock land, basic, sloping	55	VIs-1	75	17	84
RoE	Rock land, basic, steep	55	VIIs-1	75	17	84
Rw	Rowland silt loam	56	IIIw-1	72	2	81
SeB	Seneca fine sandy loam, 2 to 7 percent slopes	56	IIe-3	69	2	81
SrC	Starr silt loam, 2 to 10 percent slopes	57	I-1	68	1	80
StA	State loam, 0 to 4 percent slopes	58	I-2	68	1	80
TaB2	Tatum loam, 2 to 7 percent slopes, eroded	59	IIe-3	69	8	82
TaC2	Tatum loam, 7 to 15 percent slopes, eroded	59	IIIe-3	71	8	82
TsB	Tatum silt loam, 2 to 7 percent slopes	59	IIe-3	69	8	82
TsB2	Tatum silt loam, 2 to 7 percent slopes, eroded	59	IIe-3	69	8	82
TsC	Tatum silt loam, 7 to 15 percent slopes	59	IIIe-3	71	8	82
TsC2	Tatum silt loam, 7 to 15 percent slopes, eroded	59	IIIe-3	71	8	82
TtB3	Tatum silty clay loam, 2 to 7 percent slopes, severely eroded	59	IIIe-3	71	9	82
TtC3	Tatum silty clay loam, 7 to 15 percent slopes, severely eroded	59	IVe-2	73	9	82
TuB	Turbeville loam, 2 to 7 percent slopes	60	IIe-2	69	8	82
TuB2	Turbeville loam, 2 to 7 percent slopes, eroded	60	IIe-2	69	8	82
TuC2	Turbeville loam, 7 to 15 percent slopes, eroded	60	IIIe-2	70	8	82
VaB	Vance fine sandy loam, 2 to 7 percent slopes	61	IIe-4	69	13	83
VaB2	Vance fine sandy loam, 2 to 7 percent slopes, eroded	61	IIe-4	69	13	83
WaB2	Wadesboro fine sandy loam, 2 to 7 percent slopes, eroded	62	IIe-2	69	8	82
WaC2	Wadesboro fine sandy loam, 7 to 15 percent slopes, eroded	62	IIIe-2	70	8	82
WaD2	Wadesboro fine sandy loam, 15 to 25 percent slopes, eroded	62	IVe-2	73	8	82
WbB	Watt silt loam, 2 to 7 percent slopes	62	IIIe-6	72	4	81
WbC	Watt silt loam, 7 to 15 percent slopes	63	IVe-3	73	4	81
WbD	Watt silt loam, 15 to 30 percent slopes	63	VIe-2	74	4	81
We	Wahadkee silt loam	63	IVw-2	74	3	81
WkC	Wilkes sandy loam, 7 to 15 percent slopes	64	IVe-3	73	4	81
WkD	Wilkes sandy loam, 15 to 25 percent slopes	64	VIe-2	74	4	81
WoB	Worsham silt loam, 2 to 7 percent slopes	65	Vw-1	74	3	81
YoB	York silt loam, 2 to 7 percent slopes	65	IIIw-2	72	12	83
ZoB	Zion silt loam, 2 to 7 percent slopes	66	IIe-4	69	13	83
ZoC2	Zion silt loam, 7 to 15 percent slopes, eroded	66	IIIe-4	71	13	83

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