SOIL SURVEY OF

Louisa County, Virginia

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

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in the period 1965-70. Soil names and descriptions were approved in 1971. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1970. This survey was made cooperatively by the Soil Conservation Service and the Virginia Polytechnic Institute and State University. It is part of the technical assistance furnished to the Thomas Jefferson Soil and Water Conservation District.

HOW TO USE THIS SURVEY

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

Locating Soils

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

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

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all of the soils in the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the page for the capability unit in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be 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 that have a moderate limitation can be colored yellow, and those that have a severe limitation can be colored red.

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

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

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

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

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

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

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

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SOIL SURVEY OF LOUISA COUNTY, VIRGINIA

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

LOUISA COUNTY is in the north-central part of Virginia (fig. 1). The county extends about 26 miles north and south and about 34 miles east and west. The total area of the county is about 514 square miles, or 328,960 acres. Louisa is the county seat.

Negro Run and the North Anna River form most of the northern boundary of the county, and they separate this county from Orange and Spotsylvania Counties. Louisa County is entirely on the Piedmont Plateau. Louisa County is bounded on the east by Hanover County, on the south by Goochland and Fluvanna Counties, and on the west by Albemarle County.

Louisa County is mainly a farming area. Many of the soils are suited to a wide variety of crops, and the climate is favorable for both general farming and livestock production. Modern farm machinery can be used on much of the land in the county. Corn, barley, oats, and other crops are grown, mainly to be fed to livestock. Tobacco is grown as a cash crop. Dairy and beef cattle are the principal kinds of livestock. Sheep, hogs, poultry, and horses are also raised. About 75 percent of the farm income is derived from livestock and livestock products.

Approximately 70 percent of the county is wooded, and most of the woodlands are privately owned. Among the dominant species are oak, yellow-poplar, blackgum, sweetgum, maple, beech, Virginia pine, shortleaf pine, and cedar. Loblolly pine has been planted in some areas.

Among the industries in Louisa County are grain milling, textile production, lumbering, and quarrying.

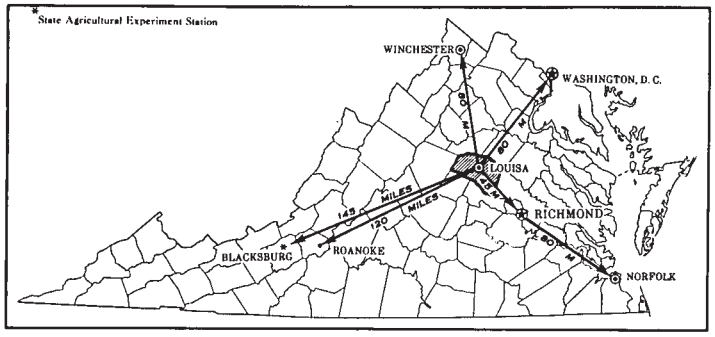

Figure 1.—**Location of Louisa County in Virginia.**

The industries produce lumber and other building materials, industrial pallets, hand-crafted furniture, concrete pipe, textiles, and crushed stone.

How This Survey Was Made

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

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

Soils that have profiles almost alike make up a soil series. Except for different textures 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. Poindexter and Sekil, for example, are the names of two soil series. All the soils in the United States that have the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

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

loam, 2 to 7 percent slopes, is one of several phases in the Poindexter series.

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

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, however, 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 phase.

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind of mapping unit is shown on the soil map of Louisa County, the soil complex.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Orange-Poindexter complex, 2 to 7 percent slopes, is an example.

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

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

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

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

General Soil Map

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

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

Because of technical changes in the naming, mapping, and classification of soils, delineations on the general soil map of Louisa County do not join those for the published general soil maps of Fluvanna County and Orange County. The eight soil associations in Louisa County are discussed in the following pages.

1. Nason–Tatum–Manteo association

Deep and shallow, well-drained and excessively drained soils that have a subsoil that is dominantly silty clay or channery silt loam; on uplands

This association is in the western part of the county. The topography is rolling. Slopes generally are 2 to 7 percent on ridges and 7 to 15 percent on side slopes. Along the larger drainageways and streams, however, side slopes are steeper. In these areas slopes are commonly 15 to 25 percent, but they are as much as 45 percent in some places. Elevation ranges from about 290 feet to 540 feet.

This association covers about 25 percent of the county. Nason soils make up about 51 percent of the association, Tatum soils 26 percent, Manteo soils 6 percent, and minor soils 17 percent.

Nason soils are on the ridges and more gentle side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is yellowish-brown silt loam, and the subsoil is dominantly yellowish-red silty clay. The soils are very strongly acid.

Tatum soils are also on the ridges and more gentle

side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is yellowish-brown silt loam, and the subsoil is red silty clay. The soils are very strongly acid.

Manteo soils are mostly on steeper side slopes along the drainageways and streams. These soils are shallow, somewhat excessively drained, and moderately rapidly permeable. The surface layer is brown silt loam, and the subsoil is yellowish-brown channery silt loam. Bedrock is commonly at a depth of 1 to 1½ feet. These soils are very strongly acid to extremely acid.

The minor soils of this association are in the Altavista, Chewacla, Congaree, Fork, Lignum, Roanoke, Wehadkee, and other series. Lignum soils are gently sloping and occur on broad ridges or in low areas. The other soils are mostly on small flood plains and low terraces along the larger drainageways and streams.

Farms in this association are commonly larger than 300 acres. General farming is practiced, and beef cattle are important. Corn, small grain, and hay are the most common crops. Some tobacco is grown, but it is mostly limited to the area south of State Highway 22. A large part of the association is suited to general farm crops and pasture, but Manteo soils are limited in their suitability for cultivation because they are shallow, are channery, and have low available water capacity.

The supply of ground water is good. Springs are plentiful. Shallow wells provide water of good quality, but yields are low to moderate. The potential of this association for residential, industrial, and recreational development is good.

2. *Nason–Tatum association*

Deep, well-drained soils that have a subsoil that is dominantly silty clay; on uplands

This association is a broad belt across the east-central part of the county. The topography is gently rolling to rolling. Slopes generally are 2 to 7 percent on the tops of ridges and 7 to 15 percent on the sides. In a few areas along the streams, however, side slopes are steeper; in these areas slopes are as much as 25 percent. Elevation ranges from about 200 feet to 525 feet.

This association covers about 15 percent of the county. Nason soils make up about 56 percent of the association, Tatum soils 30 percent, and minor soils 14 percent.

Nason soils are on ridges and side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is yellowish-brown silt loam, and the subsoil is dominantly yellowish-red silty clay. The soils are very strongly acid.

Tatum soils are also on ridges and side slopes. The soils are deep, well drained, and moderately permeable. The surface layer is yellowish-brown silt loam, and the subsoil is dominantly red silty clay. The soils are very strongly acid.

Among the minor soils of this association are soils that are similar to Nason and Tatum soils, but in which the surface layer and subsoil combined are thicker and depth to bedrock is greater than in Nason and Tatum soils. Other minor soils are Altavista, Chewacla, Lignum, Manteo, Orange, Roanoke, and Wehadkee soils. The gently sloping soils that are similar to Nason and Tatum soils are in broad areas. Chewacla, Altavista, Roanoke, and Wehadkee soils are mostly on small flood plains and low terraces along the larger drainageways and streams. Lignum and Orange soils are gently sloping and occur on broad ridges or in broad, low-lying areas. Manteo soils are commonly along streams.

Farms in this association are commonly smaller than 500 acres. General farming is practiced, and beef cattle are important, Corn, small grain, and hay are the most common crops. Some tobacco is grown, but it is limited mostly to the area south of U.S. Highway No. 33. Most of this association is suited to crops and pasture.

The supply of ground water is fair. Springs are limited. Shallow wells provide water of good quality, but yields are low to moderate. The potential of this association for residential, industrial, and recreational development is good.

3. *Zion–Poindexter–Iredell association*

Moderately deep and deep, well-drained to somewhat poorly drained soils that have a subsoil that is dominantly clay or clay loam; on uplands

This association is in the western part of the county. The topography is gently rolling. Slopes generally are 0 to 7 percent on broad ridges and 7 to 15 percent on side slopes. Ridges are narrower and side slopes are more pronounced near the streams and in the northeastern part of the association. In a few places along the streams, side slopes are steeper, and slopes are as much as 25 percent. Elevation ranges from about 330 feet to about 460 feet.

This association covers about 5 percent of the county. Zion soils make up about 19 percent of the association, Poindexter soils 18 percent, Iredell soils 10 percent, and minor soils 53 percent.

Zion soils are gently sloping and occur on ridges and some of the more gentle side slopes. These soils are moderately deep, well drained, and slowly permeable. The surface layer is dark grayish-brown loam, and the yellowish-brown subsoil is dominantly clay. These soils are slightly acid to medium acid.

Poindexter soils are gently sloping and occur on ridges and side slopes. These soils are moderately deep, well drained, and moderately permeable. The surface layer is dark grayish-brown loam, and the subsoil is yellowish-brown clay loam. These soils are strongly acid to neutral.

Iredell soils are nearly level and gently sloping and occur on broad ridges; in broad, low-lying areas; and on some of the more gentle side slopes. These soils are deep, moderately well drained to somewhat poorly drained, and slowly permeable. The surface layer is dark grayish-brown loam or sandy loam, and the subsoil is dominantly yellowish-brown clay. The soils are slightly acid to neutral.

The most extensive minor soils are of the Cullen, Appling, and Colfax series. Other minor soils are of the Abell, Altavista, Chewacla, Cecil, Durham, Fluvanna, Mecklenburg, Sekil, Wehadkee, Worsham, and

other series. Cullen and Appling soils are on the narrower ridges and more pronounced side slopes. Colfax soils are gently sloping and occur on broad ridges or in broad, low-lying areas. Appling and Colfax soils are more common in the northeastern part of the association. Abell soils are gently sloping and occur in small areas around the heads of drainageways. Altavista, Chewacla, Wehadkee, and Worsham soils are mostly on small flood plains and low terraces along the larger drainageways and streams. Cecil, Durham, Fluvanna, Mecklenburg, and Sekil soils are in positions similar to those of the Zion, Poindexter, and Appling soils.

Farms in this association are commonly larger than 500 acres. Dairying and raising beef cattle are important. A large part of the association is in pasture. Corn, small grain, and hay are the most common crops.

The supply of ground water is variable. Springs range from few to plentiful. Deep wells provide water of good quality, but yields are low. The potential of this association for residential or industrial development is poor, but the potential for recreational development is good.

4. *Grover–Ashlar–Madison association*

Deep and moderately deep, well-drained and excessively drained soils that have a subsoil that is dominantly sandy clay loam, clay loam, sandy loam, or clay; on uplands.

This association is in the north-central part of the county. The topography is rolling. Slopes are generally 2 to 7 percent on tops of ridges and 7 to 15 percent on the sides. Along the larger drainageways and streams, however, the tops of ridges are narrower and the sides are steeper. In these areas slopes are commonly 15 to 25 percent, but are as much as 30 percent in a few places. Elevation ranges from about 220 feet to 450 feet.

This association covers about 7 percent of the county. Grover soils make up about 46 percent of the association, Ashlar soils 31 percent, Madison soils 12 percent, and minor soils 11 percent.

Grover soils are on ridges and side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is brown sandy loam, and the subsoil is dominantly yellowish-red sandy clay loam and clay loam. The soils are strongly acid.

Ashlar soils are on ridges and side slopes. The steeper slopes along the larger drainageways and streams are mostly Ashlar soils. These soils are moderately deep, well drained to excessively drained, and moderately rapidly permeable. The surface layer is grayish-brown sandy loam, and the subsoil is yellowish-brown sandy loam. Bedrock is commonly at a depth of about 2 to 3½ feet. The soils are strongly acid to very strongly acid.

Madison soils are on some of the broader ridges and more gentle side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is brown sandy loam, and the subsoil is red clay. The soils are very strongly acid.

Minor soils are of the Abell, Appling, Cecil, Chewacla, Colfax, Durham, Worsham, Wehadkee, and other series. Abell soils are gently sloping and occur in small areas around the heads of drainageways. Chewacla, Wehadkee, and Worsham soils are mostly on small flood plains and in low-lying areas along the larger drainageways and streams. Appling, Cecil, and Durham soils are in positions similar to those of the Grover, Ashlar, and Madison soils. Colfax soils are gently sloping and occur on broad ridges or in broad, low-lying areas.

Farms in this association are commonly about 400 acres in size. General farming is practiced, and beef cattle are important. Corn, small grain, and hay are the most common crops. Most of the association is suited to crops and pasture, but Ashlar soils are of limited suitability for cultivation because they are shallow and have low available water capacity.

The supply of ground water is good. Springs are plentiful. Moderately deep wells provide water of good quality. The potential of this association for residential, industrial, and recreational development is good.

5. *Appling–Ashlar–Cecil association*

Deep and moderately deep, well-drained and excessively drained soils that have a subsoil that is dominantly clay or sandy loam; on uplands

This association is a narrow belt across the central part of the county. The topography is rolling. Slopes generally are of 2 to 6 percent on the tops of ridges and 7 to 15 percent on the sides. In a few places along the streams, however, side slopes are steeper, or as much as 25 percent. Elevation ranges from about 220 feet to 475 feet.

This association covers about 4 percent of the county. Appling soils make up about 38 percent of the association, Ashlar soils 21 percent, Cecil soils 16 percent, and minor soils 25 percent.

Appling soils are on ridges and side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is yellowish-brown sandy loam, and the yellowish-red subsoil is dominantly clay. The soils are strongly acid.

Ashlar soils are also on ridges and side slopes. These soils are moderately deep, well drained to excessively drained, and moderately permeable. The surface layer is grayish-brown sandy loam, and the subsoil is yellowish-brown sandy loam. Bedrock is commonly at a depth of about 2 to 3½ feet. The soils are strongly acid to very strongly acid.

Cecil soils are also on ridges and side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is reddish-brown sandy loam, and the subsoil is red and is dominantly clay. The soils are strongly acid.

Minor soils are of the Abell, Chewacla, Colfax, Durham, Wehadkee, Worsham, and other series. Abell soils are gently sloping and occur in small areas around the heads of drainageways. Chewacla, Wehadkee, and Worsham soils are on small flood plains along the larger drainageways and streams. Colfax soils are gently sloping and occur on broad ridges or in broad, low-lying areas. Durham soils are gently sloping and occur on broad ridges.

Farms in this association are commonly about 200 acres in size. General farming is practiced, and beef cattle are important. Corn, small grain, and hay are

the most common crops. Some tobacco is grown, but it is mostly limited to the area south of U.S. Highway No. 33.

The supply of ground water is good. Springs are plentiful. Moderately deep wells provide water of good quality. The potential of this association for residential, industrial, and recreational development is good.

6. *Appling–Cecil association*

Deep, well-drained soils that have a subsoil that is dominantly clay; on uplands

This association is in the eastern part of the county. The topography is gently rolling to rolling. Slopes generally are 2 to 7 percent on the tops of ridges and 7 to 15 percent on the sides. Slopes along the larger drainageways and streams, however, are steeper and commonly range from 15 to 25 percent. Elevation ranges from about 180 feet to 450 feet.

This association covers about 35 percent of the county. Appling soils make up about 41 percent of the association, Cecil soils 16 percent, and minor soils 43 percent.

Appling soils are on ridges and side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is yellowish-brown sandy loam, and the yellowish-red subsoil is dominantly clay. The soils are strongly acid.

Cecil soils are also on ridges and side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is reddish-brown sandy loam, and the red subsoil is dominantly clay. The soils are strongly acid.

The most extensive minor soils are of the Wedowee and Pacolet series. Other minor soils are in the Abell, Ashlar, Chewacla, Colfax, Congaree, Durham, Grover, Madison, Wehadkee, and other series. Wedowee soils are on the ridges and side slopes close to Appling soils. Pacolet soils are on ridges and side slopes close to Cecil soils. Abell soils are gently sloping and occur in small areas at the heads of drainageways. Chewacla, Congaree, and Wehadkee soils are on small flood plains along drainageways and streams. Ashlar soils are commonly on side slopes near large drainageways and streams. Colfax soils are gently sloping and occur on broad ridges and in low-lying areas. Durham, Grover, and Madison soils are commonly in positions similar to those of Appling and Cecil soils.

Farms in this association are commonly about 200 acres. Dairying and raising beef cattle are important. Corn, small grain, and hay are the most common crops. Some tobacco is grown in the southern part of the association.

Springs are plentiful. Fairly deep wells can supply water of good quality. The potential of this association for residential, industrial, and recreational development is good.

7. *Sekil–Iredell–Cullen association*

Moderately deep and deep, well-drained to somewhat poorly drained soils that have a subsoil that is dominantly sandy loam or clay; on uplands

This association is in small areas scattered across the southern and eastern parts of the county. The topography is rolling. Slopes generally are 2 to 7 percent on tops of ridges and 7 to 15 percent on the sides. Slopes along the larger drainageways and streams, however, are steeper. In these areas slopes are commonly 15 to 25 percent but are as much as 45 percent in a few places. Elevation ranges from about 250 feet to about 475 feet.

This association covers about 4 percent of the county. Sekil soils make up about 29 percent of the association, Iredell soils 12 percent, Cullen soils 11 percent, Fluvanna soils 10 percent, and other minor soils 38 percent.

Sekil soils are mostly on side slopes and a few narrow ridges along the larger drainageways and streams. These soils are moderately deep, well drained, and moderately rapidly permeable. The surface layer is brown sandy loam, and the subsoil is strong-brown sandy loam. Bedrock is at a depth of about 2 to 3½ feet. The soils are strongly acid to medium acid.

Iredell soils are on broad ridges; in broad, low-lying areas; and on some of the more gentle side slopes. These soils are deep, moderately well drained to somewhat poorly drained, and slowly permeable. The surface layer is dark grayish-brown loam, and the subsoil is dominantly yellowish-brown clay. Iredell soils are slightly acid to neutral.

Cullen soils are on ridges and more pronounced side slopes. These soils are deep, well drained, and moderately permeable. The surface layer is brown loam, and the subsoil is dominantly red clay. The soils are medium acid to strongly acid.

Fluvanna soils are the most extensive minor soils. Other minor soils are of the Abell, Appling, Cecil, Chewacle, Colfax, Orange, Wehadkee, Worsham, and other series. Fluvanna soils are gently sloping on uplands. Abell soils are gently sloping and occur in small areas around the heads of drainageways. Chewacla, Wehadkee, and Worsham soils are on small flood plains along the larger drainageways and streams. Appling and Cecil soils are in positions similar to those of the Cullen soils. Colfax and Orange soils are gently sloping and occur on broad ridges and in broad, low-lying areas.

Farms in this association are commonly smaller than 200 acres. General farming is practiced, and beef cattle are important. Corn, small grain, and hay are the most common crops. Some tobacco is grown, but it is limited mostly to the areas in the southern part of the county.

The supply of ground water commonly is low. The number of springs is limited. Deep wells provide water of good quality, but yields are low. The potential of this association for residential and industrial development is poor, but the potential for recreational development is good.

8. *Masada–Wehadkee–Chewacla association*

Deep, well-drained to poorly drained soils that have a subsoil that is dominantly clay or silty clay loam; on stream terraces and flood plains

This association is in the northwestern part of the county and along the North Anna River and the South Anna River in the eastern part. Slopes are 2 to 15 percent on terraces and 0 to 7 percent on flood plains. Elevation ranges from about 190 feet to 350 feet.

This association covers about 5 percent of the county. Masada soils make up about 22 percent of the association, Wehadkee soils 18 percent, Chewacla soils 13 percent, Altavista soils 10 percent, and other minor soils 37 percent.

Masada soils are on terraces. These soils are deep, well drained, and moderately permeable. The surface layer is dark-brown fine sandy loam, and the yellowish-red subsoil is dominantly clay. The soils are strongly acid.

Wehadkee soils are on flood plains. These soils are deep, poorly drained, and moderately permeable. The surface layer is grayish-brown silt loam, and the subsoil is dominantly gray and dark-gray silty clay loam. The soils are slightly acid to medium acid. They are flooded very frequently.

Chewacla soils are also on flood plains. These soils are deep, somewhat poorly drained, and moderately permeable. The surface layer is dark-brown silt loam, and the subsoil is dominantly light olive-brown, gray, and dark grayish-brown silty clay loam. The soils are medium acid to strongly acid. They are flooded frequently.

Altavista soils are the most extensive minor soils. Other minor soils are of the Congaree, Fork, Toccoa, and other series. Altavista and Fork soils are gently sloping and are on terraces. Congaree and Toccoa soils are on flood plains.

Farms in this association are commonly smaller than 200 acres. Dairying and raising beef cattle are important. Corn, soybeans, small grain, and hay are the most common crops. Tobacco is grown mostly in the area along the South Anna River.

The supply of ground water is good. Springs are plentiful. Moderately deep wells provide water of good quality. The potential for residential and industrial development is limited, but the potential for recreational development is good.

Descriptions of the Soils

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

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

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

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

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

Abell Series

The Abell series consists of deep, mostly moderately well drained, gently sloping soils at the base of slopes, in depressions, and along small drainageways. These soils formed in loamy colluvium that washed from nearby, higher soils and in underlying material weathered from granite and gneiss.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 9 inches thick. The subsoil is about 29 inches thick. The upper 4 inches is brown, friable loam; the next 19 inches is yellowish-brown and strong-brown, friable sandy clay loam; and the lower 6 inches is pale-brown, friable clay loam that has distinct, strong-brown and grayish-brown mottles. The substratum begins at a depth of about 38 inches and extends to a depth of 50 inches or more. It is prominently mottled sandy loam mixed with weathered granitic material.

Abell soils are strongly acid to very strongly acid except where they have been limed. Organic-matter content is low to medium, and natural fertility is low. Permeability of the subsoil is moderate, and available water capacity is medium. The water table rises to a depth of 2 to 3½ feet during wet periods.

Representative profile of Abell fine sandy loam, 2 to 7 percent slopes, in a field along State Route 613, one-fifth of a mile east of State Route 628:

Ap—0 to 9 inches, dark grayish-brown (10YR 4/2) fine sandy loam; moderate, fine, granular structure; friable; many fine roots; many fine and medium pores; slightly acid; clear, smooth boundary.

B1—9 to 13 inches, brown (10YR 4/3) heavy loam; weak, fine, subangular blocky structure; friable; many fine and medium roots; few angular quartz pebbles; few fine flakes of mica; medium acid; clear, smooth boundary.

B21t—13 to 17 inches, yellowish-brown (10YR 5/6) sandy clay loam; weak, fine, subangular blocky struc-

[1] Italic numbers in parentheses refer to Literature Cited, p. 103.

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

Soil	Acres	Percent
Abell fine sandy loam, 2 to 7 percent slopes	4,719	1.5
Abell silt loam, 2 to 7 percent slopes	550	.2
Abell loam, dark surface variant, 2 to 7 percent slopes	641	.2
Altavista fine sandy loam, 2 to 7 percent slopes	2,063	.6
Appling sandy loam, 2 to 7 percent slopes, eroded	34,074	10.6
Appling sandy loam, 7 to 15 percent slopes, eroded	21,380	6.8
Appling sandy clay loam, 2 to 7 percent slopes, severely eroded	1,163	.4
Appling-Wedowee sandy clay loams, 7 to 15 percent slopes, severely eroded	3,524	1.1
Ashlar sandy loam, 2 to 7 percent slopes	395	.1
Ashlar sandy loam, 7 to 15 percent slopes	4,566	1.4
Ashlar sandy loam, 7 to 15 percent slopes, severely eroded	653	.2
Ashlar sandy loam, 15 to 25 percent slopes	3,625	1.1
Ashlar sandy loam, 15 to 30 percent slopes, severely eroded	610	.2
Ashlar-Manteo-Rock outcrop complex	548	(1)
Cecil sandy loam, 2 to 7 percent slopes, eroded	11,365	3.5
Cecil sandy loam, 7 to 15 percent slopes, eroded	3,811	1.1
Cecil clay loam, 2 to 7 percent slopes, severely eroded	1,978	.6
Cecil-Pacolet clay loams, 7 to 15 percent slopes, severely eroded	4,754	1.5
Chewacla silt loam	2,920	.9
Colfax fine sandy loam, 2 to 7 percent slopes	3,356	1.0
Congaree silt loam	590	.2
Congaree-Chewacla complex	2,037	.6
Cullen loam, 2 to 7 percent slopes, eroded	1,947	.6
Cullen loam, 7 to 15 percent slopes, eroded	642	.2
Cullen clay loam, 2 to 7 percent slopes, severely eroded	229	(1)
Cullen clay loam, 7 to 15 percent slopes, severely eroded	566	.2
Cut and fill land	150	(1)
Durham fine sandy loam, 2 to 5 percent slopes	2,284	.7
Elbert silt loam	701	.2
Fluvanna fine sandy loam, 2 to 7 percent slopes, eroded	1,142	.4
Fluvanna fine sandy loam, 7 to 15 percent slopes, eroded	966	.3
Fluvaquents	931	.3
Forestdale silt loam	225	(1)
Fork fine sandy loam, 0 to 5 percent slopes	1,452	.4
Grover sandy loam, 2 to 7 percent slopes, eroded	3,518	1.1
Grover sandy loam, 7 to 15 percent slopes, eroded	5,161	1.6
Grover sandy clay loam, 2 to 7 percent slopes, severely eroded	242	(1)
Grover sandy clay loam, 7 to 15 percent slopes, severely eroded	1,818	.6
Iredell loam, 0 to 2 percent slopes	1,352	.4
Iredell loam, 2 to 7 percent slopes	293	.1
Iredell sandy loam, 2 to 7 percent slopes	694	.2
Iredell sandy loam, 2 to 7 percent slopes, eroded	1,488	.5
Iredell sandy loam, 7 to 15 percent slopes, eroded	789	.2
Iredell silt loam, silty subsoil variant	271	(1)
Lignum loam, 2 to 7 percent slopes	3,510	1.1
Madison sandy loam, 2 to 7 percent slopes, eroded	1,601	.5
Madison sandy loam, 7 to 15 percent slopes, eroded	660	.2
Madison clay loam, 2 to 7 percent slopes, severely eroded	399	.1
Madison clay loam, 7 to 15 percent slopes, severely eroded	1,416	.4
Manteo channery silt loam, 2 to 7 percent slopes	256	(1)
Manteo channery silt loam, 7 to 15 percent slopes	1,570	.5
Manteo channery silt loam, 15 to 25 percent slopes	2,757	.8
Manteo channery silt loam, 25 to 45 percent slopes	374	.1
Manteo very channery silt loam, 7 to 15 percent slopes	325	.1
Manteo very channery silt loam, 15 to 25 percent slopes	1,305	0.4
Masada fine sandy loam, 2 to 7 percent slopes, eroded	3,088	1.0
Masada fine sandy loam, 7 to 15 percent slopes, eroded	869	.3
Mecklenburg-Enon loams, 2 to 7 percent slopes, eroded	512	.2
Mecklenburg-Enon loams, 7 to 15 percent slopes, eroded	225	(1)
Mecklenburg-Enon clay loams, 7 to 15 percent slopes, severely eroded	149	(1)
Mine dump	346	.1
Nason loam, 15 to 25 percent slopes, eroded	2,314	.8
Nason silt loam, 2 to 7 percent slopes, eroded	34,555	10.5
Nason silt loam, 7 to 15 percent slopes, eroded	34,762	10.6
Nason silty clay loam, 2 to 7 percent slopes, severely eroded	143	(1)
Nason silty clay loam, 7 to 15 percent slopes, severely eroded	950	.3
Orange silt loam, 2 to 7 percent slopes	1,269	.4
Orange-Poindexter complex, 2 to 7 percent slopes	239	(1)
Pacolet-Cecil sandy loams, 2 to 7 percent slopes, eroded	3,841	1.2
Pacolet-Cecil sandy loams, 7 to 15 percent slopes, eroded	1,718	.5
Pacolet-Cecil sandy loams, 15 to 25 percent slopes, eroded	385	.1
Pacolet-Cecil clay loams, 15 to 25 percent slopes, severely eroded	240	(1)
Poindexter loam, 2 to 7 percent slopes	916	.3
Poindexter loam, 7 to 15 percent slopes	1,463	.4
Poindexter loam, 7 to 15 percent slopes, severely eroded	191	(1)
Poindexter loam, 15 to 25 percent slopes	305	(1)
Quarry	61	(1)
Roanoke silt loam, local alluvium, 2 to 7 percent slopes	6,754	2.1
Sekil sandy loam, 2 to 7 percent slopes	582	.2
Sekil sandy loam, 7 to 15 percent slopes	3,115	1.0
Sekil sandy loam, 7 to 15 percent slopes, severely eroded	378	.1
Sekil sandy loam, 15 to 25 percent slopes	1,989	.6
Sekil sandy loam, 25 to 45 percent slopes	242	(1)
Sekil-Poindexter-Rock outcrop complex	563	.2
Tatum silt loam, 2 to 7 percent slopes, eroded	26,874	8.0
Tatum silt loam, 7 to 15 percent slopes, eroded	6,677	2.1
Tatum silt loam, 15 to 25 percent slopes, eroded	211	(1)
Tatum silty clay loam, 2 to 7 percent slopes, severely eroded	818	.3
Tatum silty clay loam, 7 to 15 percent slopes, severely eroded	2,680	.8
Tatum silty clay loam, 15 to 25 percent slopes, severely eroded	152	(1)
Toccoa loamy fine sand	274	.1
Toccoa fine sandy loam	1,139	.4
Turbeville fine sandy loam, 2 to 12 percent slopes	379	.1
Wedowee-Appling sandy loams, 2 to 7 percent slopes, eroded	4,083	1.2
Wedowee-Appling sandy loams, 7 to 15 percent slopes, eroded	5,838	1.8
Wedowee-Appling sandy loams, 15 to 25 percent slopes, eroded	957	.3
Wedowee-Appling sandy clay loams, 15 to 25 percent slopes, severely eroded	157	(1)
Wehadkee silt loam	1,704	.5
Wehadkee-Chewacla complex	11,806	3.6
Wickham fine sandy loam, 2 to 7 percent slopes	240	(1)
Worsham fine sandy loam, 2 to 7 percent slopes	7,822	2.4
York silt loam, 2 to 10 percent slopes	398	.1
Zion loam, 2 to 7 percent slopes	577	.2
Zion loam, 2 to 7 percent slopes, eroded	1,858	.6
Zion loam, 7 to 15 percent slopes, eroded	610	.2
Water	1,186	.4
Total	328,960	100.0

[1] *Less than 0.1 percent.*

ture; friable, slightly sticky and slightly plastic; few fine and medium roots; few thin clay films; few angular quartz pebbles; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B22t—17 to 32 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few fine flakes of mica; very strongly acid; clear, smooth boundary.

IIB3t—32 to 38 inches, pale-brown (10YR 6/3) clay loam; common, fine, distinct, strong-brown (7.5YR 5/6) and grayish-brown (10YR 5/2) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few angular quartz pebbles; few granite fragments; common fine flakes of mica; strongly acid; gradual, wavy boundary.

IIC—38 to 50 inches, mottled yellow, brown, gray, white, and black sandy loam mixed with weathered granitic material; firm in place, micaceous and friable when dug; strongly acid.

The solum ranges from 36 to 46 inches in thickness. The A horizon is 10YR or 7.5YR in hue, 4 or 5 in value, and 2 to 6 in chroma. Texture ranges from fine sandy loam to silt loam. The part of the Bt horizon above the IIBt horizon ranges from 5YR to 10YR in hue, from 4 to 6 in value, and from 6 to 8 in chroma. Texture ranges from light sandy clay loam to clay loam. Depth to the IIB horizon ranges from 30 to 40 inches. The IIBt horizon commonly has mottles that are 2 or less in chroma. The horizon is dominantly finer in texture than the overlying Bt horizon. Bedrock is at a depth of 4 feet or more.

Abell soils commonly are near Appling, Colfax, and Worsham soils. They have a less clayey B horizon than Appling soils. They lack the fragipan of Colfax soils. They are better drained than Worsham soils.

Abell fine sandy loam, 2 to 7 percent slopes (AbB).—This soil has the profile described as representative of the series. In some areas the surface layer is as much as 20 inches thick, and in a few areas the surface layer is loam.

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

Runoff is slow to medium. This soil receives seepage water from higher lying areas. A seasonal high water table is at a depth of 2 to 3½ feet, and artificial drainage is sometimes beneficial if the soil is cultivated. If this soil is adequately drained, limed, and fertilized, it is well suited to most locally grown crops. Alfalfa is usually not long lived, because wetness is excessive in winter and spring. Capability unit IIw–2; woodland suitability group 2o1.

Abell silt loam, 2 to 7 percent slopes (AcB).—This soil has a profile similar to the one described as representative of the series, but the surface layer is silt loam, part of the subsoil is silty clay loam, and the substratum is weathered schist. In some areas the surface layer is as much as 20 inches thick.

Included with this soil in mapping were scattered areas of Lignum, Roanoke, and Worsham soils.

Runoff is slow to medium. This soil receives seepage water from higher lying areas. A seasonal high water table is at a depth of 2 to 3 feet, and artificial drainage is desirable if the soil is cultivated. If this soil is adequately drained, limed, and fertilized, it is well suited to most locally grown crops. Alfalfa is usually not long lived, because wetness is excessive in winter and in spring. Capability unit IIw–2; woodland suitability group 2o1.

Abell Series, Dark Surface Variant

The Abell series, dark surface variant, consists of deep, well drained and moderately well drained, gently sloping soils at the base of slopes, in depressions, and along small drainageways. These soils formed in loamy colluvium that washed from nearby soils on higher adjacent slopes and in material weathered from granite and gneiss.

In a representative profile the surface layer is dark reddish-brown loam about 11 inches thick. The subsoil is about 34 inches thick. The upper 14 inches is dark reddish-brown, friable clay loam; the next 13 inches is red, friable and firm clay loam; and the lower 7 inches is yellowish-red, friable clay loam that has strong-brown and yellowish-brown mottles. The substratum begins at a depth of about 45 inches and extends to a depth of 60 inches or more. It is distinctly mottled, strongly weathered granitic material that crushes easily to sandy loam.

Abell soils, dark surface variant, are medium acid to strongly acid except where they have been limed. Organic-matter content is high, and natural fertility is medium. Permeability of the subsoil is moderate, and available water capacity is high. The water table rises to a depth of 3 to 4 feet during wet periods.

Representative profile of Abell loam, dark surface variant, 2 to 7 percent slopes, by State Route 618, one-fourth of a mile west of junction of State Route 618 and State Route 609:

Ap—0 to 11 inches, dark reddish-brown (5YR 3/4) loam; moderate, fine and medium, granular structure; very friable, slightly sticky and nonplastic; many fine roots; many fine and medium pores; slightly acid; clear, smooth boundary.

B1—11 to 25 inches, dark reddish-brown (2.5YR 3/4) clay loam; weak, fine, subangular blocky structure; friable, sticky and slightly plastic; few fine roots; many medium pores; medium acid; gradual, smooth boundary.

B21t—25 to 32 inches, red (2.5YR 4/6) clay loam; weak, fine and medium, subangular blocky structure; friable, sticky and slightly plastic; few thin clay films; few brown concretions; few quartz pebbles; thin gravel line along lower boundary; medium acid; clear, wavy boundary.

IIB22t—32 to 38 inches, red (2.5YR 5/8) clay loam; moderate, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; few thin clay films; few quartz pebbles; few fine flakes of mica; strongly acid; gradual, smooth boundary.

IIB3t—38 to 45 inches, yellowish-red (5YR 4/8) clay loam; common, medium, distinct, strong-brown (7.5YR 5/8) and yellowish-brown (10YR 5/8) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few weathered granite fragments; common fine flakes of mica; strongly acid; gradual, wavy boundary.

IIC—45 to 60 inches, mottled red, yellowish-red, and strong-brown, weathered granitic material that crushes easily to sandy loam; firm in place, friable when dug; strongly acid.

The solum ranges from 36 to 50 inches in thickness. The A horizon is 5YR or 7.5YR in hue, 3 in value, and 2 to 4 in chroma. It is commonly loam but is silt loam in places. The Bt horizon is 2.5YR or 5YR in hue, 3 to 5 in value, and 3 to 8 in chroma. It is commonly clay loam or sandy clay loam. Depth to the IIB horizon ranges from 30 to 40 inches. In some places the IIBt horizon has mottles that are 2 or less in chroma. Bedrock is below a depth of 5 feet.

Abell soils, dark surface variant, commonly are near Cecil, Cullen, Madison, and Tatum soils. They have a less clayey B horizon than those soils.

Abell loam, dark surface variant, 2 to 7 percent slopes (AeB).—In some places the surface layer of this soil is as much as 18 inches thick. In some areas this soil has grayish mottles below a depth of about 38 inches.

Included with this soil in mapping were small, scattered areas of soils that have a surface layer of silt loam and a subsoil of silt loam and silty clay loam.

Runoff is slow to medium. This soil receives seepage water from higher lying areas. A seasonal high water table is at a depth of 3 to 4 feet, and artificial drainage is sometimes beneficial if the soil is cultivated. If this soil is adequately drained, limed, and fertilized, it is well suited to most locally grown crops. Alfalfa is usually short lived, because wetness is excessive in winter and spring. Capability unit IIw–2; woodland suitability group 2o1.

Altavista Series

The Altavista series consists of deep, moderately well drained, gently sloping soils on terraces along the larger streams, especially the North Anna and South Anna Rivers. These soils formed in loamy alluvium.

In a representative profile about one-fourth inch of partly decayed organic matter overlies the surface layer. The surface layer is fine sandy loam about 12 inches thick. The upper 2 inches is dark grayish brown, and the lower 10 inches is grayish brown. The subsoil is about 35 inches thick. The upper 5 inches is light olive-brown, friable sandy clay loam; the next 5 inches is yellowish-brown, friable clay loam; the next 17 inches is yellowish-brown, friable sandy clay loam that has light brownish-gray mottles; and the lower 8 inches is mottled brown, gray, and yellowish-brown, firm clay loam. The substratum begins at a depth of about 47 inches and extends to a depth of 64 inches or more. It consists of gray sandy loam that has light olive-brown and yellowish-brown mottles.

The subsoil is medium acid to strongly acid. Organic-matter content is medium, and natural fertility is low. Permeability of the subsoil is moderate, and available water capacity is medium. The water table rises to a depth of 2 to 3 feet during wet periods.

Representative profile of Altavista fine sandy loam, 2 to 7 percent slopes, in a planted pine woodland, seven-tenths of a mile northeast of the end of State Route 754:

O2—¼ inch to 0, very dark gray (10YR 3/1), partly decomposed organic matter; abrupt, smooth boundary.

A1—0 to 2 inches, dark grayish-brown (2.5Y 4/2) fine sandy loam; weak, fine, granular structure; very friable; many fine roots; strongly acid; clear, smooth boundary.

A2—2 to 12 inches, grayish-brown (2.5Y 5/2) fine sandy loam; moderate, fine, granular structure; very friable; many fine and medium roots; many fine pores; few rounded quartz pebbles; medium acid; clear, smooth boundary.

B1t—12 to 17 inches, light olive-brown (2.5Y 5/6) sandy clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; many fine and medium pores; few thin clay films; few rounded quartz pebbles; strongly acid; clear, smooth boundary.

B21t—17 to 22 inches, yellowish-brown (10YR 5/4) clay loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; many fine and medium pores; few thin clay films; strongly acid; gradual, smooth boundary.

B22t—22 to 39 inches, yellowish-brown (10YR 5/4) sandy clay loam; common, medium, faint, light brownish-gray (10YR 6/2) mottles; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium pores; few thin clay films; strongly acid; clear, wavy boundary.

B3t—39 to 47 inches, mottled brown (10YR 5/3), gray (10YR 6/1), and yellowish brown (10YR 5/6) clay loam; weak, fine, subangular blocky structure; firm, sticky and plastic; few thin clay films; few rounded quartz pebbles; strongly acid; abrupt, wavy boundary.

Cg—47 to 64 inches, gray (N 6/0) sandy loam; common, medium, distinct, light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/6) mottles; massive; common rounded quartz pebbles; few fine flakes of mica; medium acid.

The solum ranges from 40 to 60 inches in thickness. In many places, fine, rounded quartz pebbles make up from less than 1 percent to about 5 percent, by volume, of the solum. The A horizon is 2.5Y or 10YR in hue, 4 to 6 in value, and 2 to 6 in chroma. The Bt horizon is 10YR or 2.5Y in hue, 4 to 6 in value, and 3 to 6 in chroma. Mottles 2 or less in chroma are in the upper 24 inches of the Bt horizon, and mottling commonly increases with depth. Texture is sandy clay loam or clay loam. Bedrock is below a depth of 5 feet.

Altavista soils commonly are near Forestdale, Fork, and Wickham soils. They are better drained and have a less gray B horizon than Forestdale and Fork soils. They are not so well drained as Wickham soils.

Altavista fine sandy loam, 2 to 7 percent slopes (AlB).—This soil is on broad terraces. In some places the surface layer ranges from 4 to 8 inches in thickness.

Included with this soil in mapping were small, scattered areas of Fork and Wickham soils and small spots of soils that have a clayey subsoil.

Runoff is slow to medium. The hazard of erosion is moderate if the soil is clean tilled or exposed. A seasonal high water table is at a depth of 2 to 3 feet, and artificial drainage is beneficial if this soil is cultivated. If this soil is adequately drained, limed, and fertilized, it is well suited to most locally grown crops. Alfalfa is usually not long lived, because wetness is excessive in winter and spring. Capability unit IIe–2; woodland suitability group 2o1.

Appling Series

The Appling series consists of deep, well-drained, gently sloping to moderately steep soils on uplands. These soils formed in material weathered from granite and gneiss.

In a representative profile about ½ inch of partly decayed organic matter overlies the surface layer. The surface layer is sandy loam about 9 inches thick. The upper 1 inch is dark gray, and the lower 8 inches is yellowish brown. The subsoil is about 48 inches thick. The upper 5 inches is strong-brown, friable sandy clay loam; the next 25 inches is yellowish-red, firm clay

that has strong-brown and reddish-brown mottles in the lower part; and the lower 18 inches is yellowish-red, friable clay loam that has strong-brown and red mottles. The substratum begins at a depth of about 57 inches and extends to a depth of about 80 inches or more. It is mottled yellowish-red, red, yellowish-brown, and white, weathered granitic material that crushes easily to sandy loam.

The subsoil is strongly acid, except where these soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Appling sandy loam, 2 to 7 percent slopes, eroded, in a stand of hardwoods 1 mile southwest of U.S. Highway 33, just off State Route 657.

O1—½ inch to 0, partly decomposed leaves and twigs.

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

A2—1 to 9 inches, yellowish-brown (10YR 5/6) sandy loam; moderate, fine, granular structure; very friable; many fine and medium roots; many fine and medium pores; few angular quartz pebbles; strongly acid; clear, smooth boundary.

B1—9 to 14 inches, strong-brown (7.5YR 5/6) sandy clay loam; moderate, fine, subangular blocky structure; friable; common fine and medium roots; strongly acid; clear, smooth boundary.

B21t—14 to 22 inches, yellowish-red (5YR 4/6) clay; strong, medium, subangular blocky structure; firm, sticky and plastic; many fine and medium roots; many fine and medium pores; thin continuous clay films; few weathered gneiss fragments; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B22t—22 to 33 inches, yellowish-red (5YR 4/6) clay; common, fine, faint, strong-brown (7.5YR 5/6) mottles; strong, fine and medium, subangular blocky structure; firm, sticky and plastic; few medium and large roots; thin continuous clay films; few weathered gneiss fragments; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B23t—33 to 39 inches, yellowish-red (5YR 4/6) clay; common, fine, faint, reddish-brown (5YR 4/4) mottles; moderate, fine and medium, subangular blocky structure; firm, sticky and plastic; few medium and large roots; few thin clay films; few feldspar fragments; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B3t—39 to 57 inches, yellowish-red (5YR 4/6) clay loam; common, medium, distinct, strong-brown (7.5YR 5/6) and red (2.5YR 4/8) mottles; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few feldspar and granite fragments; common fine flakes of mica; strongly acid; gradual, wavy boundary.

C—57 to 80 inches, mottled yellowish-red, red, yellowish-brown, and white, weathered granitic material that crushes easily to sandy loam; few angular quartz pebbles; common fine flakes of mica; strongly acid.

The solum ranges from 40 to 60 inches in thickness. In many places fine to medium, angular quartz pebbles make up from less than 1 percent to about 15 percent, by volume, of the solum. The A horizon is 10YR in hue, 4 to 6 in value, and 1 to 6 in chroma. It is commonly sandy loam but ranges to sandy clay loam where the soil is severely eroded. The Bt horizon is 5YR or 7.5YR in hue, 4 to 6 in value, and 6 to 8 in chroma. It is clay or heavy clay loam. Bedrock is below a depth of 5 feet.

Appling soils commonly are near Ashlar, Cecil, Colfax, Durham, Grover, Madison, and Wedowee soils. Appling soils have a more clayey B horizon than Ashlar, Durham, and Grover soils. They lack the fragipan of Colfax soils. They have a yellower B2t horizon than Cecil and Madison soils, and they contain less mica than Madison soils. They have a thicker solum than Wedowee soils.

Appling sandy loam, 2 to 7 percent slopes, eroded (AnB2).—This soil is on broad ridges. It has the profile described as representative of the series. In some places the surface layer is 2 to 15 percent, by volume, angular quartz pebbles.

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

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Appling sandy loam, 7 to 15 percent slopes, eroded (AnC2).—This soil is on narrow ridges and wide side slopes. The surface layer generally is 6 to 8 inches thick, but in a few places it is as much as 10 inches thick. In some places the surface layer is 2 to 15 percent, by volume, angular quartz pebbles.

Included with this soil in mapping were small, scattered areas of Abell, Colfax, and Iredell soils. Also included were small spots of Rock outcrop and loose gravel.

Runoff is medium to rapid. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–1; woodland suitability group 3o1.

Appling sandy clay loam, 2 to 7 percent slopes, severely eroded (ApB3).—This soil is on narrow ridges. It has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Small erosion rills are common in some places.

Included with this soil in mapping were small, scattered areas of Abell, Cecil, and Wedowee soils.

Runoff is medium. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IIIe–2; woodland suitability group 4c1.

Appling-Wedowee sandy clay loams, 7 to 15 percent slopes, severely eroded (ArC3).—This complex consists of Appling and Wedowee soils intermingled in such an intricate pattern that it was not practical to map them separately. Appling soils make up about 40 percent of this complex, Wedowee soils 35 percent, and other soils 25 percent.

Included with this complex in mapping were small, scattered areas of Ashlar, Cecil, Durham, and Sekil soils.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are suited to most locally grown crops,

but they are better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–1; woodland suitability group 4c1.

Ashlar Series

The Ashlar series consists of moderately deep, well-drained to excessively drained, gently sloping to steep soils on uplands. These soils formed in material weathered from granite and gneiss.

In a representative profile about 2 inches of partly decayed organic matter overlies the surface layer. The surface layer is sandy loam about 9 inches thick. The upper 3 inches is very dark grayish brown, and the lower 6 inches is grayish brown. The subsoil is yellowish-brown, very friable sandy loam about 9 inches thick. The substratum begins at a depth of about 18 inches and extends to a depth of about 34 inches. It is brown, very friable sandy loam that has light yellowish-brown and light-brown mottles to a depth of about 26 inches; below this the substratum is granite gneiss that crushes easily to coarse sandy loam. Hard rock is at a depth of 34 inches.

Ashlar soils are strongly acid to very strongly acid except where they have been limed. Organic-matter content and natural fertility are low. Permeability is moderately rapid, and available water capacity is low.

Representative profile of Ashlar sandy loam, 7 to 15 percent slopes, in a stand of hardwoods, 300 yards east of State Route 651, near Ellis Mill Bridge on the North Anna River:

O1—2 to 1 inch, fresh forest litter of leaves and twigs.
O2—1 inch to 0, very dark brown (10YR 2/2), partly decomposed organic matter.
A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, very fine, granular structure; very friable; many fine roots; few fine flakes of mica; medium acid; clear, smooth boundary.
A2—3 to 9 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, granular structure; very friable; many fine roots; common fine and medium pores; few angular quartz pebbles; few fine flakes of mica; medium acid; abrupt, wavy boundary.
B—9 to 18 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine and medium, subangular blocky structure parting to moderate, fine, granular; very friable; many fine and medium roots; few fine and medium pores; few fine flakes of mica; strongly acid; gradual, wavy boundary.
C1—18 to 26 inches, brown (10YR 5/3) sandy loam; common, medium, faint, light yellowish-brown (10YR 6/4) and common, medium, distinct, light-brown (7.5YR 6/4) mottles; massive; firm in place, very friable when dug out; few hard rock fragments; few fine flakes of mica; very strongly acid; gradual, wavy boundary.
C2—26 to 34 inches, mottled and streaked in shades of brown, yellow, white, and black, strongly weathered granite gneiss that crushes easily to coarse sandy loam; firm in place, friable when crushed; few hard rock fragments; few fine flakes of mica; very strongly acid; diffuse, wavy boundary.
R—34 inches, hard, multicolored granite gneiss.

The solum ranges from 14 to 24 inches in thickness. In many places angular rock fragments make up from less than 1 percent to about 20 percent, by volume, of the solum and from 5 to 35 percent, by volume, of the substratum. The A horizon is 10YR or 2.5Y in hue, 3 to 6 in value, and 2 to 4 in chroma. The B horizon is 10YR or 7.5YR in hue, 5 in value, and 4 to 8 in chroma. Depth to bedrock ranges from 22 to 40 inches.

Ashlar soils commonly are near Appling, Cecil, Grover, Madison, Pocolet, and Wedowell soils. They have a coarser textured B horizon and are shallower to bedrock than these soils.

Ashlar sandy loam, 2 to 7 percent slopes (AsB).—This soil has a profile similar to the one described as representative of the series.

Included with this soil in mapping were a few small areas of Abell, Appling, Grover, and Wedowee soils.

Runoff is medium. The hazard of erosion is severe where the soil is clean tilled or exposed. The soil is somewhat droughty during the growing season. The suitability for most locally grown crops is limited because available water capacity is low, the soil is droughty, and rock is at a depth of 22 to 40 inches. Capability unit IIIe–6; woodland suitability group 3d1.

Ashlar sandy loam, 7 to 15 percent slopes (AsC).—This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Abell, Appling, Grover, and Wedowee soils.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is clean tilled or exposed. This soil is somewhat droughty during the growing season. The suitability for most locally grown crops is limited because available water capacity is low, the soil is droughty, and rock is at a depth of 22 to 40 inches. Capability unit IVe–3; woodland suitability group 3d1.

Ashlar sandy loam, 7 to 15 percent slopes, severely eroded (AsC3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil.

Included with this soil in mapping were some areas of severely eroded Appling and Grover soils. Also included were some areas of Rock outcrop.

Runoff is rapid. The hazard of further erosion is very severe where the soil is exposed. The soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 22 to 30 inches. The soil is suited to drought-resistant pasture and woodland. Capability unit VIe–2; woodland suitability group 5d1.

Ashlar sandy loam, 15 to 25 percent slopes (AsD).—This soil has a profile similar to the one described as representative of the series.

Included with this soil in mapping were some small areas of Appling, Grover, and Wedowee soils. Also included were some small spots of Rock outcrop.

Runoff is rapid. The hazard of erosion is very severe where the soil is exposed. This soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 22 to 40 inches. The soil is suited to drought-resistant pasture and woodland. Capability unit VIe–2; woodland suitability group 3d1.

Ashlar sandy loam, 15 to 30 percent slopes, severely eroded (AsD3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil.

Included with this soil in mapping were some areas of Rock outcrop and some areas of shallow gullies.

Runoff is rapid. The hazard of further erosion is very severe where the soil is exposed. This soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 22 to 28 inches. The soil is better suited to woodland than to crops and pasture. Capability unit VIIe–1; woodland suitability group 5d1.

Ashlar-Manteo-Rock outcrop complex (AV).—This complex consists of Ashlar and Manteo soils and Rock outcrop intermingled in such an intricate pattern that it was not practical to map them separately. Ashlar soils make up about 30 percent of this complex, Manteo soils 28 percent, Rock outcrop 26 percent, and other soils 16 percent. Slopes range from about 10 percent to about 45 percent.

Included with these soils in mapping were small, scattered areas of Appling, Grover, and Nason soils. Also included were small areas of very stony and extremely stony soils.

Runoff is rapid. The hazard of erosion is very severe if these soils are exposed. This complex is better suited to pasture and woodland than to other crops. Capability unit VIs–1; woodland suitability group 5d1.

Cecil Series

The Cecil series consists of deep, well-drained, gently sloping to moderately steep soils on piedmont uplands. These soils formed in material weathered from granite and gneiss.

In a representative profile the surface layer is reddish-brown sandy loam about 6 inches thick. The subsoil is about 42 inches thick. The upper 5 inches is yellowish-red, friable sandy clay loam; the next 27 inches is red, firm clay; and the lower 10 inches is red, friable clay loam that has yellowish-red and strong-brown mottles. The substratum begins at a depth of about 48 inches and extends to a depth of about 62 inches or more. It is mottled red, strong-brown, yellowish-red, and white granitic material that crushes easily to sandy loam.

The subsoil is strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Cecil sandy loam, 2 to 7 percent slopes, eroded, in a pine woodland, 1½ miles south of U.S. Highway 522, near the end of State Route 611:

Ap—0 to 6 inches, reddish-brown (5YR 4/4) sandy loam; moderate, fine and medium, granular structure; friable; many fine and medium roots; common angular quartz pebbles; strongly acid; clear, smooth boundary.

B1—6 to 11 inches, yellowish-red (5YR 4/8) sandy clay loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; many fine and medium pores; common angular quartz pebbles; strongly acid; clear, smooth boundary.

B21t—11 to 19 inches, red (2.5YR 4/8) clay; strong, fine and medium, subangular blocky structure; firm, sticky and plastic; few large roots; thin continuous clay films; few angular quartz pebbles; strongly acid; gradual, smooth boundary.

B22t—19 to 38 inches, red (2.5YR 4/8) clay; strong, medium, subangular blocky structure; firm, sticky and plastic; thin continuous clay films; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B3—38 to 48 inches, red (2.5YR 4/6) clay loam; few, medium, distinct, yellowish-red (5YR 4/8) and strong-brown (7.5YR 5/8) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few angular quartz pebbles; few weathered gneiss fragments; few fine flakes of mica; strongly acid; gradual, smooth boundary.

C—48 to 62 inches, mottled red (2.5YR 4/6), strong-brown (7.5YR 5/8), yellowish-red (5YR 4/6), and white (10YR 8/2), weathered granitic material that crushes easily to sandy loam; massive; firm in place; many fine flakes of mica; many feldspar fragments; strongly acid.

The solum ranges from 40 to 60 inches in thickness. In many places, fine to medium angular quartz pebbles make up from less than 1 percent to about 15 percent, by volume, of the solum. The A horizon is 5YR, 7.5YR, or 10YR in hue, 4 or 5 in value, and 4 to 6 in chroma. It is commonly sandy loam but ranges to clay loam where the soil is severely eroded. The Bt horizon is 2.5YR or 10R in hue, 4 or 5 in value, and 6 or 8 in chroma. It is commonly clay but ranges to heavy clay loam. Bedrock is below a depth of 5 feet.

Cecil soils commonly are near Appling, Ashlar, and Pacolet soils. They have a redder B horizon than Appling soils. They have a thicker, more clayey B horizon than Ashlar soils. They have a thicker solum than Pacolet soils.

Cecil sandy loam, 2 to 7 percent slopes, eroded (CcB2).—This soil has the profile described as representative of the series. The surface layer ranges from 4 to 10 inches in thickness.

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

Runoff is medium. The hazard of further erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Cecil sandy loam, 7 to 15 percent slopes, eroded (CcC2).—This soil is on narrow ridges and side slopes. The surface layer ranges from 4 to 8 inches in thickness.

Included with this soil in mapping were small, scattered areas of Abell soils and small areas of shallow gullies.

Runoff is medium to rapid. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–1; woodland suitability group 3o1.

Cecil clay loam, 2 to 7 percent slopes, severely eroded (CeB3).—This soil is on narrow ridges. This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Small erosion rills are common in some places.

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

Runoff is medium. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IIIe–2; woodland suitability group 4c1.

Cecil-Pacolet clay loams, 7 to 15 percent slopes, severely eroded (CfC3).—This complex consists of Cecil and Pacolet soils intermingled in such an intricate pattern that it was not practical to map them separately. Cecil soils make up about 45 percent of this complex, Pacolet soils 35 percent, and other soils 20 percent.

Included with this complex in mapping were small, scattered areas of Abell, Cullen, and Madison soils.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are suited to most locally grown crops, but they are better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–1; woodland suitability group 4c1.

Chewacla Series

The Chewacla series consists of deep, somewhat poorly drained, nearly level soils on flood plains along the streams in Louisa County. These soils formed in loamy alluvium.

In a representative profile the surface layer is dark-brown silt loam about 12 inches thick. The subsoil is about 36 inches thick. The upper 4 inches is yellowish-brown, friable silt loam that has strong-brown mottles; the next 9 inches is yellowish-brown, friable silt loam that has grayish-brown and strong-brown mottles; the next 11 inches is mottled light olive-brown, and gray, friable silty clay loam; and the lower 12 inches is dark grayish-brown, friable silty clay loam. The substratum begins at a depth of about 48 inches and extends to a depth of about 52 inches or more. It is dark-gray sandy loam that contains thin lenses and layers of sand, silt, and gravel.

Chewacla soils are medium acid to strongly acid. Organic-matter content and natural fertility are medium. Permeability of the subsoil is moderate, and available water capacity is high. The water table rises to a depth of 1 to 2 feet during wet periods. Chewacla soils are frequently flooded.

Representative profile of Chewacla silt loam, 300 feet northwest of State Highway 22 along the South Anna River:

A1—0 to 12 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many fine and medium roots; few fine flakes of mica; medium acid; clear, smooth boundary.

B1—12 to 16 inches, yellowish-brown (10YR 5/4) silt loam; few, fine, faint, strong-brown (7.5YR 5/6) mottles; weak, fine, granular structure; friable; few fine flakes of mica; medium acid; gradual, smooth boundary.

B21—16 to 25 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, distinct, grayish-brown (10YR 5/3) and common, medium, faint, strong-brown (7.5YR 5/6) mottles; weak, fine, subangular blocky structure; friable; few fine flakes of mica; medium acid; gradual, smooth boundary.

B22—25 to 36 inches, mottled light olive-brown (2.5Y 5/4) and gray (5Y 5/1) light silty clay loam; weak, medium, subangular blocky structure; friable; few fine flakes of mica; strongly acid; abrupt, smooth boundary.

B23g—36 to 48 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; weak, fine, subangular blocky structure; friable; few fine flakes of mica; medium acid; gradual, smooth boundary.

IICg—48 to 52 inches, dark-gray (5YR 4/1) sandy loam; thin lenses and layers of sand, silt, and gravel; medium acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 10YR or 7.5YR in hue, 3 to 5 in value, and 2 to 4 in chroma. Mottles that are 2 or less in chroma are in the B horizon above a depth of 20 inches, and the number of gray mottles increases with depth. Bedrock is below a depth of 5 feet.

Chewacla soils commonly are near Congaree, Forestdale, Toccoa, and Wehadkee soils. They are less well drained than Congaree and Toccoa soils. They are better drained than Forestdale and Wehadkee soils. They have a less clayey B horizon than Forestdale soils. They are more clayey throughout than Toccoa soils.

Chewacla silt loam (Ch).—This soil has slopes that are dominantly 0 to 2 percent.

Included with this soil in mapping were small areas of Congaree and Wehadkee soils. Also included were small, scattered areas of soils that are fine sandy loam in texture and small spots of soils that have a clayey subsoil.

Runoff is slow. A seasonal high water table is at a depth of 1 to 2 feet, and artificial drainage is beneficial if the soil is cultivated. This soil is frequently flooded. If the soil is adequately drained, limed, and fertilized, it is well suited to most locally grown crops. Alfalfa is usually not long lived, because wetness is excessive in winter and spring. Capability unit IIIw–1; woodland suitability group 1w1.

Colfax Series

The Colfax series consists of deep, somewhat poorly drained, gently sloping soils on upland flats, at the base of slopes, and at the head of drainageways. These soils formed in material weathered from granite and gneiss. They have a moderately developed to strongly developed fragipan at a depth of 25 to 36 inches.

In a representative profile the surface layer is grayish-brown fine sandy loam about 11 inches thick. The subsoil is about 39 inches thick. The upper 7 inches is light yellowish-brown, friable fine sandy loam; the next 10 inches is yellowish-brown, friable sandy clay loam that has pale-brown and light-gray mottles; and the lower 22 inches is mottled brownish-yellow, light-gray, gray, and yellowish-brown sandy loam that is brittle and compact in place. The substratum begins at a depth of about 50 inches and extends to a depth of about 62 inches or more. It is gray, weathered granite gneiss that crushes easily to sandy loam and that has pale-brown mottles.

The subsoil is very strongly acid to strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. The fragipan is slowly permeable, and available water capacity is low. A perched water table is above the fragipan during wet periods.

Representative profile of Colfax fine sandy loam, 2 to 7 percent slopes, two-tenths of a mile south of Mt. Hope Church, along west side of State Route 602:

Ap—0 to 11 inches, grayish-brown (10YR 5/2) fine sandy loam; weak, fine, granular structure; very friable; many fine and medium roots; many fine and medium pores; slightly acid; clear, smooth boundary.

B1—11 to 18 inches, light yellowish-brown (10YR 6/4) heavy fine sandy loam; weak, fine, subangular

blocky structure; friable; many fine and medium roots; many fine and medium pores; strongly acid; clear, smooth boundary.

B2t—18 to 28 inches, yellowish-brown (10YR 5/6) light sandy clay loam; common, medium, distinct, pale-brown (10YR 6/3) and light-gray (10YR 7/2) mottles; weak, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; few thin clay films; very strongly acid; clear, smooth boundary.

Bx—28 to 50 inches, mottled brownish-yellow (10YR 6/6), light-gray (10YR 7/1), gray (10YR 6/1), and yellowish-brown (10YR 5/8) heavy sandy loam; moderate, thick, platy structure; brittle and compact in place, friable, sticky; very strongly acid; gradual, wavy boundary.

C—50 to 62 inches, light-gray (10YR 7/1), weathered granite gneiss that crushes readily to sandy loam; common, medium, distinct, very pale brown (10YR 7/3) mottles; firm in place; easily dug out; few angular quartz pebbles; clay flows in cracks and crevices; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 10YR or 2.5Y in hue, 4 to 6 in value, and 2 to 4 in chroma. The Bt horizon is 10YR in hue, 5 or 6 in value, and 4 to 8 in chroma. Mottles that are 2 or less in chroma are in the upper 10 inches of the Bt horizon. The Bt horizon is light sandy clay loam or clay loam. Depth to the fragipan ranges from 25 to 36 inches. The Bx horizon is 10YR or 2.5Y in hue, 5 to 7 in value, and 1 to 8 in chroma. It ranges from heavy sandy loam to sandy clay loam. Bedrock is at a depth of 4 feet or more.

Colfax soils commonly are near Appling, Durham, and Worsham soils. They have a fragipan, which these soils lack.

Colfax fine sandy loam, 2 to 7 percent slopes (CfB).—This is the only Colfax soil mapped in the county.

Included with this soil in mapping were small, scattered areas of Durham and Worsham soils. Also included were small areas of a soil that has many quartz pebbles on the surface.

Runoff is slow to medium. This soil receives seepage water from higher lying areas. A perched water table is above the fragipan after heavy rains. This soil is droughty during the growing season because available water capacity is low and the fragipan restricts roots. If this soil is adequately drained, limed, and fertilized, it has limited suitability for most locally grown crops. Excessive wetness in winter and spring and the fragipan severely limit this soil for alfalfa and other deep-rooted crops. Capability unit IIIw–2; woodland suitability group 2w1.

Congaree Series

The Congaree series consists of deep, well-drained, nearly level soils on flood plains along the larger streams in the county. These soils formed in loamy alluvium.

In a representative profile the surface layer is silt loam about 10 inches thick. The substratum begins at a depth of about 10 inches and extends to a depth of 58 inches or more. The upper 24 inches is brown and dark yellowish-brown, friable silt loam; the next 10 inches is dark-brown, friable very fine sandy loam; and the lower 14 inches is yellowish-brown, friable silt loam that has dark-brown mottles.

The substratum is medium acid. Organic-matter content is high, and natural fertility is medium. Permeability is moderate throughout, and available water capacity is high. A seasonal high water table is at a depth of 4 feet or more. Congaree soils are occasionally flooded.

Representative profile of Congaree silt loam northwest of State Route 635 along the South Anna River:

Ap—0 to 10 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; very friable; many fine roots; few fine flakes of mica; slightly acid; clear, smooth boundary.

C1—10 to 18 inches, brown (7.5YR 4/4) silt loam; massive; friable; many fine and medium roots; many fine and medium pores; many fine flakes of mica; medium acid; gradual, smooth boundary.

C2—18 to 34 inches, dark yellowish-brown (10YR 4/4) silt loam; massive; friable; many fine and medium roots; many fine flakes of mica; medium acid; clear, smooth boundary.

Ab—34 to 44 inches, dark-brown (10YR 3/3) very fine sandy loam; massive; friable; common fine and medium roots; many fine flakes of mica; medium acid; clear, smooth boundary.

C3—44 to 58 inches, yellowish-brown (10YR 5/4) silt loam; few, fine, faint, dark-brown (10YR 4/3) mottles; massive; friable; medium acid.

The A horizon is 10YR or 7.5YR in hue, 4 or 5 in value, and 2 to 6 in chroma. It is commonly silt loam but ranges to loam and fine sandy loam. The C horizon is 10YR or 7.5YR in hue, 3 to 5 in value, and 3 to 6 in chroma. It ranges from silt loam and very fine sandy loam to loam and sandy loam, and it has lenses and thin layers of finer textured and coarser textured material in most places. In many places mottles that are 2 or less in chroma are below a depth of 30 inches. A buried A horizon is not present in all places. Bedrock is below a depth of 5 feet.

Congaree soils are commonly near Chewacla, Toccoa, and Wehadkee soils. They are better drained than Chewacla and Wehadkee soils. They are finer textured throughout than Toccoa soils.

Congaree silt loam (Cn).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 16 inches thick. Slopes are dominantly 0 to 2 percent.

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

Runoff is slow. A seasonal high water table is at a depth of 4 feet or more, and the soil is occasionally flooded. If the soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIw–1; woodland suitability group 1o1.

Congaree-Chewacla complex (CO).—This complex consists of Congaree and Chewacla soils intermingled in such an intricate pattern that it was not practical to map them separately. Congaree soils make up about 45 percent of this complex, Chewacla soils 40 percent, and included soils 15 percent. Slopes are dominantly 0 to 2 percent.

Included with this complex in mapping were small areas of Toccoa and Wehadkee soils. Also included were small, scattered spots of very poorly drained soils and gravelly soils.

Runoff is slow. A seasonal high water table is at a depth of 2 to 4 feet, and the soils are frequently flooded. Artificial drainage is beneficial if these soils are cultivated. If these soils are adequately drained, limed, and fertilized, they are well suited to most locally grown crops. Alfalfa is usually short lived because wetness is excessive in winter and spring. Capability unit IIIw–1; woodland suitability group 1w1.

Cullen Series

The Cullen series consists of deep, well-drained, gently sloping to sloping soils on piedmont uplands. These soils formed in material weathered from basic and acidic rocks and from hornblende gneiss.

In a representative profile about 1 inch of undecomposed forest litter overlies the surface layer. The surface layer is loam about 6 inches thick. The upper 2 inches is very dark grayish brown, and the lower 4 inches is brown. The subsoil is about 48 inches thick. The upper 4 inches is yellowish-red, friable clay loam; the next 4 inches is red, firm clay; the next 22 inches is dark-red, firm clay; and the lower 18 inches is dark-red, friable clay loam that has yellowish-red and reddish-yellow mottles. The substratum begins at a depth of about 54 inches and extends to a depth of 78 inches or more. It is red, very friable sandy loam that has yellowish-red, strong-brown, and very pale brown mottles.

The subsoil is medium acid to strongly acid. Organic-matter content is medium, and natural fertility is low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Cullen loam, 2 to 7 percent slopes, eroded, one-fourth of a mile south of the junction of State Route 640 and State Route 695:

O1—1 inch to 0, undecomposed forest litter of leaves, twigs, and sticks.

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) loam; weak, medium, granular structure; very friable; many fine roots; many fine and medium pores; few small quartz pebbles; strongly acid; clear, smooth boundary.

A2—2 to 6 inches, brown (7.5YR 4/4) loam; moderate, fine and medium, granular structure; friable; many fine and medium roots; many fine and medium pores; strongly acid; gradual, wavy boundary.

B1—6 to 10 inches, yellowish-red (5YR 4/6) clay loam; moderate, medium, subangular blocky structure; friable; many fine and medium roots; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B21t—10 to 14 inches, red (2.5YR 4/6) clay; strong, fine and medium, subangular blocky structure; firm, sticky and plastic; common medium roots; thin clay films; few fine flakes of mica; medium acid; gradual, smooth boundary.

B22t—14 to 36 inches, dark-red (2.5YR 3/6) clay; strong, coarse and medium, subangular blocky structure; firm, sticky and plastic; common medium roots; thin, continuous clay films; few fine flakes of mica; medium acid; gradual, smooth boundary.

B3t—36 to 54 inches, dark-red (2.5YR 3/6) clay loam; few, medium, distinct, yellowish-red (5YR 5/6) and reddish-yellow (7.5YR 6/6) mottles; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few fine flakes of mica; medium acid; clear, wavy boundary.

C—54 to 78 inches, red (2.5YR 5/8) saprolite, sandy loam when dug out; common, medium, distinct, yellowish-red (5YR 5/8), strong-brown (7.5YR 5/8), and very pale brown (10YR 7/3) mottles; massive; firm in place, very friable when dug; few fine flakes of mica; medium acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 10YR or 7.5YR in hue, 3 to 5 in value, and 2 to 4 in chroma. It is commonly loam but ranges to silt loam or to clay loam where the soil is severely eroded. The Bt horizon is 2.5YR or 10R in hue, 3 or 4 in value, and 4 to 6 in chroma. The B2t horizon is clay but ranges to silty clay. Mottles that are 5YR, 7.5YR, or 10YR in hue, 4 to 6 in value, and 4 to 8 in chroma are in the B3t horizon. The B3t horizon is commonly clay loam. Bedrock is below a depth of 5 feet.

Cullen soils commonly are near Cecil, Enon, Mecklenburg, Poindexter, and Zion soils. They have a dark-red subhorizon in the B horizon that these soils lack. They are deeper to bedrock and have a more clayey Bt horizon than Poindexter soils.

Cullen loam, 2 to 7 percent slopes, eroded (CuB2).—This soil has the profile described as representative of the series. In some places the surface layer is silt loam. In some places quartz pebbles are on the surface and in the surface layer.

Included with this soil in mapping were small, scattered areas of Abell, Enon, and Mecklenburg soils.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If the soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Cullen loam, 7 to 15 percent slopes, eroded (CuC2).—This soil is on narrow ridges and wide side slopes. In some places the surface layer is silt loam.

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

Runoff is medium to rapid. The hazard of further erosion is severe where the soil is clean tilled or exposed. If the soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–1; woodland suitability group 3o1.

Cullen clay loam, 2 to 7 percent slopes, severely eroded (CwB3).—This soil is on narrow ridges. It has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Small erosion rills are common in some places.

Included with this soil in mapping were small, scattered areas of Cecil, Tatum, and Turbeville soils.

Runoff is medium. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IIIe–2; woodland suitability group 4c1.

Cullen clay loam, 7 to 15 percent slopes, severely eroded (CwC3).—This soil is on narrow ridges and side slopes. It has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Shallow gullies are common in some places.

Included with this soil in mapping were small, scattered areas of Fluvanna and Poindexter soils and small areas of soils that have slopes steeper than 15 percent.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. It is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–1; woodland suitability group 4c1.

Cut and Fill Land

Cut and fill land consists of small areas where the natural soils have been removed or mixed. Some areas have been leveled for commercial construction, for parking lots, and for school construction. Other areas have been excavated, filled, or shaped for various reasons. Some areas have been paved. Texture of the soil material is quite variable. Areas of Cut and fill land are indicated by a conventional sign on the soil map.

Durham Series

The Durham series consists of deep, well-drained, gently sloping soils on uplands. These soils formed in material weathered from granite gneiss.

In a representative profile about 1 inch of forest litter overlies the surface layer. The surface layer is about 19 inches thick. The upper 9 inches is light brownish-gray fine sandy loam, and the lower 10 inches is pale-brown sandy loam. The subsoil is about 27 inches thick. The upper 15 inches is yellowish-brown, friable sandy clay loam; and the lower 12 inches is brownish-yellow, friable sandy clay loam that has yellowish-brown and pale-brown mottles. The substratum begins at a depth of about 46 inches and extends to a depth of about 54 inches or more. It is mottled pale-brown, brownish-yellow, and light-gray sandy loam.

The subsoil is strongly acid to very strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Durham fine sandy loam, 2 to 5 percent slopes, in a cutover pine forest, 1 mile north of State Highway 22, by State Route 625:

O1—1 to ¼ inch, undecomposed pine needles and twigs.
O2—¼ inch to 0, very dark gray (10YR 3/1), partly decomposed organic matter.
Ap—0 to 9 inches, light brownish-gray (10YR 6/2) fine sandy loam; weak, fine, granular structure; very friable; many fine roots; many fine pores; medium acid; clear, smooth boundary.
A21—9 to 16 inches, pale-brown (10YR 6/3) sandy loam; weak, fine, granular structure; very friable; many fine roots; many fine pores; medium acid; gradual, smooth boundary.
A22—16 to 19 inches, pale-brown (10YR 6/3) sandy loam; weak, medium, granular structure; friable, slightly brittle; few fine and medium roots; many fine pores; few quartz pebbles; strongly acid; clear, smooth boundary.
B21t—19 to 25 inches, yellowish-brown (10YR 5/4) sandy clay loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common medium and large roots; many fine pores; few thin clay films; very strongly acid; gradual, smooth boundary.
B22t—25 to 34 inches, yellowish-brown (10YR 5/8) heavy sandy clay loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; very strongly acid; gradual, smooth boundary.
B3—34 to 46 inches, brownish-yellow (10YR 6/6) sandy clay loam; few, fine, faint, yellowish-brown (10YR 5/8) and pale-brown (10YR 6/3) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; clear, wavy boundary.
C—46 to 54 inches, mottled pale-brown (10YR 6/3), brownish-yellow (10YR 6/6), and light-gray (10YR 7/2) sandy loam saprolite; massive; friable; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 10YR in hue, 4 to 6 in value, and 2 to 4 in chroma. The Bt horizon is 10YR or 7.5 YR in hue, 5 or 6 in value, and 3 to 8 in chroma. It is sandy clay loam or light clay loam. Bedrock is below a depth of 5 feet.

Durham soils commonly are near Appling, Colfax, and Worsham soils. They have a less clayey B horizon than Appling soils. They are better drained than Colfax and Worsham soils, and they lack the fragipan of Colfax soils.

Durham fine sandy loam, 2 to 5 percent slopes (DuB).—This soil is on broad, smooth ridges. In some places the surface layer is as much as 20 inches thick.

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

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–2; woodland suitability group 3o1.

Elbert Series

The Elbert series consists of deep, somewhat poorly drained to poorly drained, nearly level soils. These soils formed in material weathered from basic rocks.

In a representative profile about 2 inches of forest litter overlies the surface layer. The surface layer is 11 inches thick. The upper 5 inches is gray silt loam; and the lower 6 inches is mottled, light-gray, firm silty clay. The subsoil is about 41 inches thick. The upper 10 inches is mottled dark-gray and olive-brown, very firm clay; the next 9 inches is olive, very firm clay that has dark-gray mottles; the next 11 inches is mottled olive and olive-brown, firm clay; and the lower 11 inches is dark-gray, firm sandy clay. The substratum begins at a depth of about 52 inches and extends to a depth of about 61 inches or more. It is mottled light olive-brown, light-gray, gray, and olive, weathered rock that crushes to sandy loam.

The subsoil is very strongly acid to neutral. Organic-matter content and natural fertility are medium. Permeability of the subsoil is very slow, and available water capacity is medium. The water table rises to a depth of 1 foot or less during winter and spring.

Representative profile of Elbert silt loam in a hardwood forest, on the east side of State Route 638, eight-tenths of a mile south of the junction of State Route 638 and State Highway 22:

O1—2 inches to ½ inch, loose leaves and twigs.
O2—½ inch to 0, partly decomposed leaves, twigs, and organic matter.
A1—0 to 5 inches, gray (5Y 5/1) silt loam; few, medium, distinct, light olive-brown (2.5Y 5/4) mottles; weak, fine and medium, granular structure; friable, slightly sticky; many fine, medium, and coarse roots; extremely acid; clear, smooth boundary.
A3—5 to 11 inches, light-gray (10YR 7/1) silty clay; common, medium, distinct, brownish-yellow (10YR 6/6) and yellowish-brown (10YR 5/4) mottles; weak, medium, angular blocky structure; firm, sticky and plastic; many fine and medium roots;

gray silt coatings on ped surfaces; very strongly acid; abrupt, smooth boundary,

B21t—11 to 21 inches, mottled dark-gray (5Y 4/1) and olive-brown (2.5Y 4/4) clay; moderate, coarse, prismatic structure parting to angular blocky; very firm, sticky and plastic; few fine roots; gray silt coatings on ped surfaces; very strongly acid; gradual, smooth boundary.

B22t—21 to 30 inches, olive (5Y 4/3) clay; common, medium, faint, dark-gray (5Y 4/1) mottles; moderate, coarse prismatic structure; very firm, very sticky and plastic; few fine roots; very strongly acid; gradual, smooth boundary.

B23t—30 to 41 inches, mottled olive (5Y 4/3) and olive-brown (2.5Y 4/4) clay; weak, coarse, prismatic structure; firm, sticky and very plastic; few fine roots; few, fine, light-gray feldspar crystals; strongly acid; gradual, smooth boundary.

B3tg—41 to 52 inches, dark-gray (5Y 4/1) sandy clay; massive; firm, sticky and plastic; few fine roots; common root channels filled with clay; common light-gray feldspar crystals; neutral; abrupt, irregular boundary.

IIC—52 to 61 inches. mottled light olive-brown (2.5Y 5/4), light-gray (N 7/0), and olive (5Y 4/3), weathered rock that crushes to sandy loam; massive; very friable; many rounded quartz pebbles; olive-gray clay flows in lower part; root channels filled with clay; few feldspar crystals; mildly alkaline.

The solum ranges from 40 to 60 inches in thickness. The A1 horizon is 5Y, 2.5Y, or 10YR in hue, 4 to 6 in value, and 1 to 4 in chroma. The A3 horizon is 10YR or yellower in hue, 5 to 7 in value, and 1 to 6 in chroma. The Bt horizon is 5Y, 2.5Y, 10YR, or N/0 in hue, 4 or 5 in value, and 0 to 4 in chroma. Bedrock is at a depth of 3½ feet or more.

In this county Elbert soils have a subhorizon that is dominantly more than 2 in chroma at a depth of less than 30 inches, which Elbert soils elsewhere lack. This difference does not alter their use and management.

Elbert soils commonly are near Enon, Iredell, Mecklenburg, Poindexter, and Zion soils. They are more poorly drained and are grayer throughout the profile than these soils.

Elbert silt loam (Eb).—This soil is on upland flats, in depressions, and along small drainageways throughout the Green Springs area of the county. In some areas the surface layer is as much as 16 inches thick. Slopes are dominantly 0 to 2 percent.

Included with this soil in mapping were small, scattered areas of Iredell and Zion soils. Also included were small areas of soils that have many quartz pebbles on the surface and in the surface layer.

Runoff is slow. This soil receives seepage water from higher lying areas. A seasonal high water table is between the surface and a depth of 1 foot, and artificial drainage is beneficial where this soil is farmed. If this soil is adequately drained, limed, and fertilized, it has limited suitability for some locally grown crops. Adequate drainage is difficult to obtain. It is poorly suited to alfalfa or other deep-rooted crops. Capability unit Vw–1; woodland suitability group 4w1.

Enon Series

The Enon series consists of deep, well-drained, gently sloping to sloping soils on piedmont uplands. These soils formed in material weathered from diorite, hornblende, hornblende gneiss, and other basic rocks. Enon soils in Louisa County were mapped only in complexes with Mecklenburg soils.

In a representative profile the surface layer is dark-brown loam about 6 inches thick. The subsoil is about 32 inches thick. The upper 5 inches is yellowish-brown, friable clay loam; the next 6 inches is yellowish-brown, firm clay that has strong-brown and pale-brown mottles; the next 14 inches is strong-brown, firm clay that has yellowish-brown and light olive-brown mottles; and the lower 7 inches is yellowish-brown, firm clay that has pale-brown mottles. The substratum begins at a depth of about 38 inches and extends to a depth of about 52 inches or more. It is mottled yellowish-brown, pale-brown, and gray clay loam.

The subsoil is medium acid to strongly acid except where the soils have been limed. Organic-matter content and natural fertility are medium. Permeability of the subsoil is slow, and available water capacity is medium.

Representative profile of Enon loam in an area of Mecklenburg-Enon loams, 2 to 7 percent slopes, eroded, 1 mile southeast of Peck's Store, along State Route 695:

Ap—0 to 6 inches, dark-brown (10YR 4/3) loam; moderate, fine and medium, granular structure; very friable; many fine and medium roots; many fine pores; neutral; clear, smooth boundary.

B1—6 to 11 inches, yellowish-brown (10YR 5/4) clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; few quartz pebbles; slightly acid; clear, smooth boundary.

B21t—11 to 17 inches, yellowish-brown (10YR 5/8) clay; common, medium, faint, strong-brown (7.5YR 5/8) and pale-brown (10YR 6/3) mottles; moderate, coarse, subangular blocky structure; firm, sticky and plastic; common medium roots; few thin clay films; strongly acid; gradual, smooth boundary.

B22t—17 to 31 inches, strong-brown (7.5YR 5/6) clay; common, medium, faint, yellowish-brown (10YR 5/6) and common, medium, distinct, light olive-brown (2.5Y 5/4) mottles; moderate, medium, subangular blocky structure; firm, sticky and plastic; few fine roots; thin continuous clay films; strongly acid; gradual, smooth boundary.

B3—31 to 38 inches, yellowish-brown (10YR 5/6) clay; common, medium, faint, pale-brown (10YR 6/3) mottles; weak, medium, subangular blocky structure; firm, sticky and plastic; few weathered rock fragments; strongly acid; gradual, wavy boundary.

C—38 to 52 inches, mottled yellowish-brown (10YR 5/6), pale-brown (10YR 6/3), and gray (10YR 6/1) clay loam; massive; common weathered rock fragments; strongly acid.

The solum ranges from 20 to 40 inches in thickness. The A horizon is 10YR or 7.5YR in hue, 4 or 5 in value, and 2 to 6 in chroma. It is commonly loam but ranges to clay loam where the soil is severely eroded. The Bt horizon is 10YR, 7.5YR, or 2.5Y in hue, 4 to 6 in value, and 3 to 8 in chroma. Bedrock is at a depth of 4 feet or more.

In this county Enon soils are more acid in the soil profile than Enon soils elsewhere. This difference does not alter their use and management.

Enon soils commonly are near Cullen, Iredell, Mecklenburg, Poindexter, and Zion soils. They have a yellower B horizon than Cullen and Mecklenburg soils. They are better drained than Iredell soils. They have a more clayey Bt horizon than Poindexter soils. They lack the concretionary horizon of Zion soils.

Fluvanna Series

The Fluvanna series consists of deep, well-drained, gently sloping to sloping soils on piedmont uplands. These soils formed in material weathered from mixed basic and acidic rocks.

In a representative profile about 1 inch of forest litter overlies the surface layer. The surface layer is about 9 inches thick. The upper 4 inches is brown fine sandy loam, and the lower 5 inches is strong-brown loam. The subsoil is about 37 inches thick. The upper 5 inches is reddish-brown, friable clay loam; the next 21 inches is yellowish-red, very firm clay; and the lower 11 inches is yellowish-red, friable silty clay loam. The substratum begins at a depth of about 46 inches and extends to a depth of about 54 inches or more. It is strong-brown, yellowish-brown, and yellowish-red, weathered rock that crushes easily to silty clay loam.

The subsoil is strongly acid to very strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is high.

Representative profile of Fluvanna fine sandy loam, 2 to 7 percent slopes, eroded, in a pine woodland, 1 mile north of Interstate Highway 64, on west side of State Route 604:

O1—1 to ¼ inch, loose, undecomposed pine needles and twigs.

O2—¼ inch to 0, very dark brown (10YR 2/2), partly decomposed organic matter.

Ap1—0 to 4 inches, brown (10YR 5/3) fine sandy loam; moderate, fine, granular structure; very friable; many fine and medium roots; few, fine, angular quartz pebbles; very strongly acid; clear, smooth boundary.

Ap2—4 to 9 inches, strong-brown (7.5YR 5/6) loam; weak, fine, granular and weak, fine, subangular blocky structure; friable; many fine and medium roots; few, fine, angular quartz pebbles; very strongly acid; clear, smooth boundary.

B1—9 to 14 inches, reddish-brown (5YR 5/4) clay loam; moderate, fine and medium, subangular blocky structure; friable, slightly sticky; many fine and medium roots; few fine pores; few, fine, angular quartz pebbles; very strongly acid; gradual, smooth boundary.

B21t—14 to 24 inches, yellowish-red (5YR 4/6) clay; strong, medium, subangular blocky structure; very firm; slightly sticky and slightly plastic; many medium and large roots; few fine and medium pores; many, thin, continuous clay films; strongly acid; gradual, smooth boundary.

B22t—24 to 35 inches, yellowish-red (5YR 4/8) clay; strong, fine and medium, subangular blocky structure; very firm, sticky and plastic; few large roots; many prominent clay films; strongly acid; gradual, smooth boundary.

B3t—35 to 46 inches, yellowish-red (5YR 4/6) silty clay loam; few, medium, distinct, strong-brown (7.5YR 5/6) and reddish-yellow (7.5YR 6/8) mottles; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few, thin, patchy clay films; few weathered rock fragments; very strongly acid; gradual, wavy boundary.

C—46 to 54 inches, strong-brown (7.5YR 5/8), weathered rock that crushes to silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and yellowish-red (5YR 4/6) mottles; massive; firm in place; crushes easily, very strongly acid.

The solum ranges from 28 to 56 inches in thickness. In many places fine to medium, angular quartz pebbles make up from less than 1 percent to about 10 percent, by volume, of the solum. The A horizon is 10YR or 7.5YR in hue, 4 to 6 in value, and 2 to 6 in chroma. The Bt horizon is 5YR or 7.5YR in hue, 4 to 6 in value, and 4 to 8 in chroma. Bedrock is below a depth of 5 feet.

Fluvanna soils commonly are near Cullen, Orange, Nason, and Tatum soils. They have a yellower B horizon than Cullen and Tatum soils. They are better drained than Orange soils. They have a firmer and more plastic B horizon than Nason soils.

Fluvanna fine sandy loam, 2 to 7 percent slopes, eroded (FlB2).—This soil has the profile described as representative of the series.

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

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Fluvanna fine sandy loam, 7 to 15 percent slopes, eroded (FlC2).—This soil has a surface layer that is generally 3 to 6 inches thick. In some places angular quartz pebbles are on the surface and in the surface layer.

Included with this soil in mapping were small, scattered areas of Nason and Sekil soils. Also included were small areas of soils that have a surface layer of silt loam.

Runoff is medium to rapid. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–1; woodland suitability group 3o1.

Fluvaquents

Fluvaquents (FN) consists of swampy, low-lying areas of loamy mixed alluvium along small streams in the county. The soils are waterlogged or covered by water except during extended dry periods. They have been ponded by beaver dams or by natural conditions.

The surface layer is commonly gray or dark gray. Lower layers are gray, greenish gray, or bluish gray. A mat of partly decayed organic matter is on the surface in many places.

Fluvaquents commonly are wooded but include small areas of open water and areas covered by reeds, cattails, arrowleaf, and other aquatic plants. They produce little usable timber and are too wet for normal woodland management. They are suited to habitat for wetland wildlife. Capability unit VIIw–1; woodland suitability group not assigned.

Forestdale Series

The Forestdale series consists of deep, poorly drained, nearly level soils on terraces along the larger streams in the county. These soils formed in loamy and clayey alluvium.

In a representative profile the surface layer is grayish-brown silt loam about 8 inches thick that has light brownish-gray and light yellowish-brown mottles. The subsoil is about 47 inches thick. The upper 6 inches is light brownish-gray, friable silty clay loam that has yellowish-brown mottles; the next 21 inches is gray, firm clay that has light olive-brown and grayish-brown mottles; the next 10 inches is mottled gray and light olive-brown, firm clay; and the lower 10 inches is

gray, firm silty clay loam. The substratum begins at a depth of about 55 inches and extends to a depth of 62 inches or more. It is gray sandy clay loam.

The subsoil is very strongly acid to medium acid. Organic-matter content is medium, and natural fertility is low. Permeability of the subsoil is very slow, and available water capacity is medium. The water table rises to a depth of 1 foot or less at times. Forestdale soils are occasionally flooded and are often ponded after heavy rains.

Representative profile of Forestdale silt loam in a hardwood forest, east of State Route 601, just north of the South Anna River bridge:

Ap—0 to 8 inches, grayish-brown (2.5Y 5/2) silt loam; few, fine, faint, light brownish-gray (2.5Y 6/2) and light yellowish-brown (10YR 6/4) mottles; weak, fine, granular structure; very friable; many fine roots; many fine pores; very strongly acid; clear, smooth boundary.

B1g—8 to 14 inches, light brownish-gray (10YR 6/2) silty clay loam; few, medium, faint, yellowish-brown (10YR 5/4) mottles; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; many fine and medium pores; strongly acid; clear, smooth boundary.

B21tg—14 to 19 inches, gray (N 6/0) clay; common, fine, distinct, light olive-brown (2.5Y 5/6) and grayish-brown (2.5Y 5/2) mottles; moderate, medium, angular blocky structure; firm, sticky and plastic; few medium and coarse roots; few thin clay films; very strongly acid; gradual, smooth boundary.

B22tg—19 to 35 inches, gray (5Y 5/1) clay; common, medium, distinct, light olive-brown (2.5Y 5/6) mottles; moderate, coarse, angular blocky structure; firm, sticky and plastic; few medium and coarse roots; thin continuous clay films; very strongly acid; gradual, smooth boundary.

B23tg—35 to 45 inches, mottled gray (N 5/0) and light olive-brown (2.5Y 5/6) clay; moderate, coarse, prismatic structure parting to weak, fine, angular blocky structure; firm, sticky and plastic; few coarse roots; thin continuous clay films; very strongly acid; gradual, smooth boundary.

B3g—45 to 55 inches, gray (5Y 6/1) silty clay loam; weak, fine, angular blocky structure; firm, slightly sticky and slightly plastic; few rounded quartz pebbles; medium acid; gradual, smooth boundary.

Cg—55 to 62 inches, gray (5Y 5/1) sandy clay loam; massive; few rounded quartz pebbles; slightly acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 2.5Y or 10YR in hue, 4 to 6 in value, and 2 to 6 in chroma. The Btg horizon is 10YR, 2.5Y, 5Y or N in hue, 4 to 6 in value, and 0 to 6 in chroma. It is dominantly clay or silty clay. Bedrock is below a depth of 5 feet.

Forestdale soils commonly are near Altavista, Fork, and Wickham soils. They are more poorly drained and have a more clayey Bt horizon than those soils.

Forestdale silt loam (Fo).—Slopes are dominantly 0 to 2 percent. Most areas of this soil were bedded for drainage during farming, and the surface layer ranges from 6 to 12 inches or more in thickness.

Included with this soil in mapping were small, scattered areas of Fork and Wehadkee soils.

Runoff is slow. This soil is ponded after heavy rains and is occasionally flooded. The seasonal high water table is between the surface and a depth of 1 foot. The soil has limited suitability for water-tolerant pasture and woodland. Capability unit Vw–1; woodland suitability group 4w1.

Fork Series

The Fork series consists of deep, somewhat poorly drained, nearly level to gently sloping soils on the terraces along the larger streams of the county. These soils formed in loamy alluvium.

In a representative profile about 1½ inches of forest litter overlies the surface layer. The surface layer is fine sandy loam about 9 inches thick. The upper 1 inch is dark grayish brown, and the lower 8 inches is grayish brown and has brown mottles. The subsoil is about 43 inches thick. The upper 9 inches is mottled light brownish-gray and light olive-brown, friable clay loam; the next 12 inches is grayish-brown, friable clay loam that has yellowish-brown mottles; and the lower 22 inches is gray, firm to friable clay loam and sandy clay loam that has brownish-yellow and yellowish-brown mottles. The substratum begins at a depth of about 52 inches and extends to a depth of 64 inches or more. It is gray silty clay loam that has yellowish-brown and olive-brown mottles and that contains rounded quartz pebbles.

The subsoil is strongly acid to neutral. Organic-matter content is medium, and natural fertility is low. Permeability of the subsoil is moderate, and available water capacity is medium. The water table rises to a depth of 1 to 2 feet during wet periods.

Representative profile of Fork fine sandy loam in a hardwood forest, on State Route 640, one-tenth of a mile west of Fork Creek:

O1—1½ inches to ¼ inch, undecomposed forest litter of leaves and twigs.

O2—½ inch to 0, very dark grayish-brown (10YR 3/2), partially decomposed organic matter.

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

A2—1 to 9 inches, grayish-brown (2.5Y 5/2) fine sandy loam; few, fine, faint, brown (10YR 5/3) mottles; weak, fine, granular structure; friable; many fine and medium roots; very strongly acid; clear, smooth boundary.

B1t—9 to 18 inches, mottled light brownish-gray (2.5Y 6/2) and light olive-brown (2.5Y 5/6) light clay loam; moderate, fine, subangular blocky structure; friable; many fine and medium roots; many fine and medium pores; very strongly acid; gradual, smooth boundary.

B21t—18 to 30 inches, grayish-brown (2.5Y 5/2) light clay loam; many, medium, distinct, yellowish-brown (10YR 5/4) mottles; moderate, medium, subangular blocky structure; friable, slightly plastic and sticky; common fine roots; few patchy clay films; strongly acid; gradual, smooth boundary.

B22tg—30 to 38 inches, gray (N 6/0) clay loam; common, medium, prominent, brownish-yellow (10YR 6/6) mottles; moderate, medium, subangular blocky structure; firm, sticky and plastic; common, thin, continuous clay films; slightly acid; gradual, smooth boundary.

B3tg—38 to 52 inches, gray (5Y 6/1) sandy clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few bodies of clay; neutral; gradual, smooth boundary.

Cg—52 to 64 inches, gray (5Y 6/1) silty clay loam; common, medium, distinct, light yellowish-brown (10YR 6/4) and olive-brown (2.5Y 4/4) mottles; massive; common, fine, rounded quartz pebbles; few fine mica flakes; neutral.

The solum ranges from 40 to 60 inches in thickness. In many places fine, rounded quartz pebbles make up from less than 1 percent to about 5 percent, by volume, of the solum. The A horizon is 10YR or 2.5Y in hue, 4 or 5 in value, and 1 to 3 in chroma. The Bt horizon above a depth of about 30 inches is 2.5Y or 10YR in hue, 5 or 6 in value, and 2 to 6 in chroma. The Bt horizon below a depth of about 30 inches is 2.5Y, 5Y, or N in hue, 5 or 6 in value, and 0 or 1 in chroma. Common to many mottles of brownish yellow, yellowish brown, and olive brown occur. The Bt horizon is light clay loam, clay loam, or sandy clay loam. Bedrock is below a depth of 5 feet.

Fork soils commonly are near Altavista, Forestdale, and Wickham soils. They are more poorly drained than Altavista and Wickham soils. They are better drained and have a less clayey Bt horizon than Forestdale soils.

Fork fine sandy loam, 0 to 5 percent slopes (FrB).—This soil is on broad terraces. In some places the surface layer is loam.

Included with this soil in mapping were small, scattered areas of Altavista and Forestdale soils.

Runoff is slow. A seasonal high water table is at a depth of 1 to 2 feet, and artificial drainage is beneficial where this soil is cultivated. If this soil is adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is usually not long lived, because wetness is excessive in winter and spring. Capability unit IIIw–2; woodland suitability group 2wl.

Grover Series

The Grover series consists of deep, well-drained, gently sloping to sloping soils on uplands. These soils formed in material weathered from coarse-grained granite gneiss.

In a representative profile the surface layer is brown sandy loam about 6 inches thick. The subsoil is about 27 inches thick. The upper 10 inches is strong-brown, friable sandy clay loam; the next 9 inches is yellowish-red, friable clay loam that has strong-brown mottles; and the lower 8 inches is yellowish-red, friable sandy clay loam that has red mottles. The substratum begins at a depth of about 33 inches and extends to a depth of about 62 inches or more. It is mottled yellow, brown, red, white, and black, weathered rock that crushes easily to sandy loam.

The subsoil is strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Grover sandy loam, 2 to 7 percent slopes, eroded, one-tenth of a mile north of State Route 669, by State Route 651:

Ap—0 to 6 inches, brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable; many fine roots; many fine pores; common coarse sand grains; slightly acid; clear, smooth boundary.

B1—6 to 16 inches, strong-brown (7.5YR 5/6) sandy clay loam; moderate, fine and medium, subangular blocky structure; friable; many fine flakes of mica; medium acid; gradual, smooth boundary.

B2t—16 to 25 inches, yellowish-red (5YR 5/6) light clay loam; few, fine, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; many fine flakes of mica that give a shiny appearance and a greasy feel; strongly acid; gradual, wavy boundary.

B3—25 to 33 inches, yellowish-red (5YR 5/8) light sandy clay loam; common, medium, distinct, red (2.5YR 5/8) mottles; weak, fine, subangular blocky structure; friable; few thin clay films; many flakes of mica that give a greasy feel and a shiny appearance; few weathered granite fragments; strongly acid; gradual, wavy boundary.

C—33 to 62 inches, yellow, brown, red, white, and black, weathered granite gneiss that crushes to sandy loam; massive; crushes easily; very micaceous; very strongly acid.

The solum ranges from 20 to 40 inches in thickness. The A horizon is 10YR or 7.5YR in hue, 4 to 6 in value, and 2 to 4 in chroma. It is commonly sandy loam but ranges to sandy clay loam where the soil is severely eroded. The Bt horizon is 7.5YR, 5YR, or 10YR in hue, 4 or 5 in value, and 4 to 8 in chroma. It is sandy clay loam or clay loam. Bedrock is below a depth of 5 feet.

Grover soils commonly are near Appling, Ashlar, Cecil, and Madison soils. They are less clayey than Appling, Cecil, and Madison soils. They are deeper and have more clay in the B horizon than Ashlar soils.

Grover sandy loam, 2 to 7 percent slopes, eroded (GrB2).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 12 inches thick. In some places the surface layer is loam or fine sandy loam.

Included with this soil in mapping were small areas of Appling and Madison soils.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–2; woodland suitability group 3o1.

Grover sandy loam, 7 to 15 percent slopes, eroded (GrC2).—The surface layer generally is 4 to 7 inches thick. Shallow gullies are in a few areas.

Included with this soil in mapping were small, scattered areas of Appling and Ashlar soils. Also included were small areas of soils that have slopes greater than 15 percent.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–1; woodland suitability group 3o1.

Grover sandy clay loam, 2 to 7 percent slopes, severely eroded (GvB3).—This soil is on narrow ridges. It has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Small erosion rills are common in some places.

Included with this soil in mapping were small, scattered areas of Abell, Appling, and Madison soils.

Runoff is medium. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IIIe–2; woodland suitability group 4c1.

Grover sandy clay loam, 7 to 15 percent slopes, severely eroded (GvC3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from

the original surface layer and the subsoil. Shallow gullies are common in some places.

Included with this soil in mapping were small, scattered areas of Ashlar and Madison soils. Also included were small areas of soils that have slopes greater than 15 percent.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–1; woodland suitability group 4c1.

Iredell Series

The Iredell series consists of deep, moderately well drained and somewhat poorly drained, nearly level to sloping soils on piedmont uplands. These soils formed in material weathered from diorite and hornblende gneiss.

In a representative profile the surface layer is loam about 9 inches thick. The upper 7 inches is dark grayish brown, and the lower 2 inches is mottled brown and strong brown. The subsoil is about 18 inches thick. The upper 2 inches is mottled brown and strong-brown, friable extremely gravelly loam; the next 13 inches is yellowish-brown, firm clay; and the lower 3 inches is mottled dark grayish-brown, very dark grayish-brown, and gray, firm clay loam. The substratum begins at a depth of about 27 inches and extends to a depth of 69 inches or more. It is mottled very dark grayish-brown, gray, yellowish-brown, and olive-gray fine sandy loam to a depth of about 60 inches. Below this it is olive-gray, dark olive-gray, and gray loamy fine sand.

The subsoil is slightly acid to neutral. Organic-matter content is low, and natural fertility is medium. Permeability of the subsoil is slow, and available water capacity is medium. The water table rises to a depth of 1 to 2½ feet during wet periods. Nearly level Iredell soils are ponded after heavy rains.

Representative profile of Iredell loam, 0 to 2 percent slopes, 300 feet west of State Route 638, one-half of a mile south of the junction of State Route 638 and State Highway 22:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; friable; many fine roots; common black concretions; slightly acid; abrupt, smooth boundary.

A2—7 to 9 inches, mottled brown (10YR 5/3) and strong-brown (7.5YR 5/6) loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few black concretions; slightly acid; abrupt, wavy boundary.

Bcn—9 to 11 inches, mottled brown (7.5YR 5/4), strong-brown (7.5YR 5/6), and brown (10YR 5/3) extremely gravelly loam; weak, fine and medium, subangular blocky structure; friable, compact, slightly sticky and slightly plastic; 50 to 80 percent, by volume, black concretions; medium acid; abrupt, wavy boundary.

B2t—11 to 24 inches, yellowish-brown (10YR 5/4) clay; moderate, coarse, prismatic structure parting to weak, fine and medium, angular blocky; firm, sticky and very plastic; few fine roots; common slickensides; few black concretions; common fine flakes of mica; slightly acid; clear, wavy boundary.

B3tg—24 to 27 inches, mottled dark grayish-brown (10YR 4/2), very dark grayish-brown (10YR 3/2), and gray (10YR 5/1) clay loam; weak, fine and medium, subangular blocky structure; firm, sticky and plastic; many fine flakes of mica; neutral; abrupt, wavy boundary.

C1—27 to 60 inches, mottled very dark grayish-brown (10YR 3/2), gray (10YR 5/1), yellowish-brown (10YR 5/4), and olive-gray (5Y 4/2) saprolite that crushes to fine sandy loam; massive; friable; crushes easily; few thin lenses of clay; many fine flakes of mica; neutral; gradual, smooth boundary.

C2—60 to 69 inches, olive-gray, dark olive-gray, and gray saprolite that crushes to loamy fine sand; massive; very friable; many fine flakes of mica; neutral.

The solum ranges from 20 to 36 inches in thickness. The A horizon is 10YR, 2.5Y, or 7.5YR in hue, 3 to 5 in value, and 2 to 6 in chroma. It is loam or sandy loam but ranges to clay loam in some sloping soils. The Bt horizon is 10YR or 2.5Y in hue, 4 to 6 in value, and 4 to 6 in chroma. The lower part of the Bt horizon has mottles that are 2 or less in chroma. Bedrock is at a depth of 3½ to 5 feet or more.

Iredell soils commonly are near Enon, Mecklenburg, Poindexter, and Zion soils. They are more poorly drained than these soils. They have a more clayey B horizon than Poindexter soils.

Iredell sandy loam, 2 to 7 percent slopes (IdB).—This soil has a surface layer that is as much as 16 inches thick in some places.

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

Runoff is slow to medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. The soil is seasonally wet, and artificial drainage is beneficial if the soil is cultivated. If this soil is adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is short lived because wetness is excessive in winter and spring. Capability unit IIIe–5; woodland suitability group 4w1.

Iredell sandy loam, 2 to 7 percent slopes, eroded (IdB2).—This soil has a surface layer that is commonly 4 to 8 inches thick.

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

Runoff is medium. The hazard of erosion is severe where the soil is clean tilled or exposed. The soil is seasonally wet, and artificial drainage is beneficial if the soil is cultivated. If this soil is adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is short lived because wetness is excessive in winter and spring. Capability unit IIIe–5; woodland suitability group 4w1.

Iredell sandy loam, 7 to 15 percent slopes, eroded (IdC2).—The surface layer is commonly 4 to 6 inches thick. In some places it is loam or clay loam.

Included with this soil in mapping were small, scattered areas of Cecil, Cullen, and Sekil soils. Also included were small gullied spots.

Runoff is medium to rapid. The hazard of further erosion is very severe if the soil is clean tilled or exposed. The soil is seasonally wet, and some seepage occurs in the lower areas. If this soil is adequately limed and fertilized, it has limited suitability for most locally grown crops. Because the hazard of erosion is

very severe, the soil is better suited to close-growing crops, pasture, and woodland than to row crops. Alfalfa is short lived because of excessive wetness in winter and spring. Capability unit IVe–4; woodland suitability group 4w1.

Iredell loam, 0 to 2 percent slopes (IrA).—This soil is on broad upland flats. It has the profile described as representative of the series.

Included with this soil in mapping were small, scattered areas of Elbert and Zion soils.

Runoff is slow. A seasonal high water table is at a depth of 1 to 2½ feet. The soil ponds during wet periods. Artificial drainage is desirable if this soil is farmed. If this soil is adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is short lived because wetness is excessive in winter and spring. Capability unit IIIw–2; woodland suitability group 4w1.

Iredell loam, 2 to 7 percent slopes (IrB).—This soil has a profile similar to the one described as representative of the series, but the surface layer is commonly 4 to 8 inches thick.

Included with this soil in mapping were small, scattered areas of Poindexter and Zion soils.

Runoff is slow to medium. The hazard of erosion is moderate if the soil is clean tilled or exposed. A seasonal high water table is at a depth of 1 to 2½ feet. Artificial drainage is desirable if the soil is farmed. If this soil is adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is short lived because wetness is excessive in winter and spring. Capability unit IIIe–5; woodland suitability group 4w1.

Iredell Series, Silty Subsoil Variant

The Iredell series, silty subsoil variant, consists of deep, moderately well drained, nearly level and very gently sloping soils along small drainageways, in depressions, and at the base of slopes. These soils formed in material weathered from basic rock.

In a representative profile the surface layer is dark-brown silt loam about 8 inches thick. The subsoil is about 40 inches thick. The upper 4 inches is brown, friable silt loam; the next 16 inches is strong-brown, friable silty clay loam that has yellowish-brown mottles; the next 6 inches is light olive-brown, very firm clay that has olive-gray and olive-brown mottles; and the lower 14 inches is gray, very firm clay that has olive, light yellowish-brown, and olive-brown mottles. The substratum begins at a depth of about 48 inches and extends to a depth of about 56 inches or more. It is distinctly mottled, weathered basic rock that crushes to friable sandy clay loam.

The subsoil is medium acid to neutral. Organic-matter content and natural fertility are medium. Permeability of the subsoil is slow, and available water capacity is medium. The water table rises to a depth of 1 to 2½ feet during wet periods. The nearly level soils are ponded after heavy rains.

Representative profile of Iredell silt loam, silty subsoil variant, one-half of a mile west of U.S. Highway 15, one-fourth of a mile south of State Route 640:

Ap—0 to 8 inches, dark-brown (10YR 4/3) silt loam; weak, fine, granular structure; friable; many fine roots; many fine and medium pores; slightly acid; clear, smooth boundary.

B1—8 to 12 inches, brown (7.5YR 5/4) silt loam; weak, fine, subangular blocky structure; friable; many fine and medium roots; medium acid; gradual, smooth boundary.

B21t—12 to 28 inches, strong-brown (7.5YR 5/6) silty clay loam; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; few subrounded pebbles in lower part; medium acid; clear, smooth boundary.

IIB22t—28 to 34 inches, light olive-brown (2.5Y 5/4) clay; common, medium, distinct, olive-gray (5Y 5/2) and olive-brown (2.5Y 4/4) mottles; moderate, coarse, angular blocky structure; very firm, sticky and plastic; thin continuous clay films; medium acid; clear, wavy boundary.

IIB23tg—34 to 40 inches, gray (N 5/0) clay; common, medium, distinct, olive (5Y 5/4) and light yellowish-brown (2.5Y 6/4) mottles; moderate, coarse, angular blocky structure; very firm, sticky and plastic; thin continuous clay films; medium acid; gradual, smooth boundary.

IIB3tg—40 to 48 inches, gray (5Y 5/1) clay; common, medium, distinct, olive-brown (2.5Y 4/4) and pale-olive (5Y 6/4) mottles; massive; firm, sticky and plastic; many white specks of feldspar; medium acid; abrupt, wavy boundary.

IIC—48 to 56 inches, green, brown, olive, yellow, and white, weathered basic rock that crushes to sandy clay loam; firm in place, friable when crushed; neutral.

The solum ranges from 36 to 50 inches in thickness. The A horizon is 10YR or 2.5Y in hue, 3 or 4 in value, and 2 to 4 in chroma. The Bt horizon above the IIBt horizon is 7.5YR or 10YR in hue, 4 or 5 in value, and 4 to 8 in chroma. The IIBt horizon is 2.5Y, 5Y, or N in hue, 4 to 6 in value, and 0 to 4 in chroma. Bedrock is at a depth of 3½ to 5 feet or more.

Iredell soils, silty subsoil variant, commonly are near Cullen, Elbert, Poindexter, and Zion soils. They are more poorly drained than Cullen, Poindexter and Zion soils. They have a more clayey B horizon than Poindexter soils. They are better drained than Elbert soils and are not so gray in the upper part of the B horizon as Elbert soils.

Iredell silt loam, silty subsoil variant (Iv).—This soil has a surface layer that is as much as 12 inches thick in some places.

Included with this soil in mapping were small areas of Abell, Elbert, and Zion soils.

Runoff is slow. This soil receives seepage water from higher lying areas. A seasonal high water table is at a depth of 1 to 2½ feet, and nearly level areas are ponded after heavy rains. Artificial drainage is beneficial if the soil is cultivated. If this soil is adequately drained, limed, and fertilized, it has limited suitability for most locally grown crops. Alfalfa is short lived because of excessive wetness in winter and spring. Capability unit IVw–1; woodland suitability group 4w1.

Lignum Series

The Lignum series consists of deep, moderately well drained to somewhat poorly drained, gently sloping

soils on uplands. These soils formed in material weathered from schist.

In a representative profile about 1½ inches of partly undecomposed forest litter overlies the surface layer. The surface layer is loam about 8 inches thick. The upper 2 inches is dark gray, and the lower 6 inches is light olive brown. The subsoil is about 35 inches thick. The upper 9 inches is light olive-brown, friable silty clay loam that has light yellowish-brown mottles; the next 11 inches is yellowish-brown, firm clay that has light yellowish-brown and light brownish-gray mottles; the next 9 inches is mottled yellowish-brown, gray, and light olive-brown, firm clay; and the lower 6 inches is mottled yellowish-brown, light brownish-gray, and light-gray, friable silty clay loam. The substratum begins at a depth of about 43 inches and extends to a depth of about 52 inches or more. It is mottled light yellowish-brown, yellowish-brown, and light-gray, weathered schist that crushes to friable silt loam.

The subsoil is very strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderately slow to slow, and available water capacity is high. The water table rises to a depth of 1 to 2 feet during wet periods (fig. 2).

Representative profile of Lignum loam, 2 to 7 percent slopes, in a mixed hardwood and pine forest, one-half of a mile north of U.S. Highway 33, along fire trail 2707:

O1—1½ inches to 1 inch, undecomposed forest litter of sticks, twigs, needles, and leaves.

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

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

A2—2 to 8 inches, light olive-brown (2.5Y 5/4) loam; weak, fine, granular structure; friable; many fine and medium roots; few angular quartz pebbles; very strongly acid; gradual, smooth boundary.

B1—8 to 13 inches, light olive-brown (2.5Y 5/4) silty clay loam; weak, fine, subangular blocky structure; friable; many fine and medium roots; common angular quartz pebbles; very strongly acid; gradual, smooth boundary.

B21t—13 to 17 inches, light olive-brown (2.5Y 5/6) silty clay loam; few, fine, faint, light yellowish-brown (2.5Y 6/4) mottles; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few medium roots; very strongly acid; abrupt, wavy boundary.

B22t—17 to 28 inches, yellowish-brown (10YR 5/4) clay; many, coarse, distinct, light brownish-gray (10YR 6/2) and light yellowish-brown (10YR 6/4) mottles; moderate, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; few medium roots; thin, continuous clay films; very strongly acid; gradual, smooth boundary.

B23t—28 to 37 inches, mottled yellowish-brown (10YR 5/8), gray (10YR 6/1), and light olive-brown (2.5Y 5/6) clay; moderate, coarse, angular blocky structure; firm; sticky and plastic; thin, continuous clay films; few fine quartz pebbles; very strongly acid; gradual, smooth boundary.

B3—37 to 43 inches, mottled yellowish-brown (10YR 5/4), light brownish-gray (10YR 6/2), and light-gray (10YR 7/2) silty clay loam; moderate, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few weathered schist fragments; very strongly acid; clear, wavy boundary.

C—43 to 52 inches, mottled light yellowish-brown (10YR 6/4), yellowish-brown, (10YR 5/6), and light-gray (10YR 7/1), weathered schist that crushes to silt loam; massive; firm in place, friable when crushed; very strongly acid.

The solum ranges from 34 to 50 inches in thickness. In many places fine, angular quartz pebbles make up from 1 percent to about 10 percent, by volume, of the solum. The A horizon is 10YR or 2.5Y in hue, 4 to 6 in value, and 1 to 4 in chroma. It is commonly loam but is silt loam in places. The Bt horizon is 10YR or 2.5Y in hue, 5 to 7 in value, and 1 to 8 in chroma. Mottles that are 2 or less in chroma are in the upper 10 inches of the Bt horizon. Bedrock is at a depth of 4 feet or more.

Lignum soils commonly are near Nason, Roanoke, Tatum, and York soils. They are more poorly drained than Nason and Tatum soils. They are better drained and have a less gray B horizon than Roanoke soils. They lack the fragipan of York soils.

Figure 2.—**Excavation of Lignum loam, 2 to 7 percent slopes, shows seasonal high water table of Lignum soils.**

Lignum loam, 2 to 7 percent slopes (LgB).—This soil is in slight depressions, on toe slopes, at the head of drainageways, and along small drainageways. In some places the surface layer is as much as 14 inches thick. In some places many, fine to medium, angular quartz pebbles are on the surface.

Included with this soil in mapping were small, scattered areas of Abell and Worsham soils. Also included were a few small areas of soils that have slopes greater than 7 percent.

Runoff is slow to medium. This soil receives seepage water from higher lying areas. A seasonal high water table is at a depth of 1 to 2 feet, and artificial drainage is beneficial if the soil is farmed. If this soil is adequately drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is not long lived, because of excessive wetness in winter and spring. Capability unit IIIw–2; woodland suitability group 3w1.

Madison Series

The Madison series consists of deep, well-drained, gently sloping to sloping soils on uplands. These soils formed in material weathered from mica gneiss.

In a representative profile about 1½ inches of partly decayed organic matter overlies the surface layer. The surface layer is sandy loam about 5 inches thick. The upper 1 inch is dark grayish brown, and the lower 4 inches is brown. The subsoil is about 19 inches thick. The upper 4 inches is yellowish-red, friable sandy clay loam; the next 10 inches is red, friable clay; and the lower 5 inches is red, friable heavy clay loam that has yellowish-red and strong-brown mottles. The substratum begins at a depth of about 24 inches and extends to a depth of about 72 inches or more. It is red, brown, yellow, and white, weathered gneiss that crushes easily to sandy loam.

The subsoil is very strongly acid to strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Madison sandy loam, 2 to 7 percent slopes, eroded, in a mixed hardwood forest, 2 miles south of Ellisville, along State Route 669:

O1—1½ inches to ½ inch, partially decomposed forest litter of leaves and twigs.

O2—½ inch to 0, black (5YR 2/1), partially decomposed organic matter.

A1—0 to 1 inch, dark grayish-brown (10YR 4/2) sandy loam; weak, fine, granular structure; very friable; many fine roots; few fine flakes of mica; very strongly acid; clear, smooth boundary.

A2—1 to 5 inches, brown (7.5YR 5/4) sandy loam; moderate, fine, granular structure; very friable; many fine and medium roots; few quartz pebbles; few fine flakes of mica; very strongly acid; clear, smooth boundary.

B1—5 to 9 inches, yellowish-red (5YR 5/6) sandy clay loam; weak, medium, subangular blocky structure; friable; many fine and medium roots; many fine and medium pores; common fine flakes of mica; very strongly acid; gradual, smooth boundary.

B2t—9 to 19 inches, red (2.5YR 4/6) clay; strong, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; thin, continuous clay films; many flakes of mica that give a slick and greasy feel; few specks of white feldspar; very strongly acid; gradual, smooth boundary.

B3t—19 to 24 inches, red (2.5YR 5/8) heavy clay loam; common, medium, distinct, yellowish-red (5YR 4/6) and strong-brown (7.5YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; friable; few thin clay films; few specks of white feldspar; many flakes of mica that give a slick and greasy feel; very strongly acid; gradual, smooth boundary.

C—24 to 72 inches, red, brown, yellow, and white, weathered gneiss that is micaceous sandy loam when dug; massive; firm in place, loose when dug, very friable when dug; clay flows in cracks and crevices; very strongly acid.

The solum ranges from 22 to 48 inches in thickness. The A horizon is 10YR or 7.5YR in hue, 4 or 5 in value, and 2 to 6 in chroma. It is commonly sandy loam but ranges to clay loam where the soil is severely eroded. The Bt horizon is 5YR or 2.5YR in hue, 4 to 6 in value, and 6 to 8 in chroma. Mottles that are yellower in hue than the matrix are in the lower part of the horizon in many places. Bedrock is below a depth of 5 feet.

Madison soils commonly are near Appling, Ashlar, Cecil, and Grover soils. They have a redder B horizon and contain more mica than Appling soils. They have a redder, more clayey B horizon than Ashlar and Grover soils. They have a thinner solum and contain more mica than Cecil soils.

Madison sandy loam, 2 to 7 percent slopes, eroded (MaB2).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 8 inches thick.

Included with this soil in mapping were small areas of Cecil and Grover soils. Also included were small spots of Rock outcrop.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Madison sandy loam, 7 to 15 percent slopes, eroded (MaC2).—This soil is on narrow ridges and side slopes. In some places angular quartz pebbles are on the surface.

Included with this soil in mapping were small, scattered areas of Abell, Ashlar, and Grover soils. Also included are small areas of Rock outcrop and small areas of gullies.

Runoff is medium to rapid. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–1; woodland suitability group 3o1.

Madison clay loam, 2 to 7 percent slopes, severely eroded (MdB3).—This soil is on narrow ridges. It has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Small erosion rills and shallow gullies are common in some places.

Included with this soil in mapping were small, scattered areas of Grover soils. Also included were small areas of soils that have a gravelly surface layer.

Runoff is medium. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IIIe–2; woodland suitability group 4c1.

Madison clay loam, 7 to 15 percent slopes, severely eroded (MdC3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Shallow gullies are common in some places.

Included with this soil in mapping were small areas of Ashlar and Grover soils. Also included were small areas of Rock outcrop.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–1; woodland suitability group 4c1.

Manteo Series

The Manteo series consists of shallow, somewhat excessively drained, gently sloping to steep soils on uplands. These soils formed in material weathered from sericite schist.

In a representative profile about 1 inch of partly decayed organic matter overlies the surface layer. The surface layer is channery silt loam about 11 inches thick. The upper 2 inches is very dark grayish brown, and the lower 9 inches is brown. The subsoil is yellowish-brown, friable channery silt loam about 5 inches thick. The substratum is 4 inches of brown, yellow, and gray, weathered rock that digs out to friable very channery silt loam. Bedrock is at a depth of 20 inches.

Manteo soils are very strongly acid to extremely acid. Organic-matter content and natural fertility are low. Permeability is moderately rapid throughout, and available water capacity is low.

Representative profile of Manteo channery silt loam, 15 to 25 percent slopes, in a mixed hardwood forest, one-fourth of a mile east of State Route 720, along a fire trail:

O1—1 to ¼ inch, loose leaves, sticks, and twigs.
O2—¼ inch to 0, very dark gray (10YR 3/1), partially decomposed organic matter.
A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) channery silt loam; weak, fine, granular structure; very friable; many fine roots; very strongly acid; clear, smooth boundary.
A2—2 to 11 inches, brown (10YR 4/3) channery silt loam; moderate, fine, granular structure; friable; many fine roots; few small quartz pebbles; very strongly acid; gradual, wavy boundary.
B—11 to 16 inches, yellowish-brown (10YR 5/4) channery silt loam; weak, fine, subangular blocky structure; friable; many fine and medium roots; very strongly acid; gradual, wavy boundary.
C—16 to 20 inches, mottled brown, yellow, and gray, weathered schist that digs out to very channery silt loam; massive; firm in place, friable when dug out; very strongly acid; clear, irregular boundary.
R—20 inches, firm to hard schist.

The solum ranges from 12 to 20 inches in thickness. In many places thin, flat fragments of schist make up from about 20 percent to about 35 percent, by volume, of the solum and from about 35 percent to about 50 percent, by volume, of the C horizon. The A horizon is 10YR or 2.5Y in hue, 3 or 4 in value, and 2 or 3 in chroma. The B horizon is 10YR in hue, 4 or 5 in value, and 4 to 8 in chroma. Bedrock is at a depth of 15 to 20 inches.

Manteo soils commonly are near Nason and Tatum soils. They have a thinner, less clayey solum and are much shallower to bedrock than these soils.

Manteo channery silt loam, 2 to 7 percent slopes (MnB).—This soil is on narrow ridges. In some places the surface layer is as much as 14 inches thick.

Included with this soil in mapping were small, scattered areas of Abell and Nason soils. Also included were small areas of soils that have a surface layer and subsoil of loam.

Runoff is medium. The hazard of erosion is severe where the soil is clean tilled or exposed. This soil is somewhat droughty during the growing season. It has limited suitability for most locally grown crops, because available water capacity is low, the soil is droughty, and rock is at a depth of 15 to 20 inches. Capability unit IVe–3; woodland suitability group 4d1.

Manteo channery silt loam, 7 to 15 percent slopes (MnC).—This soil is on side slopes. In some places the surface layer is as much as 14 inches thick.

Included with this soil in mapping were small, scattered areas of Nason soils. Also included were small areas of Rock outcrop, a few small areas of gullies, and a few areas of soils that have angular quartz pebbles and schist fragments on the surface.

Runoff is rapid. The hazard of erosion is very severe where the soil is clean tilled or exposed. This soil is droughty during the growing season. It has limited suitability for most locally grown crops because available water capacity is low, the soil is droughty, and rock is at a depth of 15 to 20 inches. Capability unit VIe–2; woodland suitability group 4d1.

Manteo channery silt loam, 15 to 25 percent slopes (MnD).—This soil has the profile described as representative of the series.

Included with this soil in mapping were small, scattered areas of Nason and Tatum soils. Also included were some areas of Rock outcrop, some areas of shallow gullies, and some areas of soils that have angular quartz pebbles and schist fragments on the surface.

Runoff is rapid. The hazard of erosion is very severe where the soil is exposed. This soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 15 to 20 inches. The soil is suited to drought-resistant pasture and woodland. Capability unit VIIe–1; woodland suitability group 4d2.

Manteo channery silt loam, 25 to 45 percent slopes (MnE).—This soil has a profile similar to the one described as representative of the series, but the surface layer is 4 to 8 inches thick.

Included with this soil in mapping were areas of Rock outcrop, small areas of very shallow soils, small areas of shallow gullies, and small areas of soils that have angular quartz pebbles and schist fragments on the surface.

Runoff is rapid. The hazard of erosion is very severe if the soil is exposed. This soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 15 to 20 inches. This soil is suited to trees. Capability unit VIIe–1; woodland suitability group 4d2.

Manteo very channery silt loam, 7 to 15 percent slopes (MoC).—This soil has a profile similar to the one described as representative of the series, but schist fragments make up 35 to 50 percent, by volume, of the surface layer and subsoil.

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

Runoff is rapid. The hazard of erosion is very severe where the soil is exposed. This soil is droughty during the growing season because available water capacity is low and rock is at a depth of 15 to 20 inches. Schist fragments interfere with cultivation. The soil is suited to drought-resistant pasture and woodland. Capability unit VIs–1; woodland suitability group 4d1.

Manteo very channery silt loam, 15 to 25 percent slopes (MoD).—This soil has a profile similar to the one described as representative of the series, but schist fragments make up 35 to 50 percent, by volume, of the surface layer and subsoil.

Included with this soil in mapping were small, scattered areas of Nason soils and small areas of Rock outcrop.

Runoff is rapid. The hazard of erosion is very severe where the soil is exposed. The soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 15 to 20 inches. The soil is suited to drought-resistant pasture and woodland. Capability unit VIIs–1; woodland suitability group 4d2.

Masada Series

The Masada series consists of deep, well-drained, gently sloping to sloping soils on high terraces along the larger streams in the county. These soils formed in loamy and clayey alluvium.

In a representative profile the surface layer is dark-brown fine sandy loam about 10 inches thick. The subsoil is about 38 inches thick. The upper 3 inches is strong-brown, friable sandy clay loam; the next 22 inches is yellowish-red, friable to firm clay; and the lower 13 inches is yellowish-red, friable clay loam that has yellowish-brown and red mottles. The substratum begins at a depth of about 48 inches and extends to a depth of 54 inches or more. It is mottled yellow, brown, and gray extremely gravelly clay loam.

The subsoil is strongly acid except where the soils have been limed. Organic-matter content is low to medium, and natural fertility is low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Masada fine sandy loam, 2 to 7 percent slopes, eroded, 3 miles north of Orchid, west of State Route 601 near Shelton's Cemetery:

Ap—0 to 10 inches, dark-brown (10YR 4/3) fine sandy loam; weak, very fine, granular structure; very friable; many fine roots; common rounded quartz pebbles; slightly acid; clear, smooth boundary.

B1t—10 to 13 inches, strong-brown (7.5YR 5/6) sandy clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and nonplastic; many fine and medium roots; common rounded quartz pebbles; strongly acid; clear, wavy boundary.

B21t—13 to 20 inches, yellowish-red (5YR 4/8) clay; moderate, medium, subangular blocky structure; friable, sticky and plastic; many fine pores; few thin clay films; few quartz pebbles; strongly acid; gradual, smooth boundary.

B22t—20 to 35 inches, yellowish-red (5YR 4/6) clay; strong, fine and medium, subangular blocky structure; firm, sticky and plastic; many fine pores; thin continuous clay films; few rounded quartz pebbles; strongly acid; gradual, smooth boundary.

B3t—35 to 48 inches, yellowish-red (5YR 5/8) clay loam; common, medium, distinct, yellowish-brown (10YR 5/8) and red (2.5YR 4/6) mottles; weak, fine, subangular blocky structure; friable, sticky and slightly plastic; many fine and medium pores; few thin clay films; few rounded quartz pebbles; strongly acid; gradual, wavy boundary.

C—48 to 54 inches, mottled yellow, brown, and gray extremely gravelly clay loam; massive; firm in place, sticky and slightly plastic; strongly acid.

The solum ranges from 40 to 60 inches in thickness. Fine to medium, rounded quartz pebbles make up from 5 to 20 percent, by volume, of the solum and from 35 to 80 percent, by volume, of the C horizon. The A horizon is 10YR in hue, 3 to 5 in value, and 3 or 4 in chroma. It is commonly fine sandy loam but ranges to loam. The Bt horizon is 5YR or 7.5YR in hue, 4 or 5 in value, and 6 to 8 in chroma. The lower part of the Bt horizon has red and yellowish-brown mottles in many places. Bedrock is below a depth of 5 feet.

Masada soils commonly are near Appling, Altavista, Cecil, Nason, and Turbeville soils. They lack the kaolinitic mineralogy of Appling soils. They are better drained than Altavista soils. They lack the red B horizon of Cecil and Turbeville soils. They have less silt and more sand in the profile than Nason soils.

Masada fine sandy loam, 2 to 7 percent slopes, eroded (MsB2).—This soil has the profile described as representative of the series. In some places, the surface layer is as much as 14 inches thick.

Included with this soil in mapping were small, scattered areas of Altavista and Turbeville soils. Also included were small areas of soils that have slopes of less than 2 percent.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Masada fine sandy loam, 7 to 15 percent slopes, eroded (MsC2).—This soil has a profile similar to the one described as representative of the series, but the surface layer generally is 4 to 8 inches thick.

Included with this soil in mapping were small, scattered areas of Appling and Ashlar soils. Also included were small areas of shallow gullies and small spots of gravelly soils.

Runoff is medium to rapid. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–1; woodland suitability group 3o1.

Mecklenburg Series

The Mecklenburg series consists of deep, well-drained, gently sloping to sloping soils on piedmont uplands. These soils formed in material weathered from diorite and hornblende gneiss. Mecklenburg soils in Louisa County were mapped only in complexes with Enon soils.

In a representative profile about 1 inch of forest litter overlies the surface layer. The surface layer is loam about 6 inches thick. The upper 2 inches is dark brown, and the lower 4 inches is reddish brown. The subsoil is about 32 inches thick. The upper 20 inches is yellowish-red, firm clay; and the lower 12 inches is mottled yellowish-red, red, and strong-brown, friable clay loam. The substratum begins at a depth of about 38 inches and extends to a depth of about 72 inches or more. It is brown, yellow, green, black, and white, weathered rock that crushes to sandy loam.

The subsoil is medium acid to strongly acid except where the soils have been limed. Organic-matter content and natural fertility are medium. Permeability of the subsoil is slow, and available water capacity is medium.

Representative profile of Mecklenburg loam in an area of Mecklenburg-Enon loams, 2 to 7 percent slopes, eroded, in a mixed hardwood forest along State Route 640, one-fourth of a mile north of the junction of State Route 640 and State Route 617:

O1—1 inch to 0, undecomposed forest litter of sticks, twigs, and leaves.

A1—0 to 2 inches, dark-brown (7.5YR 3/2) loam; moderate, fine, granular structure; very friable; many fine and medium roots; few black concretions; slightly acid; clear, smooth boundary.

A2—2 to 6 inches, reddish-brown (5YR 4/4) loam; moderate, fine and medium, granular structure; friable; many fine and medium roots; few black concretions; slightly acid; clear, smooth boundary.

B21t—6 to 14 inches, yellowish-red (5YR 4/6) clay; moderate, medium, blocky and subangular blocky structure; firm, slightly sticky and slightly plastic; common medium and fine roots; few fine flakes of mica; few thin clay films; few black concretions; medium acid; gradual, smooth boundary.

B22t—14 to 26 inches, yellowish-red (5YR 4/6) clay; moderate, medium, angular blocky structure; firm, sticky and plastic; few medium and large roots; thin continuous clay films; few black concretions; few fine flakes of mica; medium acid; gradual, wavy boundary.

B3—26 to 38 inches, mottled yellowish-red (5YR 5/6), red (2.5YR 4/6), and strong-brown (7.5YR 5/6) clay loam; weak, medium, angular blocky structure; friable, sticky and plastic; common fine flakes of mica; few medium and large roots; few thin clay films; few weathered rock fragments; strongly acid; clear, wavy boundary.

C—38 to 72 inches, brown, yellow, green, black, and white, weathered basic rock that digs out as sandy loam; massive; firm in place, friable when dug out; strongly acid.

The solum ranges from 20 to 40 inches in thickness. The A horizon is 7.5YR or 5YR in hue, 3 to 5 in value, and 2 to 6 in chroma. The Bt horizon is 5YR or 2.5YR in hue, 4 to 6 in value, and 4 to 8 in chroma. Bedrock is at a depth of 4 feet or more.

In this county Mecklenburg soils are more acid in the profile than Mecklenburg soils elsewhere. This difference does not alter their use and management.

Mecklenburg soils are commonly near Cullen, Enon, Iredell, Poindexter, and Zion soils. They lack the dark-red B horizon of Cullen soils. They have a redder B horizon than Enon, Poindexter and Zion soils. They have a more clayey B horizon than Poindexter soils. They are better drained than Iredell soils.

Mecklenburg-Enon loams, 2 to 7 percent slopes, eroded (MuB2).—These soils have the profiles described as representative of the Mecklenburg and Enon series. This complex consists of Mecklenburg and Enon soils intermingled in such an intricate pattern that it was not practical to map them separately. Mecklenburg soils make up about 45 percent of this complex, Enon soils 40 percent, and included soils 15 percent.

Included with these soils in mapping were small, scattered areas of Cullen, Iredell, and Zion soils.

Runoff is medium. The hazard of further erosion is moderate where the soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are well suited to most locally grown crops. Capability unit IIe–4; woodland suitability group 3c1.

Mecklenburg-Enon loams, 7 to 15 percent slopes, eroded (MuC2).—This complex consists of Mecklenburg and Enon soils intermingled in such an intricate pattern that it was not practical to map them separately. Mecklenburg soils make up about 40 percent of this complex, Enon soils 35 percent, and included soils 25 percent.

Included with these soils in mapping were small, scattered areas of Poindexter and Zion soils. Also included were small areas of Rock outcrop and some severely eroded soils.

Runoff is medium to rapid. The hazard of further erosion is severe where the soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are suited to most locally grown crops. Capability unit IIIe–4; woodland suitability group 3c1.

Mecklenburg-Enon clay loams, 7 to 15 percent slopes, severely eroded (MvC3).—This complex consists of Mecklenburg and Enon soils intermingled in such an intricate pattern that it was not practical to map them separately. Mecklenburg soils make up about 40 percent of this complex, Enon soils 35 percent, and other soils 25 percent.

Included with these soils in mapping were small areas of Poindexter soils, small areas of Rock outcrop, and small areas of gullies. Also included were small areas of soils that have slopes steeper than 15 percent.

Runoff is medium to rapid. The hazard of further erosion is very severe where these soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are suited to most locally grown crops, but they are better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–1; woodland suitability group 4c1.

Mine Dump

Mine dump consists of small areas of uneven accumulations of waste rock from mining operations and of the associated pits.

Included with Mine dump in mapping were areas of nearly level to gently sloping local alluvium along Contrary Creek in the northeastern part of the county (fig. 3). The alluvium is extremely acid throughout. In these areas vegetation has been killed by acid leaching from abandoned sulfur mines.

Runoff is slow to medium. The soils receive seepage water from higher lying areas. The hazard of erosion is very severe. Areas of Mine dump are indicated on the soil map by a conventional symbol.

Nason Series

The Nason series consists of deep, well-drained, gently sloping to moderately steep soils on piedmont uplands. These soils formed in material weathered from sericite schist.

In a representative profile about one-half inch of partly decayed organic matter overlies the surface layer. The surface layer is silt loam about 9 inches thick. The upper 2 inches is dark grayish brown, and the lower 7 inches is yellowish brown. The subsoil is about 39 inches thick. The upper 5 inches is strong-brown, friable heavy silt loam; the next 23 inches is yellowish-red, friable silty clay; and the lower 11 inches is yellowish-red, friable silty clay loam that has strong-brown, red, and yellowish-brown mottles. The substratum begins at a depth of about 48 inches and extends to a depth of about 62 inches or more. It is mottled yellowish-red, strong-brown, red, and brownish-yellow, weathered schist that crushes to silt loam.

The subsoil is very strongly acid. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Figure 3.—**Acid spoil washed from Mine dump on Contrary Creek.**

Representative profile of Nason silt loam, 2 to 7 percent slopes, eroded, in a mixed hardwood forest, 1½ miles northeast of Despot School, along a fire trail:

O2—½ inch to 0, very dark grayish-brown (10YR 3/2), partially decomposed organic matter.

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

A2—2 to 9 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine, granular structure; friable; many fine and medium roots; common fine quartz pebbles; very strongly acid; clear, smooth boundary.

B1—9 to 14 inches, strong-brown (7.5YR 5/6) heavy silt loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium pores; many fine and medium roots; few fine quartz pebbles; very strongly acid; clear, smooth boundary.

B21t—14 to 26 inches, yellowish-red (5YR 5/8) silty clay; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common medium roots; few thin clay films; few fine quartz pebbles; few fragments of weathered schist; very strongly acid; gradual, wavy boundary.

B22t—26 to 37 inches, yellowish-red (5YR 4/6) silty clay; strong, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few medium and large roots; thin continuous clay films; few fine quartz pebbles; few weathered schist fragments; very strongly acid; gradual, wavy boundary.

B3—37 to 48 inches, yellowish-red (5YR 5/8) silty clay loam; few, medium, distinct, strong-brown (7.5YR 5/6), red (2.5YR 4/8), and yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; friable; few thin clay films; common weathered schist fragments; very strongly acid; irregular, wavy boundary.

C—48 to 62 inches, mottled yellowish-red, strong-brown, red, and brownish-yellow weathered schist that digs out as silt loam; massive; firm in place, very friable when dug out; common quartz pebbles; very strongly acid.

The solum ranges from 25 to 50 inches in thickness. In many places angular quartz pebbles make up from about 1 percent to about 20 percent, by volume, of the solum. The A horizon is 10YR or 7.5YR in hue, 4 or 5 in value, and 2 to 6 in chroma. It is commonly silt loam or loam, but it is silty clay loam where the soil is severely eroded. The Bt horizon is 7.5YR or 5YR in hue, 4 or 5 in value, and 6 to 8 in chroma. It is commonly silty clay or clay. Bedrock is at a depth of 4 feet or more.

Nason soils commonly are near Lignum, Manteo, Tatum, and York soils. They are better drained than Lignum soils. They have a thicker, more clayey B horizon than Manteo soils. They are less red than Tatum soils. They lack the fragipan of York soils.

Nason loam, 15 to 25 percent slopes, eroded (NaD2).—This soil is on side slopes and stream bluffs. In some places the surface layer is 3 to 6 inches thick. Shallow gullies are common in some places.

Included with this soil in mapping were small, scattered areas of Abell and Manteo soils. Also included were small spots of Rock outcrop.

Runoff is rapid. The hazard of erosion is very severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it has limited suitability for most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–2; woodland suitability group 3r1.

Nason silt loam, 2 to 7 percent slopes, eroded (NoB2).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 12 inches thick.

Included with this soil in mapping were small, scattered areas of Abell and Tatum soils, and small areas of soils that have a gravelly surface layer and subsoil. Also included, in the vicinity of Wares Crossroads, Mineral, and Vigor, were areas more than 500 feet wide of soils similar to Nason and Tatum soils but that are deeper to bedrock and that have greater combined thickness of the surface layer and subsoil. Crop and timber production is better on these deeper soils than on this Nason soil.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–3; woodland suitability group 3o1.

Nason silt loam, 7 to 15 percent slopes, eroded (NoC2).—This soil is on narrow ridges and side slopes. In some places the surface layer is 4 to 8 inches thick.

Included with this soil in mapping were small, scattered areas of Manteo and Tatum soils. Also included were small areas of soils that have a gravelly surface layer and subsoil.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–3; woodland suitability group 3o1.

Nason silty clay loam, 2 to 7 percent slopes, severely eroded (NsB3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Small erosion rills are common in some places.

Included with this soil in mapping were small, scattered areas of Tatum soils. Also included were small areas of soils that have a gravelly surface layer and subsoil.

Runoff is medium. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops than to cultivated crops. It is also suited to pasture and woodland. Capability unit IIIe–2; woodland suitability group 4c1.

Nason silty clay loam, 7 to 15 percent slopes, severely eroded (NsC3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Small erosion rills and shallow gullies are common in some places.

Included with this soil in mapping were small, scattered areas of Manteo soils. Also included were small areas of soils that have a gravelly surface layer and subsoil.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops than to cultivated crops. It is also suited to pasture and woodland. Capability unit IVe–1; woodland suitability group 4c1.

Orange Series

The Orange series consists of deep, somewhat poorly drained to moderately well drained, gently sloping soils on uplands. These soils formed in material weathered from quartz monzonite, quartz diorite, hornblende gneiss, and sericite schist.

In a representative profile about 2 inches of forest litter overlies the surface layer. The surface layer is silt loam about 7 inches thick. The upper 3 inches is dark grayish brown, and the lower 4 inches is yellowish brown. The subsoil is about 34 inches thick. The upper 16 inches is yellowish-brown, friable and firm clay loam that has grayish-brown mottles; the next 14 inches is light olive-brown, very firm clay that has olive gray mottles; and the lower 4 inches is olive, very firm clay that has gray mottles. The substratum begins at a depth of about 41 inches and extends to a depth of about 46 inches. It is green, olive, white, yellow, brown, and gray weathered basic rock that crushes to sandy loam. Bedrock is at a depth of 46 inches.

The subsoil is strongly acid to medium acid. Organic-matter content is low, and natural fertility is medium. Permeability of the subsoil is slow, and available water capacity is medium. The water table rises to a depth of 1½ to 2½ feet during wet periods.

Representative profile of Orange silt loam, 2 to 7 percent slopes, in a mixed hardwood forest, 1 mile southwest of State Route 640 along State Route 626:

O1—2 inches to ½ inch, undecomposed forest litter of leaves and twigs.

O2—½ inch to 0, very dark grayish-brown (10YR 3/2), partially decomposed organic matter; abrupt, smooth boundary.

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

A2—3 to 7 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine and medium, granular structure; friable; many fine and medium roots; many fine pores; strongly acid; gradual, smooth boundary.

B11—7 to 13 inches, yellowish-brown (10YR 5/4) clay loam; common, medium, distinct, grayish-brown (2.5Y 5/2) mottles; moderate, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; common fine and medium pores; few quartz pebbles; strongly acid; clear, wavy boundary.

B12—13 to 23 inches, yellowish-brown (10YR 5/6) clay loam; common, medium, distinct, grayish-brown (2.5Y 5/2) mottles; moderate, fine and medium, subangular blocky structure; firm, sticky and slightly plastic; few fine and medium roots; many black concretions; few small quartz pebbles; medium acid; abrupt, wavy boundary.

B2t—23 to 37 inches, light olive-brown (2.5Y 5/4) clay; few, fine, distinct, olive-gray (5Y 5/2) mottles; strong, very coarse, prismatic structure; very firm, sticky and plastic; common slickensides; thin continuous clay films; few black concretions; medium acid; abrupt, wavy boundary.

B3—37 to 41 inches, olive (5Y 5/4) clay; common, fine, distinct, gray (5Y 5/1) mottles; massive; very firm, sticky and plastic; common feldspar fragments; few black concretions; medium acid; abrupt, wavy boundary.

C—41 to 46 inches, green, olive, white, yellow, brown, and gray, weathered basic rock that crushes to sandy

loam; massive; firm in place, becomes harder with depth; medium acid; abrupt, wavy boundary.
R—46 inches, basic and acidic rock.

The solum ranges from 34 to 42 inches in thickness. The A horizon is 10YR or 2.5Y in hue, 4 or 5 in value, and 2 to 6 in chroma. The part of the B horizon above the Bt horizon is 10YR or 2.5Y in hue, 4 or 5 in value, and 4 to 8 in chroma. It has common to many mottles that are 2 or less in chroma. The Bt horizon is 2.5Y or 10YR in hue, 4 or 5 in value, and 4 to 8 in chroma. It has few to common mottles that are 2 or less in chroma. Bedrock is at a depth of 3½ to 5 feet.

Orange soils commonly are near Fluvanna, Nason, Poindexter, and Tatum soils. They are more poorly drained than these soils. They have a more clayey B horizon than Poindexter soils.

Orange silt loam, 2 to 7 percent slopes (OrB).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 12 inches thick.

Included with this soil in mapping were small, scattered areas of Abell, Fluvanna, and Poindexter soils. Also included were small areas of soils that have slopes greater than 7 percent.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. A seasonal high water table is at a depth of 1½ to 2½ feet, and artificial drainage is desirable if the soil is farmed. If this soil is adequately drained, limed, and fertlized, it is suited to most locally grown crops. Alfalfa is short lived because wetness is excessive in winter and spring. Capability unit IIIe–5; woodland suitability group 4w1.

Orange-Poindexter complex, 2 to 7 percent slopes (OxB).—This complex consists of Orange and Poindexter soils intermingled in such an intricate pattern that it was not practical to map them separately. Orange soils make up about 55 percent of this complex, Poindexter soils 35 percent, and other soils 10 percent.

Included with these soils in mapping were small, scattered areas of Elbert soils.

Runoff is medium. The hazard of erosion is moderate where the soils are clean tilled or exposed. A seasonal high water table is at a depth of 1½ to 2½ feet in the Orange soils. If the soils in this complex are adequately limed and fertilized, they are suited to most locally grown crops. Alfalfa is short lived on the Orange soils because wetness is excessive in winter and spring. Capability unit IIIe–5; woodland suitability groups 4w1 and 4o1.

Pacolet Series

The Pacolet series consists of deep, well-drained, gently sloping to moderately steep soils on peidmont uplands. These soils formed in material weathered from granite gneiss. Pacolet soils in Louisa County were mapped only in complexes with Cecil soils.

In a representative profile the surface layer is brown sandy loam about 6 inches thick. The subsoil is about 26 inches thick. The upper 3 inches is yellowish-red, friable sandy clay loam; the next 5 inches is yellowish-red, friable heavy clay loam; the next 11 inches is red, firm clay; and the lower 7 inches is red, friable clay loam that has reddish-yellow and strong-brown mottles. The substratum begins at a depth of about 32 inches and extends to a depth of 70 inches or more. It is red, strong-brown, and yellowish-red, weathered granite gneiss that crushes to sandy clay loam.

The subsoil is medium acid to strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Pacolet sandy loam, in an area of Pacolet-Cecil sandy loams, 2 to 7 percent slopes, eroded, by State Route 614, one-fourth of a mile north of State Route 618:

Ap—0 to 6 inches, brown (10YR 5/3) sandy loam; weak, very fine, granular structure; very friable; many fine roots; many fine and medium pores; strongly acid; gradual, smooth boundary.
B1—6 to 9 inches, yellowish-red (5YR 5/6) sandy clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and medium roots; many fine pores; medium acid; gradual, smooth boundary.
B21t—9 to 14 inches, yellowish-red (5YR 4/8) heavy clay loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and common medium roots; few thin clay films; few fine flakes of mica; few small quartz pebbles; medium acid; gradual, smooth boundary.
B22t—14 to 25 inches, red (2.5YR 5/8) clay; strong, fine and medium, subangular blocky structure; firm, slightly sticky and slightly plastic; few medium and large roots; thin, continuous clay films; common fine flakes of mica; strongly acid; gradual, smooth boundary.
B3—25 to 32 inches, red (2.5YR 5/6) clay loam; few, fine, distinct, reddish-yellow (5YR 6/8) and strong-brown (7.5YR 5/6) mottles; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common fine flakes of mica; few weathered granite gneiss fragments; strongly acid; gradual, wavy boundary.
C—32 to 70 inches, red (2.5YR 5/6), weathered granite gneiss that crushes to sandy clay loam; strong-brown (7.5YR 5/6) and yellowish-red (5YR 5/6) mottles; massive; firm in place; easily dug out; many fine flakes of mica; few small quartz pebbles; strongly acid.

The solum ranges from 20 to 40 inches in thickness. The A horizon is 10YR, 7.5YR, or 5YR in hue, 5 or 6 in value, and 3 to 6 in chroma. It is commonly sandy loam but ranges to clay loam where the soil is severely eroded. The Bt horizon is 5YR, 2.5YR, or 10R in hue, 4 or 5 in value, and 6 to 8 in chroma. It is heavy clay loam or clay. Bedrock is below a depth of 5 feet.

Pacolet soils commonly are near Appling, Ashlar, Cecil, Iredell, and Wedowee soils. They have a redder B horizon than Appling, Ashlar, Iredell, and Wedowee soils. They have a more clayey B horizon than Ashlar soils. They are better drained than Iredell soils. They have a thinner solum than Cecil soils.

Pacolet-Cecil sandy loams, 2 to 7 percent slopes, eroded (PaB2).—This complex consists of Pacolet and Cecil soils intermingled in such an intricate pattern that it was not practical to map them separately. Pacolet soils make up about 45 percent of this complex, Cecil soils 40 percent, and other soils 15 percent. The Pacolet soil in this complex has the profile described as representative of the Pacolet series.

Included with these soils in mapping were small, scattered areas of Appling, Iredell, and Wedowee soils.

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

soils are adequately limed and fertilized, they are well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Pacolet-Cecil sandy loams, 7 to 15 percent slopes, eroded (PaC2).—This complex consists of Pacolet and Cecil soils intermingled in such an intricate pattern that it was not practical to map them separately. Pacolet soils make up about 45 percent of this complex, Cecil soils 35 percent, and other soils 20 percent.

Included with these soils in mapping were small, scattered areas of Appling, Ashlar, Sekil, and Wedowee soils.

Runoff is medium to rapid. The hazard of erosion is severe where the soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are suited to most locally grown crops. Capability unit IIIe–1; woodland suitability group 3o1.

Pacolet-Cecil sandy loams, 15 to 25 percent slopes, eroded (PaD2).—This complex consists of Pacolet and Cecil soils intermingled in such an intricate pattern that it was not practical to map them separately. Pacolet soils make up about 45 percent of the complex, Cecil soils 30 percent, and other soils 25 percent.

Included with these soils in mapping were small areas of Ashlar, Madison, and Sekil soils.

Runoff is rapid. The hazard of erosion is very severe where the soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are suited to most locally grown crops, but they are better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–2; woodland suitability group 3r1.

Pacolet-Cecil clay loams, 15 to 25 percent slopes, severely eroded (PcD3).—This complex consists of Pacolet and Cecil soils intermingled in such an intricate pattern that it was not practical to map them separately. Pacolet soils make up about 45 percent of the complex, Cecil soils 30 percent, and other soils 25 percent.

Included with these soils in mapping were small areas of Ashlar and Sekil soils. Also included were small areas of shallow gullies and small spots of Rock outcrop.

Runoff is rapid. The hazard of further erosion is very severe where the soils are exposed. These soils are suited to pasture and woodland. Capability unit VIe–1; woodland suitability group 4c2.

Poindexter Series

The Poindexter series consists of moderately deep to deep, well-drained, gently sloping to moderately steep soils on piedmont uplands. These soils formed in material weathered from hornblende gneiss.

In a representative profile the surface layer is loam about 14 inches thick. The upper 9 inches is dark grayish brown, and the lower 5 inches is brown. The subsoil is yellowish-brown, friable clay loam about 6 inches thick. The substratum begins at a depth of about 20 inches and extends to a depth of about 40 inches. The upper 6 inches is mottled very dark grayish-brown, olive-brown, and strong-brown silty clay loam; and the lower 14 inches is distinctly mottled, weathered basic rock that crushes to fine sandy loam. Hornblende gneiss is at a depth of 40 inches.

The subsoil is strongly acid to neutral. Organic-matter content and natural fertility are medium. Permeability of the subsoil is moderate, and available water capacity is low to medium.

Representative profile of Poindexter loam, 7 to 15 percent slopes, 300 feet east of State Route 638, 1¼ miles southeast of State Highway 22:

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

A2—9 to 14 inches, brown (10YR 4/3) loam; moderate, fine, granular structure; very friable; many fine and medium roots; many fine and medium pores; medium acid; clear, wavy boundary.

B2t—14 to 20 inches, yellowish-brown (10YR 5/6) light clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine pores; few fine mica flakes; few lenses or irregularly shaped bodies of silty clay loam; few thin clay films; medium acid; gradual, smooth boundary.

C1—20 to 26 inches, mottled very dark grayish-brown (10YR 3/2), olive-brown (2.5Y 4/4), and strong-brown (7.5YR 5/6) silty clay loam; massive; firm; common fine mica flakes; few lenses and irregularly shaped bodies of clay; few weathered rock fragments; slightly acid; clear, wavy boundary.

C2—26 to 40 inches, mottled and streaked in shades of brown, yellow, green, and black, strongly weathered hornblende gneiss that crushes to fine sandy loam; massive; easily dug out; common fine mica flakes; neutral; abrupt, wavy boundary.

R—40 inches, hornblende gneiss.

The solum ranges from 14 to 28 inches in thickness. Angular quartz pebbles or rock fragments make up from less than 1 percent to about 10 percent, by volume, of the solum. The A horizon is 2.5Y, 10YR, or 7.5YR in hue, 3 to 5 in value, and 2 to 4 in chroma. It is commonly loam but is silt loam in places. The Bt horizon is 10YR or 7.5YR in hue, 4 or 5 in value, and 4 to 8 in chroma. Bedrock is at a depth of 2 to 5 feet.

Poindexter soils commonly are near Elbert, Enon, Iredell, Mecklenburg, and Zion soils. They have a less clayey B horizon than Elbert, Enon, Iredell, Mecklenburg, and Zion soils. They are better drained than Elbert and Iredell soils.

Poindexter loam, 2 to 7 percent slopes (PxB).—This soil is on ridges. In many places the surface layer is 10 to 18 inches thick.

Included with this soil in mapping were small, scattered areas of Iredell, Orange, and Zion soils.

Runoff is medium. The hazard of erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–6; woodland suitability group 4o1.

Poindexter loam, 7 to 15 percent slopes (PxC).—This soil has the profile described as representative of the series.

Included with this soil in mapping were small, scattered areas of Mecklenburg, and Zion soils.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is clean tilled or exposed. This soil is somewhat droughty during the growing season. This soil has limited suitability for most locally grown crops because its available water capacity is low to medium, is somewhat droughty, and it has

rock at a depth of 2 to 5 feet. Capability unit IVe–3; woodland suitability group 4r1.

Poindexter loam, 7 to 15 percent slopes, severely eroded (PxC3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil.

Included with this soil in mapping were small, scattered areas of Cullen, Mecklenburg, and Zion soils. Also included were small areas of gullies and small spots of rock outcrop.

Runoff is medium to rapid. The hazard of further erosion is very severe where the soil is exposed. This soil is droughty during the growing season because available water capacity is low to medium and rock is at a depth of 2 to 5 feet. This soil is suited to drought-resistant pasture and woodland. Capability unit VIe–2; woodland suitability group 5d1.

Poindexter loam, 15 to 25 percent slopes (PxD).—This soil has a profile similar to the one described as representative of the series, but in many places the surface layer is 4 to 10 inches thick.

Included with this soil in mapping were small areas of Cullen and Sekil soils. Also included were small areas of Rock outcrop, small areas of gullies, and small areas of soils that have slopes greater than 25 percent.

Runoff is rapid. The hazard of erosion is very severe where the soil is exposed. This soil is droughty during the growing season because available water capacity is low to medium and rock is at a depth of 2 to 5 feet. The soil is suited to drought-resistant pasture and woodland. Capability unit VIe–2; woodland suitability group 4r1.

Quarry

Quarry consists of small excavations from which soil and underlying rock have been removed. Included are associated small dumps of waste material.

These excavations produce crushed rock, primarily granite and limestone, for commercial purposes. Areas of Quarry are indicated by a conventional sign on the soil map.

Roanoke Series

The Roanoke series consists of deep, poorly drained, gently sloping soils along small drainageways, on upland flats, in depressions, and at the base of slopes. These soils formed in loamy and clayey local alluvium.

In a representative profile the surface layer is silt loam about 10 inches thick. The upper 4 inches is olive gray, and the lower 6 inches is gray and has yellowish-brown mottles. The subsoil is about 40 inches thick. The upper 8 inches is gray, friable silty clay loam that has yellowish-brown and light olive-brown mottles; the next 20 inches is gray, firm clay that has yellowish-brown, light yellowish-brown, and olive mottles; and the lower 12 inches is light-gray, firm silty clay loam that has light olive-brown and pale-yellow mottles. The substratum begins at a depth of about 50 inches and extends to a depth of about 57 inches or more. It is light-gray silt loam.

The subsoil is very strongly acid. Organic-matter content and natural fertility are low. Permeability of the subsoil is slow, and available water capacity is high. At times the water table rises to a depth of 1 foot or less.

Representative profile of Roanoke silt loam, local alluvium, 2 to 7 percent slopes, in mixed hardwood stand, one-half of a mile south of U.S. Highway 33, along State Route 741:

A1—0 to 4 inches, olive-gray (5Y 5/2) silt loam; weak, fine, granular structure; very friable; many fine and medium roots; many fine and medium pores; very strongly acid; abrupt, smooth boundary.

A2—4 to 10 inches, gray (5Y 6/1) silt loam; few, fine, distinct, yellowish-brown (10YR 5/4) mottles; weak, fine, granular structure; very friable; many fine and medium roots; many fine and medium pores; few fine flakes of mica; very strongly acid; clear, smooth boundary.

B1g—10 to 18 inches, gray (5Y 5/1) silty clay loam; common, fine and medium, distinct, yellowish-brown (10YR 5/6) and light olive-brown (2.5Y 5/6) mottles; weak, fine and medium, subangular blocky structure; friable, sticky and slightly plastic; common fine and medium roots; few fine flakes of mica; very strongly acid; clear, smooth boundary.

B21tg—18 to 27 inches, gray (5Y 5/1) clay; common, medium, distinct, yellowish-brown (10YR 5/6) and light yellowish-brown (2.5Y 6/4) mottles; moderate, fine and medium, subangular blocky structure; firm, sticky and plastic; few medium and coarse roots; thin continuous clay films; few fine flakes of mica; very strongly acid; gradual, smooth boundary.

B22tg—27 to 38 inches, gray (N 6/0) clay; many, coarse, distinct, yellowish-brown (10YR 5/6) and olive (5Y 5/4) mottles; moderate, coarse, angular blocky structure; firm, sticky and plastic; few coarse roots; thin continuous clay films; common fine flakes of mica; very strongly acid; gradual, smooth boundary.

B3g—38 to 50 inches, light-gray (N 7/0) silty clay loam; common, coarse, prominent, light olive-brown (2.5Y 5/6) and few, fine, distinct, pale-yellow (2.5Y 7/4) mottles; weak, medium, subangular blocky structure; firm, nonsticky and slightly plastic; many fine flakes of mica; very strongly acid; gradual, smooth boundary.

IICg—50 to 57 inches, light-gray (N 7/0) silt loam; massive; firm in place; few small quartz pebbles and schist fragments; common fine flakes of mica; very strongly acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 5Y, 2.5Y, or 10YR in hue, 3 to 6 in value, and 1 or 2 in chroma. The Bt horizon is 5Y, 2.5Y, 10YR, and N in hue, 5 to 7 in value, and 0 to 2 in chroma. It is clay, silty clay, or heavy silty clay loam. Mottles that are more than 2 in chroma are in many profiles. Bedrock is below a depth of 5 feet.

Roanoke soils commonly are near Lignum, Nason, and York soils. They are more poorly drained than these soils. They lack the fragipan of York soils.

Roanoke silt loam, local alluvium, 2 to 7 percent slopes (RoB).—In some places this soil has a surface layer as much as 18 inches thick.

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

Runoff is medium. A seasonal high water table is at a depth of 1 foot or less. The soil receives seepage water from higher lying areas. This soil has limited suitability for water-tolerant pasture and woodland. Capability unit Vw–1; woodland suitability group 4w1.

Rock Outcrop

Rock outcrop consists of areas where bedrock outcrops and stones cover more than 50 percent of the surface. The outcrops and stones are granite, gneiss, schist, quartz, and other acidic and basic rocks. Soil material between rock outcrops and stones ranges from a few inches to several feet in thickness.

Rock outcrops were mapped only in complexes with Ashlar, Manteo, Poindexter, and Sekil soils.

Sekil Series

The Sekil series consists of moderately deep, well-drained, gently sloping to steep soils on uplands. These soils formed in material weathered from mixed basic and acidic rocks.

In a representative profile about 1½ inches of forest litter overlies the surface layer. The surface layer is sandy loam about 10 inches thick. The upper 3 inches is very dark grayish brown, and the lower 7 inches is brown. The subsoil is strong-brown, friable sandy loam about 4 inches thick. The substratum is brown, yellow, black, and white gravelly sandy loam about 23 inches thick. Bedrock is at a depth of about 37 inches.

The subsoil is strongly acid to medium acid. Organic-matter content and natural fertility are low to medium. Permeability is moderately rapid throughout, and available water capacity is low.

Representative profile of Sekil sandy loam, 7 to 15 percent slopes, 300 feet north of State Route 657, three-fourths of a mile east of the junction of State Route 657 and U.S. Highway 522:

O1—1½ inches to ¼ inch, undecomposed leaves, pine needles, and twigs.

O2—¼ inch to 0, black (10YR 2/1), partially decomposed organic matter.

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

A2—3 to 10 inches, brown (10YR 4/3) sandy loam; weak, fine, granular structure; very friable; many fine and medium roots; few quartz pebbles; few very fine mica flakes; strongly acid; clear, smooth boundary.

B2t—10 to 14 inches, strong-brown (7.5YR 5/6) sandy loam; weak, fine, subangular blocky structure; friable; many fine and medium roots; clay bridging between sand grains, thin coatings on sand grains; few fine mica flakes; few weathered rock fragments; medium acid; gradual, smooth boundary.

C—14 to 37 inches, multicolored brown, yellow, black, and white gravelly sandy loam; massive; firm in place; many fragments of hard and weathered rock; many fine mica flakes; medium acid; gradual, irregular boundary.

R—37 inches, basic and acidic rock.

The solum ranges from 12 to 20 inches in thickness. The A horizon is 10YR or 7.5YR in hue, 3 to 5 in value, and 2 to 4 in chroma. The Bt horizon is 7.5YR or 10YR in hue, 4 or 5 in value, and 4 to 8 in chroma. Depth to bedrock ranges from 20 to 40 inches.

Sekil soils commonly are near Appling, Cecil, Cullen, Fluvanna, Iredell, and Poindexter soils. They are less clayey and shallower to bedrock than Appling, Cecil, Cullen, Fluvanna, and Iredell soils. They are less clayey than Poindexter soils.

Sekil sandy loam, 2 to 7 percent slopes (SeB).—This soil has a profile similar to the one described as representative of the series, but in some places the surface layer is as much as 14 inches thick.

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

Runoff is medium. The hazard of erosion is severe where this soil is clean tilled or exposed. The soil is somewhat droughty during the growing season. It has limited suitability for most locally grown crops, because available water capacity is low, the soil is droughty, and rock is at a depth of 20 to 40 inches. Capability unit IIIe–6; woodland suitability group 4o1.

Sekil sandy loam, 7 to 15 percent slopes (SeC).—This soil has the profile described as representative of the series.

Included with this soil in mapping were small, scattered areas of Poindexter soils. Also included were small areas of soils that have quartz pebbles on the surface and small spots of Rock outcrop.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is clean tilled or exposed. It is somewhat droughty during the growing season. The soil has limited suitability for most locally grown crops because available water capacity is low, the soil is droughty, and rock is at a depth of 20 to 40 inches. Capability unit IVe–3; woodland suitability group 4r1.

Sekil sandy loam, 7 to 15 percent slopes, severely eroded (SeC3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil.

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

Runoff is rapid. The hazard of further erosion is very severe where the soil is exposed. This soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 20 to 40 inches. The soil is suited to drought-resistant pasture and woodland. Capability unit VIe–2; woodland suitability group 5d1.

Sekil sandy loam, 15 to 25 percent slopes (SeD).—This soil is on hillsides and bluffs along streams.

Included with this soil in mapping were small, scattered areas of Pacolet, Wedowee, and Cullen soils. Also included were small areas of Rock outcrop and small areas of soils that have quartz pebbles on the surface.

Runoff is rapid. The hazard of erosion is very severe where the soil is exposed. This soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 20 to 40 inches. This soil is suited to drought-resistant pasture and woodland. Capability unit VIe–2; woodland suitability group 4r1.

Sekil sandy loam, 25 to 45 percent slopes (SeE).—This soil has a profile similar to the one described as representative of the series, but the surface layer commonly is 4 to 8 inches thick.

Included with this soil in mapping were small areas of Rock outcrop and small areas of soils that are less than 20 inches thick over bedrock.

Runoff is rapid. The hazard of erosion is very severe where the soil is exposed. The soil is droughty during the growing season because runoff is rapid, available water capacity is low, and rock is at a depth of 20 to 40 inches. Capability unit VIIe–1; woodland suitability group 4r1.

Sekil-Poindexter-Rock outcrop complex (SP).—This complex consists of areas of Sekil and Poindexter soils and Rock outcrop intermingled in such an intricate pattern that it was not practical to map them separately. Sekil soils make up about 32 percent of this complex, Poindexter soils 30 percent, Rock outcrop 28 percent, and included soils 10 percent. Slopes range from about 10 percent to about 45 percent.

Included with these soils in mapping were small, scattered areas of Appling, Cecil, Cullen, and Fluvanna soils. Also included were small areas of very stony and extremely stony soils.

Runoff is rapid. The hazard of erosion is very severe if these soils are exposed. This complex is suited to pasture and woodland. Capability unit VIs–1; woodland suitability group 5d1.

Tatum Series

The Tatum series consists of deep, well-drained, gently sloping to moderately steep soils on uplands. These soils formed in material weathered from sericite schist.

In a representative profile about 1 inch of forest litter overlies the surface layer. The surface layer is silt loam about 6 inches thick. The upper 1 inch is very dark grayish brown, and the lower 5 inches is yellowish brown. The subsoil is about 36 inches thick. The upper 5 inches is yellowish-red, friable silty clay loam; the next 19 inches is red, friable silty clay; and the lower 12 inches is red, friable silty clay loam streaked with yellowish red, strong brown, and pale red. The substratum begins at a depth of about 42 inches and extends to a depth of about 62 inches or more. It is mottled red, yellowish-red, strong-brown, pale-red, and gray weathered schist that crushes to silt loam.

The subsoil is very strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is high.

Representative profile of Tatum silt loam, 2 to 7 percent slopes, eroded, in a mixed hardwood forest, just north of the junction of State Routes 620 and 639:

O1—1 to ¼ inch, loose leaves and twigs of deciduous trees.

O2—¼ inch to 0, very dark brown (10YR 2/2), partially decomposed organic matter.

A1—0 to 1 inch, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable; many fine roots; few fine quartz pebbles; very strongly acid; abrupt, smooth boundary.

A2—1 to 6 inches, yellowish-brown (10YR 5/4) silt loam; moderate, fine and medium, granular structure; friable; many fine and medium roots; many fine and medium pores; common fine quartz pebbles; very strongly acid; clear, smooth boundary.

B1t—6 to 11 inches, yellowish-red (5YR 5/6) silty clay loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; many medium and large roots; few fine quartz pebbles; very strongly acid; clear, smooth boundary.

B21t—11 to 16 inches, red (2.5YR 5/6) silty clay; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common medium and coarse roots; few thin clay films; few fine quartz pebbles; very strongly acid; gradual, smooth boundary.

B22t—16 to 30 inches, red (2.5YR 4/6) silty clay; strong, medium and fine, subangular blocky structure; friable to firm, slightly sticky and slight plastic; thin continuous clay films; few weathered schist fragments; few fine quartz pebbles; very strongly acid; gradual, smooth boundary.

B3t—30 to 42 inches, red (2.5YR 5/6) silty clay loam; streaked with yellowish red (5YR 4/6), strong brown (7.5YR 5/8), and pale red (2.5YR 6/2); weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few thin clay films; many, small, weathered schist fragments; few fine quartz pebbles; very strongly acid; irregular, wavy boundary.

C—42 to 62 inches, mottled red (2.5YR 5/6), yellowish-red (5YR 5/6), strong-brown (7.5YR 5/6), pale-red (2.5YR 6/2), and gray (10YR 5/1), weathered schist that crushes to silt loam; massive; firm in place; digs out easily; very strongly acid.

The solum ranges from 25 to 50 inches in thickness. In many places angular pebbles make up from about 1 percent to about 20 percent, by volume, of the solum. The A horizon is 10YR or 7.5YR in hue, 3 to 6 in value, and 2 to 6 in chroma. It is commonly silt loam but ranges to silty clay loam where the soil is severely eroded. The B2t horizon is 2.5YR or 10R in hue, 4 or 5 in value, and 6 to 8 in chroma. It is commonly silty clay or clay. Bedrock is at a depth of 4 feet or more.

Tatum soils commonly are near Fluvanna, Lignum, Manteo, Nason, Orange, and York soils. They have a redder B horizon than Fluvanna, Manteo, and Nason soils. In addition they have a thicker solum and a more clayey B horizon than Manteo soils. They are better drained than Lignum and Orange soils. They lack the fragipan of York soils.

Tatum silt loam, 2 to 7 percent slopes, eroded (TaB2).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 12 inches thick.

Included with this soil in mapping were small, scattered areas of Fluvanna and Nason soils and small areas of soils that have many quartz pebbles on the surface. Also included, in the vicinities of Wares Crossroads, Mineral, and Vigor, were areas more than 500 feet wide of soils similar to Nason and Tatum soils but deeper to bedrock and having greater combined thickness of the surface layer and subsoil. Crop and timber production is better on these deeper soils than on this Tatum soil.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–3; woodland suitability group 3o1.

Tatum silt loam, 7 to 15 percent slopes, eroded (TaC2).—This soil has a profile similar to the one described as representative of the series, but the surface layer is 4 to 8 inches thick.

Included with this soil in mapping were small areas of Abell, Manteo, and Nason soils. Also included were small areas of soils that have many quartz pebbles on the surface.

Runoff is medium to rapid. The hazard of erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–3; woodland suitability group 3o1.

Tatum silt loam, 15 to 25 percent slopes, eroded (TaD2).—This soil is on side slopes and stream bluffs. It has a profile similar to the one described as representative of the Tatum series, but the surface layer is 3 to 6 inches thick. Shallow gullies are common in some places.

Included with this soil in mapping were small, scattered areas of Manteo and Nason soils. Also included were small areas of soils that have many quartz pebbles on the surface and in the surface layer.

Runoff is rapid. The hazard of erosion is very severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it has limited suitability for most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–2; woodland suitability group 3r1.

Tatum silty clay loam, 2 to 7 percent slopes, severely eroded (TmB3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of material from the original surface layer and the subsoil. Small erosion rills are common in some places.

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

Runoff is medium. The hazard of further erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IIIe–2; woodland suitability group 4c1.

Tatum silty clay loam, 7 to 15 percent slopes, severely eroded (TmC3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of the original surface layer and the subsoil. Small erosion rills and shallow gullies are common in some places.

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

Runoff is medium to rapid. The hazard of further erosion is very severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–1; woodland suitability group 4c1.

Tatum silty clay loam, 15 to 25 percent slopes, severely eroded (TmD3).—This soil has a profile similar to the one described as representative of the series, but the surface layer is a mixture of the original surface layer and the subsoil. Shallow gullies are common in some places.

Included with this soil in mapping were small, scattered areas of Manteo soils. Also included were small spots of Rock outcrop.

Runoff is rapid. The hazard of further erosion is very severe where the soil is exposed. This soil is suited to pasture and woodland. Capability unit VIe–1; woodland suitability group 4c2.

Toccoa Series

The Toccoa series consists of deep, well-drained, nearly level soils on flood plains along the larger streams of the county and especially along the South Anna River. These soils formed in sandy and loamy alluvium.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 4 inches thick. The substratum extends to a depth of about 72 inches. The upper 11 inches is brown, very friable fine sandy loam; the next 39 inches is brown, very friable fine sandy loam that has yellowish-brown, dark yellowish-brown, and pale-brown mottles; and the lower 18 inches is yellowish-brown, friable very fine sandy loam that has pale-brown and light-gray mottles.

Toccoa soils are medium acid to slightly acid throughout. Organic-matter content and natural fertility are low. Permeability of the substratum is moderately rapid, and available water capacity is low to medium. At times the water table rises to a depth of 4 feet. Toccoa soils are occasionally flooded.

Representative profile of Toccoa fine sandy loam in a mixed hardwood forest, by the South Anna River on State Route 647:

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

C1—4 to 15 inches, brown (10YR 5/3) fine sandy loam; massive; very friable; many fine and medium roots; few fine flakes of mica; medium acid; gradual, smooth boundary.

C2—15 to 28 inches, brown (10YR 4/3) fine sandy loam; common, fine, distinct, yellowish-brown (10YR 5/6) and dark yellowish-brown (10YR 4/4) mottles; massive; very friable; many medium and coarse roots; many fine flakes of mica; medium acid; clear, smooth boundary.

C3—28 to 54 inches, brown (7.5YR 4/4) fine sandy loam; common, fine, distinct, yellowish-brown (10YR 5/6) and pale-brown (10YR 6/3) mottles; massive; very friable; few medium and coarse roots; common fine flakes of mica; medium acid; clear, smooth boundary.

IIAb—54 to 72 inches, yellowish-brown (10YR 5/4) very fine sandy loam; many, medium, distinct, pale-brown (10YR 6/3) and light-gray (10YR 7/1) mottles; massive; friable; common fine flakes of mica; medium acid.

The horizon is 10YR in hue, 4 or 5 in value, and 2 or 3 in chroma. It is commonly fine sandy loam or loamy fine sand. The C horizon is 10YR or 7.5YR in hue, 4 to 6 in value, and 3 to 6 in chroma. The C horizon is commonly fine sandy loam, very fine sandy loam, or loamy fine sand. In places pebbles make up 35 to 60 percent, by volume, of the C horizon below a depth of about 40 inches. Mottles that are 2 or less in chroma occur in many places below a depth of about 48 inches. Bedrock is below a depth of 5 feet.

Toccoa soils commonly are near Chewacla, Congaree, and Wehadkee soils. They are better drained than Chewacla and Wehadkee soils. They have more sand and less clay in the upper 40 inches of the profile than Congaree soils.

Toccoa loamy fine sand (To).—The surface layer of this soil is as much as 20 inches thick. The substratum is commonly loamy fine sand. Slopes are dominantly 0 to 2 percent.

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

Runoff is slow. A seasonal high water table is at a depth of 4 feet or more, and the soil is occasionally flooded. This soil is droughty during the growing season. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIs–1; woodland suitability group 1o1.

Toccoa fine sandy loam (Ts).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 20 inches thick. Slopes are dominantly 0 to 2 percent.

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

Runoff is slow. At times the water table rises to a depth of 4 feet and the soil is occasionally flooded. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIw–1; woodland suitability group 1o1.

Turbeville Series

The Turbeville series consists of deep, well-drained, gently sloping to sloping soil on high terraces along the larger streams of the county. These soils formed in loamy and clayey alluvium.

In a representative profile the surface layer is dark-brown fine sandy loam about 12 inches thick. The subsoil is about 52 inches thick. The upper 8 inches is reddish-brown, friable clay loam; the next 6 inches is yellowish-red, firm clay; the next 30 inches is dark-red, firm clay; and the lower 8 inches is weak-red, friable clay loam. The substratum begins at a depth of about 64 inches and extends to a depth of about 72 inches or more. It is mottled red, yellow, and brown very gravelly clay loam.

The subsoil is strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Turbeville fine sandy loam, 2 to 12 percent slopes, in a stand of Virginia pine, along State Route 640, one-forth of a mile west of Fork Creek:

Ap—0 to 12 inches, dark-brown (10YR 4/3) fine sandy loam; weak, very fine, granular structure; very friable; many fine and medium roots; common fine pores; medium acid; abrupt, smooth boundary.

B1t—12 to 20 inches, reddish-brown (5YR 4/4) clay loam; moderate, fine, subangular blocky structure; friable, sticky and slightly plastic; common fine and medium roots; many fine pores; strongly acid; gradual, smooth boundary.

B21t—20 to 26 inches, yellowish-red (5YR 4/6) clay; moderate, fine and medium, subangular blocky structure; firm, sticky and plastic; many fine and medium roots; common fine pores; few thin clay films; strongly acid; clear, smooth boundary.

B22t—26 to 48 inches, dark-red (10YR 3/6) clay; strong, fine and medium, subangular blocky structure; firm, sticky and plastic; many fine and medium pores; thin continuous clay films; few rounded quartz pebbles; strongly acid; gradual, smooth boundary.

B23t—48 to 56 inches, dark-red (2.5YR 3/6) clay; strong, fine, subangular blocky structure; firm, sticky and plastic; many fine and medium pores; thin continuous clay films; few rounded quartz pebbles; strongly acid; gradual, smooth boundary.

B3t—56 to 64 inches, weak-red (10R 4/4) heavy clay loam; few, fine, distinct, yellowish-red (5YR 4/6) and strong-brown (7.5YR 5/6) mottles; moderate, fine, subangular blocky structure; friable, sticky and slightly plastic; few thin clay films; common rounded quartz pebbles; strongly acid; abrupt, wavy boundary.

C—64 to 72 inches, mottled red, yellow, and brown very gravelly clay loam; massive; firm in place, sticky and slightly plastic; strongly acid.

The solum is more than 60 inches thick. Fine to medium, rounded quartz pebbles make up from less than 1 percent to about 10 percent, by volume, of the solum and from 35 to 60 percent, by volume, of the C horizon. The A horizon is 10YR or 7.5YR in hue, 3 to 5 in value and 2 to 4 in chroma. The Bt horizon is 5YR, 2.5YR, or 10R in hue, 3 to 5 in value, and 4 to 6 in chroma. The B3t horizon has yellowish-red and strong-brown mottles. Bedrock is below a depth of 5 feet.

Turbeville soils commonly are near Altavista, Cecil, Cullen, Masada, and Wickham soils. They are more clayey and better drained than Altavista soils. They have a thicker solum and a lower content of weatherable minerals in the B horizon than Cecil and Cullen soils. They are redder than Masada soils. They are more clayey than Wickham soils.

Turbeville fine sandy loam, 2 to 12 percent slopes (TuB).—In some places the surface layer is as much as 14 inches thick.

Included with this soil in mapping were small areas of Masada soils. Also included were small spots of gravelly soils and small, scattered areas of severely eroded soils that have a surface layer of clay loam.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Wedowee Series

The Wedowee series consists of deep, well-drained, gently sloping to moderately steep soils on uplands. These soils formed in material weathered from granite. Wedowee soils in Louisa County were mapped only in complexes with Appling soils.

In a representative profile about 1 inch of forest litter overlies the surface layer. The surface layer is sandy loam about 11 inches thick. The upper 1 inch is dark grayish brown, and the lower 10 inches is yellowish brown. The subsoil is about 19 inches thick. The upper 4 inches is yellowish-brown, friable sandy clay loam; the next 11 inches is strong-brown, firm clay loam; and the lower 4 inches is strong-brown, friable sandy clay loam that has yellowish-brown and dark yellowish-brown mottles. The substratum begins at a depth of about 30 inches and extends to a depth of about 42 inches or more. It is weathered granite gneiss that crushes to sandy clay loam.

The subsoil is strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Wedowee sandy loam, in an area of Wedowee-Appling sandy loams, 2 to 7 per-

cent slopes, eroded, in a mixed hardwood forest, west of State Route 622, 2 miles north of State Route 652:

O1—1 to ¼ inch, loose leaves and twigs.
O2—¼ inch to 0, very dark gray (10YR 3/1), partly decomposed forest litter.
A1—0 to 1 inch, dark grayish-brown (10YR 4/2) sandy loam; weak, very fine, granular structure; very friable; many fine roots; medium acid; clear, smooth boundary.
A2—1 to 11 inches, yellowish-brown (10YR 5/4) sandy loam; weak, fine, granular structure; very friable; many fine and medium roots; many fine and medium pores; few fine quartz pebbles; strongly acid; gradual, smooth boundary.
B1t—11 to 15 inches, yellowish-brown (10YR 5/6) heavy sandy clay loam; weak, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; many fine and medium pores; few thin clay films; strongly acid; gradual, smooth boundary.
B2t—15 to 26 inches, strong-brown (7.5YR 5/6) heavy clay loam; moderate, medium, subangular blocky structure; firm, slightly sticky and plastic; few medium and large roots; few fine flakes of mica; thin, continuous clay films; strongly acid; gradual, smooth boundary.
B3—26 to 30 inches, strong-brown (7.5YR 5/6) sandy clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and dark yellowish-brown (10YR 2/4) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; common fine flakes of mica; few weathered rock fragments; few coarse roots; few quartz pebbles; strongly acid; gradual, wavy boundary.
C—30 to 42 inches, mottled yellowish-brown (10YR 5/6), strong-brown (7.5YR 5/6), and white (10YR 8/1), strongly weathered granite gneiss that crushes easily to sandy clay loam; massive; firm in place; common fine flakes of mica; few quartz pebbles; many weathered rock fragments; strongly acid.

The solum ranges from 20 to 40 inches in thickness. Fine to medium, angular quartz pebbles make up from less than 1 percent to about 10 percent, by volume, of the solum. The A horizon is 10YR in hue, 4 to 6 in value, and 2 to 4 in chroma. The Bt horizon is 10YR, 7.5YR, or 5YR in hue, 5 or 6 in value, and 6 to 8 in chroma. Bedrock is below a depth of 5 feet.

Wedowee soils commonly are near Appling, Ashlar, Cecil, Pacolet, and Sekil soils. They have a thinner solum than Appling soils. They are more clayey than Ashlar and Sekil soils. They are yellower than Cecil and Pacolet soils.

Wedowee-Appling sandy loams, 2 to 7 percent slopes, eroded (WaB2).—A soil in this complex has the profile described as representative of the Wedowee series. This complex consists of Wedowee and Appling soils intermingled in such an intricate pattern that it was not practical to map them separately. Wedowee soils make up about 50 percent of this complex, Appling soils 40 percent, and included soils 10 percent.

Included with these soils in mapping were small, scattered areas of Iredell and Pacolet soils. Also included were small areas of soils that have shallow gullies.

Runoff is medium. The hazard of erosion is moderate where these soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 3o1.

Wedowee-Appling sandy loams, 7 to 15 percent slopes, eroded (WaC2).—This complex consists of Wedowee and Appling soils intermingled in such an intricate pattern that it was not practical to map them separately. Wedowee soils make up about 45 percent of this complex, Appling soils 40 percent, and other soils 15 percent.

Included with these soils in mapping were small, scattered areas of Ashlar, Pacolet, and Sekil soils. Also included were small areas of soils that have shallow gullies.

Runoff is medium to rapid. The hazard of erosion is severe where these soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are suited to most locally grown crops. Capability unit IIIe-1; woodland suitability group 3o1.

Wedowee-Appling sandy loams, 15 to 25 percent slopes, eroded (WaD2).—This complex consists of Wedowee and Appling soils intermingled in such an intricate pattern that it was not practical to map them separately. Wedowee soils make up about 45 percent of this complex, Appling soils 35 percent, and other soils 20 percent.

Included with these soils in mapping were small areas of Ashlar, Poindexter, and Sekil soils.

Runoff is rapid. The hazard of erosion is very severe where these soils are clean tilled or exposed. If these soils are adequately limed and fertilized, they are suited to most locally grown crops, but they are better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–2; woodland suitability group 3r1.

Wedowee-Appling sandy clay loams, 15 to 25 percent slopes, severely eroded (WdD3).—This complex consists of Wedowee and Appling soils intermingled in such an intricate pattern that it was not practical to map them separately. Wedowee soils make up about 45 percent of this complex, Appling soils 35 percent, and other soils 20 percent.

Included with these soils in mapping were small areas of Ashlar, Poindexter, and Sekil soils. Also included were areas of soils that have shallow gullies.

Runoff is rapid. The hazard of further erosion is very severe where these soils are exposed. These soils are suited to pasture and woodland. Capability unit VIe–1; woodland suitability group 4c2.

Wehadkee Series

The Wehadkee series consists of deep, poorly drained, nearly level soils on flood plains along the streams in the county. These soils formed in loamy alluvium.

In a representative profile the surface layer, about 10 inches thick, is grayish-brown silt loam that has yellowish-brown and brown mottles. The subsoil is about 42 inches thick. The upper 8 inches is greenish-gray, friable silt loam that has yellowish-brown and dark grayish-brown mottles; the next 28 inches is gray and dark-gray, friable silty clay loam that has yellowish-brown, dark yellowish-brown, and grayish-brown mottles; and the lower 6 inches is gray, friable silt loam that has yellowish-brown mottles. The substratum begins at a depth of about 52 inches and extends to a depth of about 58 inches or more. It consists of layers of dark greenish-gray sand, silt, and gravel that have olive mottles.

The subsoil is slightly acid to medium acid. Organic-matter content and natural fertility are medium. Permeability of the subsoil is moderate, and available water capacity is high. At times the water table rises to a depth of 1 foot or less, and the soils are very frequently flooded.

Representative profile of Wehadkee silt loam, east of State Route 651, along the North Anna River, near Ellis Mill Bridge:

Ap—0 to 10 inches, grayish-brown (10YR 5/2) silt loam; few, fine, faint, yellowish-brown (10YR 5/6) and brown (10YR 4/3) mottles; weak, fine, granular structure; very friable; many fine roots; medium acid; clear, smooth boundary.

B1g—10 to 18 inches, greenish-gray (5GY 5/1) silt loam; common, medium, prominent, yellowish-brown (10YR 5/4) and dark grayish-brown (2.5Y 4/2) mottles; weak, fine, subangular blocky structure; friable; few fine and medium roots; few fine flakes of mica; slightly acid; gradual, smooth boundary.

B21g—18 to 30 inches, gray (5Y 5/1) light silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/4) and grayish-brown (2.5Y 5/2) mottles; weak, fine and medium, subangular blocky structure; friable, slightly sticky and slightly plastic; few medium roots; few fine flakes of mica; slightly acid; gradual, smooth boundary.

B22g—30 to 46 inches, dark-gray (5Y 4/1) silty clay loam; common, medium, prominent, dark yellowish-brown (10YR 4/4) mottles; weak, medium, subangular blocky structure; friable, slightly sticky and plastic; few fine flakes of mica; slightly acid; gradual, smooth boundary.

B3g—46 to 52 inches, gray (5Y 5/1) silty loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine flakes of mica; medium acid; abrupt, smooth boundary.

Cg—52 to 58 inches, dark greenish-gray (5GB 4/1) sand, silt, and gravel; few, fine, distinct, olive (5Y 5/4) mottles; massive; friable; common fine flakes of mica; medium acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 10YR or 2.5Y in hue, 4 or 5 in value, and 1 to 3 in chroma. Mottles higher in chroma occur in many places. The B horizon is 5GY, 5Y, or 2.5Y in hue, 4 to 6 in value, and 1 in chroma. Mottles that are 10YR or 2.5Y in hue, 4 to 6 in value, and 2 to 6 in chroma occur in many places. Bedrock is below a depth of 5 feet.

Wedhadkee soils in this county are dominantly 5GY and 5Y in hue in the B horizon, unlike Wehadkee soils elsewhere. This difference does not alter their use and management.

Wehadkee soils commonly are near Chewacla, Congaree, Forestdale, Fork, and Toccoa soils. They are more poorly drained than Chewacla, Congaree, Fork, and Toccoa soils. They are less clayey than Forestdale soils.

Wehadkee silt loam (We).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 14 inches thick. Slopes are dominantly 0 to 2 percent.

Included with this soil in mapping were small, scattered areas of Chewacla and Forestdale soils. Also included are small areas of soils that have a subsoil of clay loam.

Runoff is slow. A seasonal high water table is at a depth of 1 foot or less, and artificial drainage is desirable if the soil is cultivated. This soil is very frequently flooded. If this soil is adequately protected from flooding and is drained, limed, and fertilized, it is suited to most locally grown crops. Alfalfa is generally short lived because wetness is excessive in winter and spring. Capability unit IVw–1; woodland suitability group 2w2.

Wehadkee-Chewacla complex (WH).—This complex is in long, narrow areas of alluvium along drainageways and streams. It consists of Wehadkee and Chewacla soils intermingled in such an intricate pattern that it was not practical to map them separately. Wehadkee soils make up about 45 percent of this complex, Chewacla soils 35 percent, and included soils 20 percent.

Included with these soils in mapping were small areas of Congaree, Forestdale, and Fork soils.

Runoff is slow. The soils receive seepage water from higher lying areas. At times the water table rises to a depth of 2 feet or less, and artificial drainage is desirable if these soils are cultivated. These soils are very frequently flooded. If these soils are adequately protected from flooding and are drained, limed, and fertilized, they are suited to most locally grown crops. Alfalfa is generally short lived because wetness is excessive in winter and spring. Capability unit IVw–1; woodland suitability groups 2w2 and 1w1.

Wickham Series

The Wickham series consists of deep, well-drained, gently sloping soils on terraces along the larger streams, mainly the North Anna and South Anna Rivers. These soils formed in loamy alluvium.

In a representative profile the surface layer is dark-brown fine sandy loam about 7 inches thick. The subsoil is about 45 inches thick. The upper 4 inches is reddish-brown, friable sandy clay loam; the next 12 inches is yellowish-red, friable sandy clay loam; the next 21 inches is yellowish-red, friable clay loam; and the lower 8 inches is yellowish-red, friable sandy clay loam. The substratum begins at a depth of 52 inches and extends to a depth of 72 inches or more. It is yellowish-red, strong-brown, and yellowish-brown fine sandy loam.

The subsoil is medium acid to strongly acid except where the soils have been limed. Organic-matter content and natural fertility are medium. Permeability of the subsoil is moderate, and available water capacity is medium.

Representative profile of Wickham fine sandy loam, 2 to 7 percent slopes, along the South Anna River, one-half of a mile southeast of State Route 647, about 4 miles southwest of Apple Grove:

Ap—0 to 7 inches, dark-brown (7.5YR 4/2) fine sandy loam; weak, very fine, granular structure; very friable; many fine and medium roots; medium acid; clear, smooth boundary.

B1—7 to 11 inches, reddish-brown (5YR 4/4) sandy clay loam; weak, fine, subangular blocky structure; friable, slightly sticky; common fine and medium roots; many fine and medium pores; medium acid; clear, smooth boundary.

B21t—11 to 23 inches, yellowish-red (5YR 4/6) sandy clay loam; moderate, medium, subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; common fine and medium pores; few thin clay films; medium acid; gradual, smooth boundary.

B22t—23 to 44 inches, yellowish-red (5YR 4/8) clay loam; weak, medium and coarse, subangular blocky structure; friable, sticky and plastic; few medium roots; thin continuous clay films; few fine flakes of mica; medium acid; gradual, smooth boundary.

B3—44 to 52 inches, yellowish-red (5YR 4/8) sandy clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few black streaks of mineral staining; few fine flakes of mica; strongly acid; gradual, smooth boundary.

C—52 to 72 inches, yellowish-red (5YR 5/8), strong-brown (7.5YR 5/8), and yellowish-brown (10YR 5/8) fine sandy loam; massive; friable; many fine flakes of mica; strongly acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 7.5YR or 5YR in hue, 4 or 5 in value, and 2 to 4 in chroma. The Bt horizon is 5YR in hue, 4 or 5 in value, and 4 to 8 in chroma. Bedrock is below a depth of 5 feet.

Wickham soils commonly are near Atlavista, Fork, and Forestdale soils. They are better drained than these soils. They are less clayey than Forestdale soils.

Wickham fine sandy loam, 2 to 7 percent slopes (WkB).—In some places the surface layer is as much as 10 inches thick.

Included with this soil in mapping were small, scattered areas of Altavista soils. Also included were small spots of soils that have a clayey subsoil.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is well suited to most locally grown crops. Capability unit IIe–1; woodland suitability group 2o1.

Worsham Series

The Worsham series consists of deep, poorly drained, gently sloping soils. These soils formed in material weathered from granite gneiss and schist. They are in low-lying, concave positions on uplands.

In a representative profile about 2 inches of partly decomposed forest litter overlies the surface layer. The surface layer is fine sandy loam about 8 inches thick. The upper 5 inches is dark gray and has grayish-brown mottles, and the lower 3 inches is gray and has light yellowish-brown mottles. The subsoil is about 49 inches thick. The upper 11 inches is gray, friable sandy clay loam that has yellowish-brown and grayish-brown mottles; the next 21 inches is gray, firm and very firm clay that has yellowish-brown and olive-brown mottles; and the lower 17 inches is gray, firm sandy clay loam that has olive mottles. The substratum begins at a depth of about 57 inches and extends to a depth of 69 inches or more. It is light-gray sandy loam that has light brownish-gray mottles.

The subsoil is strongly acid. Organic-matter content is medium, and natural fertility is low. Permeability of the subsoil is slow, and available water capacity is medium. The water table rises to a depth of 1 foot or less during wet periods.

Representative profile of Worsham fine sandy loam, 2 to 7 percent slopes, in a mixed hardwood forest, one-half of a mile south of Mt. Hope Church, along State Route 602:

O1—2 inches to ¼ inch, partially decomposed forest litter of leaves and twigs.

O2—½ inch to 0, very dark gray (10YR 3/1), partially decomposed organic matter; abrupt, smooth boundary.

A1—0 to 5 inches, dark-gray (10YR 4/1) fine sandy loam; few, fine, faint, grayish-brown (10YR 5/2) mottles; weak, fine, granular structure; very friable; many fine roots; many fine pores; strongly acid, clear, smooth boundary.

A2—5 to 8 inches, gray (10YR 6/1) fine sandy loam; few, fine, distinct, light yellowish-brown (10YR 6/4) mottles; weak, fine, granular structure; very friable; many fine and medium roots; many fine and medium pores; strongly acid; clear, smooth boundary.

B1g—8 to 19 inches, gray (10YR 6/1) sandy clay loam; common, coarse, distinct, yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) mottles; weak, fine and medium, subangular blocky structure; friable, sticky and slightly plastic; common fine and medium roots; few fine flakes of mica; strongly acid; clear, smooth boundary.

B21tg—19 to 28 inches, gray (10YR 5/1) clay; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; moderate, fine and medium, subangular blocky structure; firm, slightly sticky and slightly plastic; few fine and medium roots; thin continuous clay films; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B22tg—28 to 40 inches, gray (N 6/0) clay; many, coarse, prominent, light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/6) mottles; weak, coarse, angular blocky structure; very firm, sticky and very plastic; few medium and fine roots; thin continuous clay films on vertical faces and along cracks; few fine flakes of mica; strongly acid; gradual, smooth boundary.

B3g—40 to 57 inches, gray (N 6/0) sandy clay loam; many, coarse, prominent, olive (5Y 5/4) mottles; weak, medium, subangular blocky structure; firm, nonsticky and slightly plastic; few fine flakes of mica; few small quartz pebbles; strongly acid; gradual, smooth boundary.

Cg—57 to 69 inches, light-gray (N 7/0) sandy loam; common, medium, faint, light brownish-gray (2.5Y 6/2) mottles; massive; firm in place; few small quartz pebbles and granite fragments; strongly acid.

The solum ranges from 40 to 60 inches in thickness. The A horizon is 10YR or 2.5Y in hue, 4 to 6 in value, and 2 or less in chroma. Mottles higher in chroma occur. The Bt horizon is 10YR, 2.5Y, or N in hue, 5 or 6 in value, and less than 2 in chroma. Mottles higher in chroma occur. Bedrock is below a depth of 5 feet.

Worsham soils commonly are near Abell, Appling, Colfax, and Durham soils. They are more poorly drained than those soils.

Worsham fine sandy loam, 2 to 7 percent slopes (WoB).—This soil is on upland flats, in depressions, at the head of drainageways, and along small drainageways. In some places the surface layer is as much as 18 inches thick.

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

Runoff is medium. This soil receives seepage water from higher lying areas. A seasonal high water table is at a depth of 1 foot or less. The soil has limited suitability for water-tolerant pasture and woodland. Capability unit Vw–1; woodland suitability group 2w2.

York Series

The York series consists of deep, moderately well drained, gently sloping to sloping soils. These soils formed in material weathered from sericite schist. A

weakly developed fragipan is at a depth of 23 to 33 inches in the subsoil. They are on uplands.

In a representative profile the surface layer is silt loam about 11 inches thick. The upper 7 inches is light yellowish brown, and the lower 4 inches is olive yellow. The subsoil is about 27 inches thick. The upper 4 inches is light olive-brown, friable silty clay loam; the next 11 inches is olive-yellow, friable silty clay loam that has light olive-brown mottles; the next 6 inches is mottled pale-yellow, brittle and firm silt loam; and the lower 6 inches is mottled light-gray, pale-yellow, and light olive-brown, friable clay loam. The substratum begins at a depth of about 38 inches and extends to a depth of 45 inches or more. It is mottled light brownish-gray, light yellowish-brown, and pale-yellow, weathered schist that crushes easily to silt loam.

The subsoil is strongly acid except where the soils have been limed. Organic-matter content and natural fertility are low. Permeability of the subsoil is moderately slow, and available water capacity is medium. The water table rises to a depth between 1½ and 2½ feet during wet periods.

Representative profile of York silt loam, 2 to 10 percent slopes, 1 mile northwest of Zion Crossroads and one-fourth of a mile east of State Route 615:

Ap—0 to 7 inches, light yellowish-brown (2.5Y 6/4) silt loam; weak, fine, granular structure; very friable; many fine and medium roots; few fine quartz pebbles; very strongly acid; gradual, smooth boundary.

A2—7 to 11 inches, olive-yellow (2.5Y 6/6) silt loam; weak, fine and medium, granular structure; friable; many fine and medium roots; few fine quartz pebbles; very strongly acid; gradual, smooth boundary.

B1—11 to 15 inches, light olive-brown (2.5Y 5/6) light silty clay loam; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and common medium roots; strongly acid; clear, smooth boundary.

B2t—15 to 26 inches, olive-yellow (2.5Y 6/6) silty clay loam; few, medium, distinct, light olive-brown (2.5Y 5/4) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; few medium roots; few thin clay films; strongly acid; clear, wavy boundary.

Bx—26 to 32 inches, mottled, pale-yellow (2.5Y 7/4) silt loam; weak, medium, platy structure; compact and brittle in place, firm, slightly sticky; common vesicular pores; few fine quartz pebbles; strongly acid; diffuse, wavy boundary.

B3—32 to 38 inches, mottled light-gray (2.5Y 7/2), pale-yellow (2.5Y 7/4), and light olive-brown (2.5Y 5/6) light clay loam; weak, fine, subangular blocky structure; friable; slightly sticky; few fine quartz pebbles; strongly acid; diffuse, wavy boundary.

C—38 to 45 inches, mottled light brownish-gray (2.5Y 6/2), light yellowish-brown (2.5 6/4), and pale-yellow (2.5Y 7/4), weathered schist that crushes easily to silt loam; massive; many quartz pebbles; few schist fragments; strongly acid.

The solum ranges from 36 to 60 inches in thickness. In many places fine, angular quartz pebbles make up from less than 1 percent to about 10 percent, by volume, of the solum. The A horizon is 2.5Y or 5Y in hue, 5 or 6 in value, and 2 to 6 in chroma. The B horizon ranges from silt loam to light clay loam. The B1 and B2t horizons are 2.5Y or 10YR in hue, 5 or 6 in value, and 4 to 6 in chroma. The fragipan is at a depth of 23 to 33 inches. The Bx and B3 horizons are 2.5Y or 10YR in hue, 5 to 7 in value, and 2 to 6 in chroma. Bedrock is below a depth of 5 feet.

York soils commonly are near Abell, Lignum, and Nason soils. They have a fragipan, which these soils lack. They are less clayey than Lignum and Nason soils.

York silt loam, 2 to 10 percent slopes (YoB).—In some places the surface layer is as much as 14 inches thick.

Included with this soil in mapping were small, scattered areas of Lignum and Nason soils and small spots of soils that have many, fine, angular quartz pebbles on the surface.

Runoff is slow to medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. A seasonal high water table is at a depth of 1½ to 2½ feet, and artificial drainage is desirable where the soil is cultivated. If this soil is adequately drained, limed, and fertilized, it has limited suitability for most locally grown crops. Excessive wetness in winter and spring and the fragipan severely limit alfalfa and other deep-rooted crops. Capability unit IIIw–2; woodland suitability group 3o1.

Zion Series

The Zion series consists of moderately deep, well-drained, gently sloping to sloping soils on piedmont uplands. These soils formed in material weathered from quartz diorite and hornblende gneiss.

In a representative profile the surface layer is dark grayish-brown loam about 7 inches thick. The subsoil is about 20 inches thick. The upper 6 inches is light olive-brown, friable clay loam that has yellowish-brown, light yellowish-brown, and pale-yellow mottles; the next 5 inches is mottled light yellowish-brown, dark yellowish-brown, and pale-yellow, firm very gravelly clay loam; the next 4 inches is yellowish-brown, very firm clay, and the lower 5 inches is light olive-brown, firm clay. The substratum begins at a depth of about 27 inches and extends to a depth of about 36 inches. It is green, black, gray, and white, weathered basic rock that crushes to sandy loam. Bedrock is at a depth of about 36 inches.

The subsoil is medium acid to slightly acid. Organic-matter content and natural fertility are medium. Permeability of the subsoil is slow, and available water capacity is medium.

Representative profile of Zion loam, 2 to 7 percent slopes, along State Route 638, one-half of a mile south of State Highway 22:

Ap—0 to 7 inches, dark grayish-brown (2.5Y 4/2) loam; weak, fine, granular structure; very friable; many fine roots; few black concretions; neutral; clear, smooth boundary.

B1—7 to 13 inches, light olive-brown (2.5Y 5/4) clay loam; common, medium, distinct, yellowish-brown (10YR 5/6), light yellowish-brown (2.5Y 6/4), and pale-yellow (2.5Y 7/4) mottles; weak, fine, subangular blocky structure; friable, slightly sticky and slightly plastic; many fine roots; many fine and medium pores; slightly acid; abrupt, wavy boundary.

B21cn—13 to 18 inches, mottled light yellowish-brown (2.5Y 6/4), dark yellowish-brown (10YR 4/4), and pale-yellow (2.5Y 7/4) very gravelly clay loam; massive; firm; difficult to dig; partly cemented pebbles and black concretions; few red quartz fragments up to 2 inches in size; slightly acid; abrupt, wavy boundary.

B22t—18 to 22 inches, yellowish-brown (10YR 5/4) clay;

weak, coarse, angular blocky structure; very firm, sticky and very plastic; few fine roots; few fine vermiculite flakes; thin continuous clay films; medium acid; gradual, smooth boundary.

B3—22 to 27 inches, light olive-brown (2.5Y 5/4) clay; common, medium, faint, green, black, and white mottles; weak, medium, subangular blocky structure to massive; firm, sticky and plastic; few fine roots; many fine vermiculite flakes; few thin clay films; slightly acid; clear, wavy boundary.

C—27 to 36 inches, green, black, gray, and white, weathered basic rock that digs out as sandy loam; massive; firm in place; many vermiculite flakes; clay flows in cracks and crevices; slightly acid.

R—36 inches, basic rock.

The solum ranges from 20 to 36 inches in thickness. Fine, angular quartz pebbles and black concretions made up from less than 1 percent to about 15 percent, by volume, of the A and B1 horizons; from about 35 percent to about 50 percent of the B21cn horizon; and from about 2 percent to about 20 percent of the B22t, B3, and C horizons. The A horizon is 2.5Y or 10YR in hue, 3 to 5 in value, and 2 to 4 in chroma. The B horizon is 2.5Y or 10YR in hue, 4 to 7 in value, and 4 to 6 in chroma. Bedrock is at a depth of 2 to 3½ feet.

Zion soils commonly are near Elbert, Enon, Iredell, Mecklenburg, and Poindexter soils. They are better drained than Elbert and Iredell soils. They have a concretionary layer in the upper part of the B horizon that Enon and Mecklenburg soils lack. They are more clayey than Poindexter soils.

Zion loam, 2 to 7 percent slopes (ZoB).—This soil has the profile described as representative of the series. In some places the surface layer is as much as 12 inches thick.

Included with this soil in mapping were small, scattered areas of Elbert, Iredell, and Poindexter soils. Also included were small spots of Rock outcrop and small areas of soils that are gravelly throughout.

Runoff is medium. The hazard of erosion is moderate where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIe–4; woodland suitability group 3o1.

Zion loam, 2 to 7 percent slopes, eroded (ZoB2).—This soil has a profile similar to the one described as representative of the series, but the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were small, scattered areas of Elbert, Enon, Mecklenburg, and Poindexter soils. Also included are small spots of Rock outcrop and small spots of soils that have many angular quartz pebbles on the surface.

Runoff is medium. The hazard of erosion is severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops. Capability unit IIIe–4; woodland suitability group 3o1.

Zion loam, 7 to 15 percent slopes, eroded (ZoC2).—This soil has a profile similar to the one described as representative of the series, but the surface layer is 4 to 6 inches thick.

Included with this soil in mapping were small, scattered areas of Poindexter and Sekil soils. Also included were small spots of Rock outcrop and a few areas of shallow gullies.

Runoff is medium to rapid. The hazard of erosion is very severe where the soil is clean tilled or exposed. If this soil is adequately limed and fertilized, it is suited to most locally grown crops, but it is better suited to close-growing crops, pasture, and woodland than to cultivated crops. Capability unit IVe–4; woodland suitability group 3r1.

Use and Management of the Soils

In this section management of the soils for crops and pasture is discussed and facts about woodland and wildlife in the county are given. Then use of the soils for engineering and for town and country planning is described.

Crops and Pasture

This section describes some basic practices of management for crops and pasture. The capability classification system used by the Soil Conservation Service is defined, and the use and management of the soils are discussed by capability units. Also given in this section are estimated yields of the commonly grown crops under a high level of management.

General principles of management for crops and pasture

Most soils require good general management for continuing satisfactory yield. 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 local Extension Agent will help the farmer to learn about his soils and about suitable management practices. The following paragraphs discuss some general principles of management for crops and pasture.

Maintenance of fertility.—Many of the soils in Louisa County are highly leached and consequently are strongly acid and generally low in essential plant nutrients. Crops and pasture plants on most of the soils respond well to lime and fertilizer. The amounts of lime and fertilizer to be applied to any area depend on past cropping history, the kind of soil, the crops to be grown, and the yield desired. The amounts applied should be based largely on the results of laboratory analysis of soil samples.

Maintenance of structure.—Excessive tillage tends to destroy soil structure. This in turn generally lowers the infiltration rate and results in less favorable tilth in the seedbed. Essential tillage should be confined to the period of optimum moisture content of each soil to help to prevent the formation of clods or conditions leading to crusting. This is especially important on soils that are moderately or severely eroded, because the plow layer of these soils generally has a higher content of clay than the plow layer of uneroded soils. Tillage should be limited to that necessary for preparing a seedbed and controlling weeds. Cropping systems that rotate close-growing crops or grass and legume crops with row crops help to prevent deterioration of structure. Compaction and deterioration of structure also result if livestock trample wet soils. Compaction increases runoff and creates a less favorable root zone for pasture plants.

Control of erosion.—Farming has declined in the county partly because of erosion losses. Soils in capability subclasses IIe, IIIe, IVe, VIe and VIIe are subject to water erosion. The control of erosion on these soils is a major management concern if farming is to be sustained. Among the practices currently used in the county to help to control erosion on cropland and pasture are contour stripcropping, terraces or diversions, grassed waterways, the use of crop residue, minimum tillage, permanent grass or vegetation, and conservation cropping systems that rotate grass or close-growing crops with row crops. The practices to be used in any area depend primarily on the needs of the farmer and the kind of soil.

Artificial drainage.—Excessive soil wetness is an at least seasonal limitation on the soils in capability subclasses IIw, IIIw, IVw, and VIIw. The soils in subclass IIw, IIIw, and IVw normally can be artificially drained, but drainage is increasingly difficult on the soils in subclasses IIIw and IVw. Artificial drainage of these soils is generally by surface ditches or tile drains or by a combination of these systems. Crops and pasture plants on these soils generally improve as a result of adequate drainage. The soils in subclasses Vw and VIIw are not commonly drained for crops or pasture. Soils such as Colfax, Iredell, or York soils, which have either a fragipan or a clayey subsoil, drain slowly if only tile drains are used.

Conservation cropping systems.—The choice of an appropriate conservation cropping system is a major management decision. The soils in the county have physical and chemical characteristics that affect their potential for farming. A cropping system should be used that (a) improves or maintains tilth, (b) helps to reduce soil losses to tolerable limits, and (c) helps to control insects and crop diseases.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops or to other crops that require special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for trees or for engineering.

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

- Class I soils have few limitations that restrict their use. (None in Louisa County.)
- Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, range, woodland, or wildlife.
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or esthetic purposes. (None in Louisa 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); 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 Louisa County, shows that the chief limitation is climate that is too cold or too dry.

Class I has no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V 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 responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–2 or IIIe–4. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the sub-

class, or kind of limitation, as defined in the foregoing paragraphs; and the Arabic numeral specifically identifies the capability unit within each subclass.

Management by capability units

The capability units in Louisa County are described in the following paragraphs. The soil series represented in each unit are named. This does not mean, however, that all of the soils in a named series are in that unit. The "Guide to Mapping Units" at the back of this survey gives the capability classification of each soil. Each capability unit description indicates the general characteristics or qualities of the soils in that unit, their suitability for crops, and the major limitations or hazards to their use for crops and pasture.

To present detailed management recommendations is not within the scope of this publication. For example, many different combinations of cropping systems and erosion control practices can control erosion on a soil, so the selection of management practices can vary from farm to farm. Assistance in planning appropriate cropping systems, controlling erosion, selecting proper plant varieties, installing artificial drainage, and implementing other aspects of farm management can be obtained from the District Conservationist at the local office of the Soil Conservation Service or from the local Extension Agent.

CAPABILITY UNIT IIe–1

This unit consists of deep, well-drained, gently sloping soils of the Appling, Cecil, Cullen, Fluvanna, Madison, Masada, Pacolet, Turbeville, Wedowee, and Wickham series. Most of these soils are moderately eroded. They are either on uplands or on stream terraces that are normally not subject to flooding.

These soils have a friable plow layer that is erodible; however, the Wickham soil is somewhat less susceptible to erosion than the other soils. Most of these soils have a dominantly clayey subsoil, but the subsoil of the Wedowee and Wickham soils is less clayey than that of the other soils. Bedrock is commonly at a depth of more than 5 feet. Permeability is moderate, available water capacity is medium to high, and the root zone is deep. Unless limed, the soils are medium acid to very strongly acid in the root zone. The capacity to store and release nutrients is medium.

Runoff is medium. The hazard of erosion is moderate if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate.

These soils are well suited to the common field crops and hay and pasture. The soils are suited to row crops if a cropping system is used that controls erosion. The soils are suited to sprinkler irrigation if erosion is controlled.

CAPABILITY UNIT IIe–2

This unit consists of deep, well drained or moderately well drained, gently sloping soils of the Altavista, Durham, and Grover series. These soils are slightly to moderately eroded. They are on uplands or on stream terraces that normally are not subject to flooding.

These soils have a friable plow layer that is erodible; however, the Durham soil is somewhat less susceptible to erosion than the other soils. The subsoil is clay loam or sandy clay loam. Permeability is moderate, available water capacity is medium, and the root zone is deep. The soils are medium acid to very strongly acid in the root zone unless limed. Bedrock is commonly below a depth of 5 feet. The capacity to store and release plant nutrients is medium.

Runoff is medium. The hazard of erosion is moderate if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, crop production is likely to decline and tilth to deteriorate. The Altavista soil commonly receives seepage and runoff water from higher lying areas; artificial drainage helps to alleviate seasonal wetness in this soil.

These soils are well suited to the common field crops and hay and pasture. Alfalfa is shorter lived on the Altavista soil than on the other soils, because of seasonal wetness. The soils are suited to row crops if a cropping system is used that controls erosion. The soils are suited to sprinkler irrigation if erosion is controlled.

CAPABILITY UNIT IIe–3

This unit consists of deep, well-drained, gently sloping soils of the Nason and Tatum series. These soils are moderately eroded. They are on uplands and are underlain by sericite schist.

These soils have a friable plow layer that is erodible. The subsoil dominantly is silty clay. Permeability is moderate, available water capacity is medium to high, and the root zone is deep. The soils are very strongly acid in the root zone unless limed. These soils have a high content of aluminum, and more lime is needed to alter the reaction of these soils than of most other soils in the county. Bedrock is commonly at a depth of 4 feet or more. The capacity to store and release plant nutrients is low to medium.

Runoff is medium. The hazard of erosion is moderate if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate.

These soils are suited to the common field crops and hay and pasture. These soils are less desirable for crops than many other soils because of the high content of aluminum. Response to lime and fertilizer depends on a careful evaluation of needs and on application of the proper amounts. These soils are suited to row crops if a cropping system is used that controls erosion. The soils are suited to sprinkler irrigation if erosion is controlled.

CAPABILITY UNIT IIe–4

This unit consists of moderately deep or deep, well-drained, gently sloping soils of the Enon, Mecklenburg, and Zion series. These soils are slightly to moderately eroded. They are on uplands and are underlain by basic crystalline rocks.

The soils in this unit have a thin, friable plow layer that is erodible. They cannot tolerate so great a loss of material as most other upland soils in the county. The Zion soil has a layer in the upper part of the subsoil

that contains many, small, shotlike concretions that feel and act like fine gravel. The Enon and Mecklenburg soils have few to common concretions throughout. The subsoil is dominantly firm, sticky clay. Permeability is slow, available water capacity is medium, and the root zone is moderately deep to deep. The Zion soil is slightly acid to medium acid in the root zone, and the Enon and Mecklenburg soils are medium acid to strongly acid unless limed. Bedrock is at a depth of 2 to 3½ feet in the Zion soil and at a depth of 4 feet or more in the Enon and Mecklenburg soils. The capacity to store and release plant nutrients is low to medium.

Runoff is medium. The hazard of erosion is moderate if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate.

These soils are suited to the common field crops and hay and pasture. Planting is occasionally delayed in spring because the soils dry slowly. These soils are not well suited to alfalfa but are well suited to pasture. They commonly need less lime and fertilizer than most other soils in the county. The soils are suited to row crops if a cropping system is used that controls erosion. They are not well suited to sprinkler irrigation.

CAPABILITY UNIT IIw–1

This unit consists of deep, well-drained, nearly level soils of the Congaree and Toccoa series. These soils are on flood plains along the larger streams of the county.

The soils in this unit have a thick, friable plow layer. They lack a distinct subsoil layer of clay accumulation but have an underlying layer of silt loam, very fine sandy loam, or fine sandy loam. Permeability is moderate to moderately rapid, available water capacity is medium to high, and the root zone is deep. The soils are slightly acid to medium acid in the root zone unless limed. Bedrock is below a depth of 5 feet. The capacity to store and release plant nutrients is medium to high.

Flooding is the principal hazard to farming these soils. Flooding commonly occurs in spring and early in summer and usually precludes the growing of high-value crops. Local silting is a problem in some areas after flooding.

These soils are well suited to summer crops, including truck crops, that can be planted after the normal flooding season. The soils are subject to little or no hazard of erosion, and row crops can be grown year after year if improved management is used. Pasture and hay plants that can withstand some flooding are well suited to these soils. These soils are well suited to sprinkler irrigation.

CAPABILITY UNIT IIw–2

This unit consists of deep, well drained to moderately well drained, gently sloping soils of the Abell series and Abell series, dark surface variant. These soils are at the base of slopes, along drainageways, and in depressions.

The soils in this unit have a friable plow layer. The subsoil is sandy clay loam, clay loam, or silty clay loam. Permeability is moderate, available water capacity is medium, and the root zone is deep. The soils are strongly acid to very strongly acid in the root zone unless limed. Bedrock is at a depth of 4 feet or more. The capacity to store and release plant nutrients is medium to high.

These soils commonly receive seepage and runoff water from higher lying areas. Local silting is a problem in some areas. Artificial drainage helps to alleviate seasonal wetness.

These soils are well suited to the common field crops and hay and pasture. Alfalfa is shorter lived than on other soils because of seasonal wetness. The soils are subject to little or no hazard of erosion, and row crops can be grown year after year if improved management is used. Pasture and hay plants that can withstand some seasonal wetness are well suited to these soils. The soils are well suited to sprinkler irrigation.

CAPABILITY UNIT IIIe-1

This unit consists of deep, well-drained, sloping soils of the Appling, Cecil, Cullen, Fluvanna, Grover, Madison, Masada, Pacolet, and Wedowee series. These soils are moderately eroded. Most of the soils are on uplands, but the Masada soil is on stream terraces that normally are not subject to flooding.

These soils have a friable plow layer that is erodible. Most of the soils have a dominantly clayey subsoil, but Grover and Wedowee soils have a subsoil that is less clayey than that of the other soils. Permeability is moderate, available water capacity is medium to high, and the root zone is deep. Unless limed soils are medium acid to very strongly acid in the root zone. Bedrock is commonly below a depth of 5 feet. The capacity to store and release plant nutrients is medium.

Runoff is medium to rapid. The hazard of erosion is severe if the soils are cultivated or if the plant cover is thin. The difficulty in controlling erosion increases as slope steepens. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate.

These soils are suited to the common field crops and hay and pasture plants. The soils are suited to row crops if a cropping system is used that controls erosion. The soils are suited to sprinkler irrigation if erosion is controlled.

CAPABILITY UNIT IIIe–2

This unit consists of deep, well-drained, gently sloping soils of the Appling, Cecil, Cullen, Grover, Madison, Nason, and Tatum series. These soils are severely eroded. They are on uplands.

Because the soils in this unit are severely eroded, their surface layer is difficult to work and to keep in good tilth. The plow layer is sticky sandy clay loam, clay loam, or silty clay loam that has low organic-matter content and that forms a crust after hard rains. The subsoil is dominantly clayey. Permeability is moderate, available water capacity is medium to high, and the root zone is deep. The soils are medium acid to very strongly acid in the root zone unless limed. Bedrock is commonly at a depth of 4 feet or more. Capacity to store and release plant nutrients is low to medium.

Runoff is medium. The hazard of erosion is severe if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate. The potential of these soils for crop production is considerably less than that of less eroded soils of the same series and slope range.

These soils are suited to the common field crops and hay and pasture plants. A high level of management is generally needed to insure good stands of alfalfa, other legumes, and grasses. These soils are suited to row crops if a cropping system is used that controls erosion. The soils cannot tolerate so great a soil loss as less eroded soils of the same series. Because of poor tilth these soils are not well suited to sprinkler irrigation.

CAPABILITY UNIT IIIe–3

This unit consists of deep, well-drained, sloping soils of the Nason and Tatum series. These soils are moderately eroded. They are on uplands and are underlain by sericite schist.

These soils have a friable plow layer that is erodible. The subsoil is dominantly silty clay. Permeability is moderate, available water capacity is medium to high, and the root zone is deep. The soils are very strongly acid in the root zone unless limed. These soils have a high content of aluminum, and more lime is needed to alter the reaction in these soils than is needed in most other soils in the county. Bedrock is commonly at a depth of 4 feet or more. The capacity to store and release plant nutrients is low to medium.

Runoff is medium to rapid. The hazard of erosion is severe if the soils are cultivated or if the plant cover is thin. The difficulty in controlling erosion increases as slope steepens. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate.

These soils are suited to the common field crops and hay and pasture plants. The high content of aluminum makes these soils less desirable than many other soils for crops. The response of crops to lime and fertilizer depends on careful evaluation of needs and on application in the proper amounts. These soils are suited to row crops if a cropping system is used that controls erosion. The soils are suited to sprinkler irrigation if erosion is controlled.

CAPABILITY UNIT IIIe–4

This unit consists of deep, well-drained, sloping soils of the Enon and Mecklenburg series, and of a moderately deep, well-drained, gently sloping soil of the Zion series. These soils are moderately eroded. They are on uplands and are underlain by basic crystalline rock.

These soils have a thin, friable plow layer that is erodible. They cannot tolerate so great a soil loss as most other upland soils in the county. The Zion soil has a layer in the upper part of the subsoil that contains many, small, shotlike concretions that feel and act like fine gravel. The Enon and Mecklenburg soils have few to common concretions throughout. The subsoil is dominantly firm, sticky clay. Permeability is slow, available water capacity is medium, and the root zone is moderately deep to deep. The Zion soil is slightly acid to medium acid in the root zone, and the Enon and Mecklenburg soils are medium acid to strongly acid unless limed. Bedrock is at a depth of 2 to 3½ feet in the Zion soil and at a depth of 4 feet or more in the Enon and Mecklenburg soils. The capacity to store and release plant nutrients is low to medium.

Runoff is medium to rapid. The hazard of erosion is severe if the soils are cultivated or if the plant cover is thin. The difficulty in controlling erosion increases as slope increases. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate. The Zion soil is somewhat droughty during the growing season.

These soils are suited to the common field crops and hay and pasture plants. Planting is occasionally delayed in spring because the soils dry out slowly. These soils are not well suited to alfalfa but are well suited to pasture. The soils commonly need less lime and fertilizer than most other soils in the county. The soils are suited to row crops if a cropping system is used that controls erosion. These soils are not well suited to sprinkler irrigation.

CAPABILITY UNIT IIIe–5

This unit consists of moderately deep or deep, well-drained to somewhat poorly drained, gently sloping soils of the Iredell, Orange, and Poindexter series. These soils are slightly eroded to moderately eroded. They are on uplands and are underlain by basic crystalline rock.

These soils have a friable plow layer that is erodible. The subsoil dominantly is firm, sticky and plastic clay, but the Poindexter soil has a subsoil that is dominantly clay loam. In most of the soils, permeability is slow, but in the Poindexter soil permeability is moderate. Available water capacity is low to medium, and the root zone is moderately deep. The soils are neutral to strongly acid in the root zone unless limed. The Orange and Iredell soils have a seasonal high water table at a depth of 1 to 2½ feet. Bedrock is at a depth of 2 to 5 feet. The capacity to store and release plant nutrients is low.

Runoff is medium. The hazard of erosion is severe if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate. The Poindexter soil is somewhat droughty during the growing season. Artificial drainage helps to alleviate seasonal wetness in the Iredell and Orange soils.

These soils are not well suited to the common field crops or hay and pasture plants. Planting is often delayed in spring because the Iredell and Orange soils dry out slowly. Because of seasonal wetness in the Iredell and Orange soils, alfalfa is short lived and pasture plants are sparse. The soils are suited to row crops if a cropping system is used that controls erosion. The soils are not well suited to sprinkler irrigation.

CAPABILITY UNIT IIIe–6

This unit consists of moderately deep, well-drained to excessively drained, gently sloping soils of the Ash-

lar, Poindexter, and Sekil series. These soils are slightly eroded. They are on uplands and are underlain by granite, gneiss, and basic crystalline rocks.

These soils have a thick, friable plow layer that is erodible. They cannot tolerate so great a soil loss as most other upland soils in the county. The subsoil is dominantly friable sandy loam or clay loam. Permeability is moderate to moderately rapid. Available water capacity is low to medium, and the root zone is moderately deep. The soils are neutral to very strongly acid in the root zone unless limed. Bedrock is at a depth of 2 to 5 feet. The capacity to store and release plant nutrients is low.

Runoff is medium. The hazard of erosion is severe if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate. These soils are somewhat droughty during the growing season.

These soils are suited to the common field crops and hay and pasture plants. Response to lime and fertilizer depends on careful evaluation of needs and application in proper amounts. These soils are suited to row crops if a cropping system is used that controls erosion. The soils are suited to sprinkler irrigation if erosion is controlled.

CAPABILITY UNIT IIIw–1

This unit consists of deep, well-drained or somewhat poorly drained, nearly level soils of the Chewacla and Congaree series. These soils are on flood plains along the streams of the county.

The soils in this unit have a thick, friable plow layer. They lack distinct subsoil layers of clay accumulation but have an underlying layer of silt loam, very fine sandy loam, or silty clay loam. Permeability is moderate, available water capacity is high, and the root zone is deep. The soils are medium acid to strongly acid in the subsoil unless limed. The seasonal high water table is at a depth of 1 to 4 feet. Bedrock is below a depth of 5 feet. The capacity to store and release plant nutrients is high.

Flooding and seasonal wetness are the principal hazards. Flooding commonly occurs in spring and early in summer and ordinarily precludes the growing of high-value crops. In some areas local silting after flooding is a concern. Artificial drainage helps to alleviate seasonal wetness.

These soils are suited to summer crops, including truck crops, that can be planted after the normal flooding season. They are subject to little or no hazard of erosion, and row crops can be grown year after year if improved management is used. Pasture and hay plants that can withstand flooding and seasonal wetness are well suited to these soils. These soils are well suited to sprinkler irrigation.

CAPABILITY UNIT IIIw–2

This unit consists of deep, moderately well drained to somewhat poorly drained, nearly level to gently sloping soils of the Colfax, Fork, Iredell, Lignum, and York series. These soils are slightly eroded. They are on uplands or on stream terraces that normally are not subject to flooding.

These soils have a friable plow layer. The Colfax and York soils have a fragipan that is slowly permeable or moderately slowly permeable. The Fork soil has a moderately permeable subsoil that is dominantly clay loam. The Iredell and Lignum soils have a slowly permeable to moderately slowly permeable subsoil that is dominantly firm, sticky and plastic clay. Available water capacity is low to high, and the root zone is moderately deep to deep. The soils are neutral to very strongly acid in the root zone unless limed. The seasonal high water table is at a depth of 1 to 2½ feet. The Colfax and York soils have a perched water table above the fragipan after heavy rains. Bedrock is at a depth of 3½ feet or more. The capacity to store and release plant nutrients is low.

These soils commonly receive seepage and runoff water from higher lying areas. The Iredell soil ponds after heavy rains. Artificial drainage helps to alleviate seasonal wetness in all of the soils. The Colfax and York soils are droughty during the growing season. The Colfax, Lignum, and York soils are subject to a moderate hazard of erosion if cultivated or if the plant cover is thin.

These soils are not well suited to the common field crops or hay and pasture plants. Alfalfa is short lived because of seasonal wetness. Pasture and hay plants that can withstand seasonal wetness and the droughtiness of the Colfax and York soils are suited to the soils in this unit. The soils are not well suited to sprinkler irrigation.

CAPABILITY UNIT IIIs–1

Toccoa loamy fine sand is the only soil in this unit. This is a deep, well-drained, nearly level soil on flood plains along the larger streams of the county.

This soil has a thick, friable plow layer. It lacks distinct layers of clay accumulation but has an underlying layer that is dominantly loamy fine sand. Permeability is moderately rapid, available water capacity is low, and the root zone is deep. The soil is medium acid to slightly acid in the root zone unless limed. Bedrock is below a depth of 5 feet. The capacity to store and release plant nutrients for crop use is low.

This soil is droughty during the growing season because available water capacity is low. Response of crops to lime and fertilizer is limited by low capacity to store and release plant nutrients and by low available water capacity. Flooding is also a hazard.

This soil is not well suited to the common field crops or hay and plasture plants. Pasture and hay plants that can withstand the droughty conditions are better suited to this soil. This soil is suited to sprinkler irrigation.

CAPABILITY UNIT IVe–1

This unit consists of deep, well-drained, sloping soils of the Appling, Cecil, Cullen, Enon, Grover, Madison, Mecklenburg, Nason, Pacolet, Tatum, and Wedowee series. These soils are severely eroded. They are on uplands.

Because these soils are severely eroded, they have a surface layer that is difficult to work and hard to keep in good tilth. The plow layer is sticky sandy clay loam,

clay loam, or silty clay loam that is low in organic matter and that forms a crust after hard rains. The subsoil of most of these soils is dominantly clayey, but the subsoil of Grover and Wedowee soils is less clayey. Permeability is generally moderate, but it is slow in the Enon and Mecklenburg soils. Available water capacity is medium to high, and the root zone is deep. The soils are medium acid to very strongly acid in the root zone unless limed. Bedrock is commonly at a depth of 4 feet or more. The capacity to store and release plant nutrients is low to medium.

Runoff is medium to rapid. The hazard of erosion is very severe if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate. The potential of these soils for crop production is considerably less than that of less eroded soils of the same series and slope range.

These soils are suited to the common field crops and hay and pasture plants. A high level of management is generally needed to insure good stands of alfalfa, other legumes, and grasses. These soils are suited to row crops if a cropping system is used that controls erosion. They cannot tolerate so great a soil loss as less eroded soils of the same series. These soils are not well suited to sprinkler irrigation, because they have poor tilth.

CAPABILITY UNIT IVe–2

This unit consists of deep, well-drained, moderately steep soils of the Appling, Cecil, Nason, Pacolet, Tatum, and Wedowee series. These soils are moderately eroded. They are on uplands.

These soils have a friable plow layer that is erodible. Most of the soils have a dominantly clayey subsoil, but the Wedowee soil has a subsoil that is less clayey. Permeability is moderate, available water capacity is medium to high, and the root zone is deep. The soils are medium acid to very strongly acid in the root zone unless limed. Bedrock is commonly at a depth of 4 feet or more. Capacity to store and release plant nutrients is low to medium.

Runoff is rapid. The hazard of erosion is very severe if the soils are cultivated or if the plant cover is thin. The difficulty in controlling erosion increases as slope increases. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate.

These soils are suited to the common field crops and hay and pasture plants. They are suited to row crops if a cropping system is used that controls erosion. The soils are suited to sprinkler irrigation if erosion is controlled.

CAPABILITY UNIT IVe–3

This unit consists of shallow or moderately deep, well-drained to excessively drained, gently sloping to sloping soils of the Ashlar, Manteo, Poindexter, and Sekil series. These soils are slightly eroded. They are on uplands.

These soils have a friable plow layer that is erodible. They cannot tolerate so great a soil loss as most other upland soils in the county. The subsoil is dominantly friable sandy loam, clay loam, or channery silt loam. Permeability is moderate to moderately rapid, available water capacity is low to medium, and the root zone is shallow to moderately deep. The soils are neutral to very strongly acid in the root zone unless limed. Bedrock is at a depth of 1 to 1½ feet in the Manteo soils and 3 to 5 feet in the other soils. The capacity to store and release plant nutrients is low.

Runoff is medium to rapid. The hazard of erosion is very severe if the soils are cultivated or if the plant cover is thin. If excessive soil losses occur on these soils, production is likely to decline and tilth to deteriorate. These soils are droughty during the growing season.

These soils are poorly suited to the common field crops and to hay and pasture. Response of crops to lime and fertilizer is limited by low to medium available water capacity, the shallow to moderately deep root zone, and low capacity to store and release nutrients. The soils are better suited to close-growing crops than to row crops, and they are suited to drought-resistant pasture and hay plants.

CAPABILITY UNIT IVe–4

This unit consists of moderately deep or deep, well drained or moderately well drained, sloping soils of the Iredell and Zion series. These soils are moderately eroded. They are on uplands and are underlain by basic crystalline rock.

These soils have a friable plow layer that is erodible. The subsoil is dominantly firm, sticky and plastic clay. Permeability is slow, available water capacity is medium, and the root zone is moderately deep. The soils are neutral to medium acid in the root zone unless limed. Iredell soils have a seasonal high water table at a depth of 1 to 2½ feet. Bedrock is at a depth of 2 to 5 feet. The capacity to store and release plant nutrients is low.

Runoff is medium to rapid. The hazard of erosion is very severe if the soils are cultivated or if the plant cover is thin. If excessive soil losses continue on these soils, production is likely to decline and tilth to deteriorate. The soils are somewhat droughty during the growing season.

These soils are poorly suited to the common field crops and to hay and pasture. Planting is often delayed in spring because the soils dry out slowly. Because of seasonal wetness, alfalfa is short lived and pasture plants are limited on the Iredell soil. The soils in this unit are better suited to close-growing crops than to row crops, and they are suited to drought-resistant pasture and hay plants.

CAPABILITY UNIT IVw–1

This unit consists of deep, moderately well drained, somewhat poorly drained, or poorly drained, nearly level to very gently sloping soils of the Chewacla and Wehadkee series and the Iredell series, silty subsoil variant. These soils are on flood plains along drainageways and streams, in depressions, and at the base of slopes.

These soils have a thick, friable plow layer. The Iredell soil has a dominantly firm, sticky and plastic clay

subsoil, but the Chewacla and Wehadkee soils lack distinct subsoil layers of clay accumulation and have an underlying layer of silt loam or silty clay loam. Permeability generally is moderate, but it is slow in the Iredell soil. Available water capacity is medium to high, and the root zone is deep. The soils are neutral to medium acid in the root zone. A seasonal high water table is at a depth of 2½ feet or less. Bedrock is at a depth of 3½ feet to more than 5 feet. The capacity to store and release plant nutrients is medium.

Flooding and seasonal wetness are the principal hazards to farming these soils. Very frequent flooding and a persistent seasonal high water table limit the Chewacla and Wehadkee soils. All of the soils receive seepage water from higher lying areas. The Iredell soil is often ponded after heavy rains. Artificial drainage helps to alleviate seasonal wetness.

These soils are poorly suited to the common field crops and to hay and pasture. They are better suited to water-tolerant crops and to hay and pasture.

CAPABILITY UNIT Vw–1

This unit consists of deep, poorly drained, nearly level to gently sloping soils of the Elbert, Forestdale, Roanoke, and Worsham series. These soils are on low terraces and flood plains along streams, in depressions, and at the base of slopes.

These soils have a friable surface layer. The subsoil is dominantly firm, sticky and plastic clay. Permeability is slow to very slow, available water capacity is medium to high, and the root zone is deep. The soils are medium acid to very strongly acid in the root zone. A seasonal high water table is at a depth of 1 foot or less. Bedrock is at a depth of 3½ feet to more than 5 feet. The capacity to store and release nutrients is low to medium.

Wetness is the principal hazard to the use of these soils. They receive seepage water from higher lying areas. The Forestdale soil is occasionally flooded. The nearly level soils are often ponded after heavy rains. Artificial drainage is difficult because of the lack of suitable outlets.

These soils are suited to pasture of water-tolerant grasses and legumes and to woodland.

CAPABILITY UNIT VIe–1

This unit consists of deep, well-drained, moderately steep soils of the Appling, Cecil, Pacolet, Tatum, and Wedowee series. These soils are severely eroded. They are on uplands.

These soils have a surface layer of sticky sandy clay loam, clay loam, or silty clay loam that is low in organic matter. The subsoil is dominantly clayey, but in the Wedowee soil the subsoil is less clayey. Permeability is moderate, available water capacity is medium to high, and the root zone is deep. The soils are medium acid to very strongly acid in the root zone. Bedrock is commonly at a depth of 4 feet or more. The capacity to store and release nutrients is low to medium.

Runoff is rapid. The hazard of erosion is very severe if the soils are exposed or if the plant cover is thin. If excessive soil losses continue on these soils, tilth will deteriorate. The difficulty in controlling erosion increases as slope steepens.

These soils are suited to the common hay and pasture plants and to woodland.

CAPABILITY UNIT VIe–2

This unit consists of shallow or moderately deep, well-drained to excessively drained, sloping to moderately steep soils of the Ashlar, Manteo, Poindexter, and Sekil series. These soils are slightly to severely eroded. They are on uplands.

These soils have a friable surface layer that is erodible. They cannot tolerate so great a soil loss as most other upland soils in the county. The subsoil is dominantly friable sandy loam, clay loam, or channery silt loam. Permeability is moderate to moderately rapid, available water capacity is low to medium, and the root zone is shallow to moderately deep. The soils are neutral to very strongly acid in the root zone. Bedrock is at a depth of 1 to 1½ feet in the Manteo soil and 2 to 5 feet in the other soils. The capacity to store and release nutrients is low.

Runoff is medium to rapid. The hazard of erosion is very severe if the soils are exposed or if the plant cover is thin. If excessive soil losses continue on these soils, tilth will deteriorate. These soils are droughty during the growing season.

These soils are suited to drought-resistant hay and pasture plants and to woodland.

CAPABILITY UNIT VIe–1

This unit consists of shallow or moderately deep, well-drained to excessively drained, sloping to steep soils of the Ashlar, Manteo, Poindexter, and Sekil series. These soils are on uplands. They either are intermingled with Rock outcrop or are very channery.

These soils have a friable surface layer that is erodible. They cannot tolerate so great a soil loss as most other upland soils in the county. The subsoil is dominantly friable sandy loam, clay loam, or channery silt loam. Permeability is moderate to moderately rapid, available water capacity is low to medium, and the root zone is shallow to moderately deep. The soils are neutral to very strongly acid in the root zone. Bedrock is at a depth of 1 to 1½ feet in the Manteo soil and at 3 to 5 feet in the other soils. The capacity of soils in this unit to store and release nutrients is low.

Runoff is rapid. The hazard of erosion is very severe if the soils are exposed or if the plant cover is thin. If excessive soil losses occur on these soils, tilth will deteriorate. The soils are droughty during the growing season.

Rock outcrop and stones, as well as many schist fragments in the Manteo soil, limit these soils to use for drought-resistant pasture and for woodland.

CAPABILITY UNIT VIIe–1

This unit consists of shallow or moderately deep, well-drained to excessively drained, moderately steep to steep soils of the Ashlar, Manteo, and Sekil series. These soils are slightly to severely eroded. They are on uplands.

These soils have a friable surface layer that is erodible. They cannot tolerate so great a soil loss as most other upland soils in the county. The subsoil is domi-

nantly friable sandy loam or channery silt loam. Permeability is moderately rapid, available water capacity is low, and the root zone is shallow to moderately deep. The soils are medium acid to very strongly acid in the root zone. Bedrock is at a depth of 1 to 3½ feet. The capacity to store and release nutrients is low.

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

These soils are suited to drought-resistant pasture and to woodland.

CAPABILITY UNIT VIIw–1

Only Fluvaquents is in this unit. This unit consists of low, wet local alluvium along the streams in the county. The surface is covered by water much of the time.

Areas of Fluvaquents are so wet and reclamation is so impractical and expensive that their use is commonly limited to woodland and wildlife habitat. Some timber or other woodland products may be produced in places.

CAPABILITY UNIT VIIs–1

Only Manteo very channery silt loam, 15 to 25 percent slopes, is in this unit. This is a shallow, somewhat excessively drained, moderately steep soil on uplands. It is slightly eroded.

This soil has a friable surface layer that is erodible. It cannot tolerate so great a soil loss as most other upland soils in the county. The subsoil is very channery silt loam. Permeability is moderately rapid, available water capacity is low, and the root zone is shallow. This soil is very strongly acid in the root zone. Bedrock is at a depth of 1 to 1½ feet. The capacity to store and release nutrients is low.

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

This soil is suited to use as woodland.

Predicted yields

The soils of Louisa County vary a great deal in suitability for crops. Some of the soils consistently produce fairly high yields of most cultivated crops. Others, though suitable for crops, produce lower yields. Some soils are better suited to less intensive uses than crops.

Estimates of yields on most soils in the county for specified general crops are given in table 2. These are the estimated average yields per acre under improved management. Vegetable gardens are rated in general terms.

To obtain the estimated yields in table 2, these improved management practices should be followed:

1. Contour tillage, stripcropping, terracing, minimum tillage, or similar measures are used, where needed, to help to control erosion; soils that need drainage are drained; and excess water is disposed of safely.
2. Cropping systems are adequately planned to fit the capabilities of the soil and to meet the needs of the farm operator.
3. Manure and crop residue are turned under to supply organic matter, nitrogen, and other nutrients; to improve tilth; and to reduce erosion.
4. Fertilizer and lime are applied according to needs indicated by soil tests.
5. Tillage is kept to a minimum, but suitable methods of plowing, preparing the seedbed, and cultivating are used.
6. Planting, cultivating, and harvesting are done at the proper time and in the proper way.
7. Weeds, diseases, and insects are controlled.

The yields shown are not presumed to be the highest yields obtainable, but they set a goal that is practical for most farmers to achieve if they use improved management. Yields on the same soil can be expected to vary because of differences in the kind of management, in the weather, in the crop varieties used, and in the number and kinds of insects and diseases.

More information about the management practices needed to obtain good yields is in the section "Crops and Pasture."

Woodland [2]

Approximately 231,092 acres, or about 70 percent, of Louisa County is wooded. Most of this is in second-growth hardwoods, Virginia pine, and loblolly pine.

The original tree growth consisted of mixed stands of chestnut oak, white oak, post oak, scarlet oak, black oak, northern red oak, southern red oak, and hickory. Yellow-poplar was in the more moist areas. Shortleaf pine and Virginia pine were scattered throughout the hardwood stands. Poorly drained areas were covered by mixed stands of green ash, sweetgum, blackgum, boxelder, and red maple.

Most of the original woodland was cleared, consolidated into farms, and cultivated as the land was settled. As the soils became eroded and fertility was depleted, some areas were allowed to return gradually to trees. The present stands of mixed hardwoods, Virginia pine, and loblolly pine are mostly in areas formerly used for crops.

Woodland suitability groups

The soils of Louisa County have been placed in woodlands suitability groups to help owners to plan the use of their soils for wood crops. Each group is made up of soils that are suited to the same kinds of trees, that need approximately the same management when the vegetation on them is similar, and that have about the same potential productivity. Each woodland group is identified by a three-part symbol, such as 1o1, 2w1, or 4c1.

The first part of the symbol, an Arabic numeral, identifies relative potential productivity of the soils in the group for an indicator tree species or forest type —generally the most important adapted species or type on these soils. The numeral 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. These ratings are based on field determina-

[2] By LUITPOLD W. KEMPF, woodland conservationist, Soil Conservation Service.

TABLE 2.—*Estimated average yields per acre of principal crops*

[Absence of an entry indicates that the crop is not commonly

Mapping unit	Corn	Wheat	Oats	Barley
	Bu	*Bu*	*Bu*	*Bu*
Abell fine sandy loam, 2 to 7 percent slopes	90	[2] 55	[2] 55	[2] 35
Abell silt loam, 2 to 7 percent slopes	90	[2] 60	[2] 60	[2] 40
Abell loam, dark surface variant, 2 to 7 percent slopes	110	[2] 60	[2] 65	[2] 40
Altavista fine sandy loam, 2 to 7 percent slopes	95	55	60	38
Appling sandy loam, 2 to 7 percent slopes, eroded	115	70	70	50
Appling sandy loam, 7 to 15 percent slopes, eroded	105	60	65	46
Appling sandy clay loam, 2 to 7 percent slopes, severely eroded	60	50	60	33
Appling-Wedowee sandy clay loams, 7 to 15 percent slopes, severely eroded		45	55	33
Ashlar sandy loam, 2 to 7 percent slopes	55	40	45	32
Ashlar sandy loam, 7 to 15 percent slopes	40	35	40	30
Ashlar sandy loam, 7 to 15 percent slopes, severely eroded				
Ashlar sandy loam, 15 to 25 percent slopes				
Ashlar sandy loam, 15 to 30 percent slopes, severely eroded				
Ashlar-Manteo-Rock outcrop complex				
Cecil sandy loam, 2 to 7 percent slopes, eroded	115	70	80	60
Cecil sandy loam, 7 to 15 percent slopes, eroded	105	60	75	56
Cecil clay loam, 2 to 7 percent slopes, severely eroded	65	50	60	33
Cecil-Pacolet clay loams, 7 to 15 percent slopes, severely eroded	60	50	60	33
Chewacla silt loam	90			
Colfax fine sandy loam, 2 to 7 percent slopes	50	40	50	30
Congaree silt loam	130	60	[2] 60	[2] 40
Congaree-Chewacla complex	100			
Cullen loam, 2 to 7 percent slopes, eroded	115	80	80	62
Cullen loam, 7 to 15 percent slopes, eroded	105	60	75	58
Cullen clay loam, 2 to 7 percent slopes, severely eroded	80	60	70	46
Cullen clay loam, 7 to 15 percent slopes, severely eroded	60	55	65	43
Cut and fill land				
Durham fine sandy loam, 2 to 5 percent slopes	95	70	65	45
Elbert silt loam				
Fluvanna fine sandy loam, 2 to 7 percent slopes, eroded	100	70	70	55
Fluvanna fine sandy loam, 7 to 15 percent slopes, eroded	95	55	65	52
Fluvaquents				
Forestdale silt loam				
Fork fine sandy loam, 0 to 5 percent slopes	55	50	55	38
Grover sandy loam, 2 to 7 percent slopes, eroded	115	70	70	52
Grover sandy loam, 7 to 15 percent slopes, eroded	105	55	65	46
Grover sandy clay loam, 2 to 7 percent slopes, severely eroded	60	50	60	33
Grover sandy clay loam, 7 to 15 percent slopes, severely eroded	60	50	60	33
Iredell loam, 0 to 2 percent slopes	50	60	55	40
Iredell loam, 2 to 7 percent slopes	60	60	55	40
Iredell sandy loam, 2 to 7 percent slopes	60	60	55	40
Iredell sandy loam, 2 to 7 percent slopes, eroded	50	60	50	35
Iredell sandy loam, 7 to 15 percent slopes, eroded	45	50	45	33
Iredell silt loam, silty subsoil variant				
Lignum loam, 2 to 7 percent slopes	55	55	50	38
Madison sandy loam, 2 to 7 percent slopes, eroded	110	70	80	60
Madison sandy loam, 7 to 15 percent slopes, eroded	100	55	75	56
Madison clay loam, 2 to 7 percent slopes, severely eroded	65	55	60	40
Madison clay loam, 7 to 15 percent slopes, severely eroded	60	50	55	36
Manteo channery silt loam, 2 to 7 percent slopes				
Manteo channery silt loam, 7 to 15 percent slopes				
Manteo channery silt loam, 15 to 25 percent slopes				
Manteo channery silt loam, 25 to 45 percent slopes				
Manteo very channery silt loam, 7 to 15 percent slopes				
Manteo very channery silt loam, 15 to 25 percent slopes				
Masada fine sandy loam, 2 to 7 percent slopes, eroded	115	70	80	60
Masada fine sandy loam, 7 to 15 percent slopes, eroded	105	55	75	56
Mecklenburg-Enon loams, 2 to 7 percent slopes, eroded	90	55	60	46
Mecklenburg-Enon loams, 7 to 15 percent slopes, eroded	80	50	60	45
Mecklenburg-Enon clay loams, 7 to 15 percent slopes, severely eroded	60	50	55	35
Mine dump				
Nason loam, 15 to 25 percent slopes, eroded	60	50	55	35

and suitability for vegetable gardens under improved management

grown on the soil or that the soil is not suited to the crop]

Hay			Pasture		Sun-cured tobacco	Suitability for vegetable gardens
Alfalfa	Red clover	Mixed hay	Orchardgrass and ladino clover	Fescue		
Tons	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Lb*	
[3] 4.0	3.0	3.2	130	225		Very good.
[3] 4.2	3.0	3.2	130	225		Very good.
[3] 4.2	4.0	4.2	130	225		Very good.
	3.0	3.0	110	175		Good.
3.7	3.0	3.2	110	225	1,800	Good.
3.0	2.5	2.5	100	210	1,600	Fair.
2.7	2.0	2.0	90	195		Poor.
2.5	1.8	1.8	80	180		Poor.
	1.3	1.8	53	115		Poor.
	1.1	1.2	50	110		Very poor.
				80		
			50	95		
				55		
			40	75		
4.2	3.5	3.5	120	255	1,800	Good.
3.7	2.7	2.7	110	220	1,600	Fair.
2.7	2.0	2.0	95	195		Poor.
2.7	2.0	2.0	95	195		Very poor.
			130	225		Very good.
	2.0	2.0	68	155		Poor.
			150	275		Very good.
			130	225		Very good.
4.7	3.7	3.7	150	275		Good.
4.0	3.2	3.2	140	255		Fair.
3.5	3.0	3.0	120	235		Poor.
3.2	2.1	2.2	110	212		Poor.
3.0	2.4	2.5	110	220	1,800	Good.
			80	145		
3.7	3.2	3.5	150	275		Fair.
3.0	2.7	2.7	135	235		Poor.
			85	145		
	2.4	2.5	95	190		Very poor.
3.5	3.2	3.2	120	225		Good.
3.0	3.0	3.0	110	210		Poor.
2.7	2.0	2.0	90	195		Poor.
2.7	2.0	2.0	90	195		Poor.
	2.2	2.2	100	180		Very poor.
	2.2	2.2	100	180		Poor.
	2.2	2.2	100	180		Poor.
	2.0	2.0	85	160		Poor.
	1.6	1.6	80	160		
			90	180		
	2.2	2.2	95	155		Poor.
4.2	3.7	3.7	125	255		Good.
4.0	3.5	3.5	110	235		Fair.
2.9	2.5	2.5	95	195		Poor.
2.7	2.1	2.2	95	195		Very poor.
			50	100		
			45	85		
				60		
				60		
			40	65		
				60		
3.7	3.7	3.7	150	275	1,800	Good.
3.5	3.5	3.5	120	235		Fair.
3.0	2.7	2.7	125	240		Fair.
2.2	2.5	2.7	115	235		Poor.
2.1	2.0	2.2	95	190		Poor.
2.2	1.8	1.8	95	190		Very poor.

TABLE 2.—*Estimated average yields per acre of principal crops*

Mapping unit	Corn	Wheat	Oats	Barley
	Bu	*Bu*	*Bu*	*Bu*
Nason silt loam, 2 to 7 percent slopes, eroded	90	80	70	45
Nason silt loam, 7 to 15 percent slopes, eroded	80	60	65	42
Nason silty clay loam, 2 to 7 percent slopes, severely eroded	60	50	53	35
Nason silty clay loam, 7 to 15 percent slopes, severely eroded	55	40	50	33
Orange silt loam, 2 to 7 percent slopes	65	55	42	32
Orange-Poindexter complex, 2 to 7 percent slopes	65	60	42	32
Pacolet-Cecil sandy loams, 2 to 7 percent slopes, eroded	115	70	80	60
Pacolet-Cecil sandy loams, 7 to 15 percent slopes, eroded	105	60	75	56
Pacolet-Cecil sandy loams, 15 to 25 percent slopes, eroded	75	50	60	42
Pacolet-Cecil clay loams, 15 to 25 percent slopes, severely eroded				
Poindexter loam, 2 to 7 percent slopes	60	50	55	38
Poindexter loam, 7 to 15 percent slopes	50	50	55	38
Poindexter loam, 7 to 15 percent slopes, severely eroded				
Poindexter loam, 15 to 25 percent slopes				
Quarry				
Roanoke silt loam, local alluvium, 2 to 7 percent slopes				
Sekil sandy loam, 2 to 7 percent slopes	55	50	50	40
Sekil sandy loam, 7 to 15 percent slopes	40	50	45	36
Sekil sandy loam, 7 to 15 percent slopes, severely eroded				
Sekil sandy loam, 15 to 25 percent slopes				
Sekil sandy loam, 25 to 45 percent slopes				
Sekil-Poindexter-Rock outcrop complex				
Tatum silt loam, 2 to 7 percent slopes, eroded	90	70	70	48
Tatum silt loam, 7 to 15 percent slopes, eroded	85	70	65	42
Tatum silt loam, 15 to 25 percent slopes, eroded	60	50	55	35
Tatum silty clay loam, 2 to 7 percent slopes, severely eroded	65	60	60	36
Tatum silty clay loam, 7 to 15 percent slopes, severely eroded	55	55	55	35
Tatum silty clay loam, 15 to 25 percent slopes, severely eroded				
Toccoa loamy fine sand	70	40	45	
Toccoa fine sandy loam	120	[2] 60	[2] 60	[2] 40
Turbeville fine sandy loam, 2 to 12 percent slopes	115	70	80	60
Wedowee-Appling sandy loams, 2 to 7 percent slopes, eroded	115	70	70	50
Wedowee-Appling sandy loams, 7 to 15 percent slopes, eroded	105	60	65	46
Wedowee-Appling sandy loams, 15 to 25 percent slopes, eroded	75	55	60	43
Wedowee-Appling sandy clay loams, 15 to 25 percent slopes, severely eroded				
Wehadkee silt loam				
Wehadkee-Chewacla complex				
Wickham fine sandy loam, 2 to 7 percent slopes	120	70	80	60
Worsham fine sandy loam, 2 to 7 percent slopes				
York silt loam, 2 to 10 percent slopes	55	50	55	36
Zion loam, 2 to 7 percent slopes	85	50	55	40
Zion loam, 2 to 7 percent slopes, eroded	80	50	55	40
Zion loam, 7 to 15 percent slopes, eroded	60	50	45	38

[1] Cow-acre-days is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture is grazed during a grazing season without injuring the sod. An acre of pasture that provides 30 days of grazing for two cows has a carrying capacity of 60 cow-acre-days. An animal unit is one cow, steer, or horse; five hogs; or seven sheep or goats.

and suitability for vegetable gardens under improved management—Continued

Hay			Pasture		Sun-cured tobacco	Suitability for vegetable gardens
Alfalfa	Red clover	Mixed hay	Orchardgrass and ladino clover	Fescue		
Tons	*Tons*	*Tons*	*Cow-acre-days* [1]	*Cow-acre-days* [1]	*Lb*	
3.0	2.5	2.5	105	220	1,600	Fair.
2.7	2.1	2.1	100	210	1,500	Poor.
2.3	1.8	1.8	90	175	----	Poor.
----	1.6	1.7	80	160	----	Very poor.
----	2.0	2.0	80	160	----	Poor.
----	2.0	2.0	80	155	----	Poor.
4.2	3.5	3.5	125	255	1,800	Good.
4.0	3.0	3.0	110	235	1,600	Fair.
2.8	2.3	2.3	105	210	----	Poor.
----	----	----	75	150	----	
----	1.2	1.7	75	150	----	Fair.
----	1.2	1.7	65	132	----	Poor.
----	----	----	----	90		
----	----	----	60	110	----	
----	----	----	----	----	----	
----	----	----	75	125	----	
----	1.2	1.4	70	125	----	Poor.
----	1.2	1.4	60	120	----	Poor.
----	----	----	----	80	----	
----	----	----	60	120	----	
----	----	----	----	65	----	
----	----	----	52	95	----	
3.7	3.0	3.0	115	235	1,600	Fair.
3.2	2.7	2.7	110	225	1,500	Poor.
2.2	2.5	2.5	95	195	----	Poor.
2.7	2.2	2.2	100	200	1,500	Poor.
2.5	1.7	1.8	90	190	----	Poor.
----	----	----	80	150	----	
----	----	----	75	145	----	Good.
----	----	----	150	265	----	Very good.
4.5	4.0	4.0	160	275	----	Good.
3.5	3.0	3.2	120	225	1,800	Good.
3.0	2.5	2.5	105	210	1,600	Fair.
2.8	2.3	2.3	95	200	----	Poor.
----	----	----	80	150	----	
----	----	----	95	180	----	
----	----	----	95	180	----	
4.6	4.0	4.3	140	255	----	Very good.
----	----	----	75	125	----	
----	2.2	2.2	80	190	----	Poor.
----	2.2	2.3	115	230	----	Fair.
----	2.2	2.3	105	200	----	Poor.
----	1.7	1.7	95	190	----	Poor.

[2] Small grain lodges on this soil.
[3] Alfalfa is short lived on this soil.

tions of average site index. Site index is the height in feet that the taller trees of a given species reach in a natural, essentially unmanaged stand on the specified soil in 50 years.

The second part of the woodland group symbol is a lowercase letter. This letter indicates an important soil property that is associated with a moderate or severe hazard or limitation in managing the soils of the group for wood crops. A letter *w* indicates that water in or on the soils, either seasonally or year round, is the chief limitation; *d* indicates that rooting depth is restricted because the soils are shallow to a hardpan, hard rock, or some other restrictive material; *c* indicates that the main limitation is the kind or amount of clay in the upper part of the soils in the group; *r* indicates that the main limitation is steep slopes; and *o* indicates that the soils have few limitations that restrict their use for trees. Some kinds of soil may have more than one of these characteristics. Priority in designating each kind of soil is in the order that the characteristics are listed above.

The last part of the symbol, another Arabic numeral, merely differentiates one woodland suitability group from others that have the same first and second parts in their identifying symbol. For example, the last numeral in the symbol 2w1 differentiates the woodland suitability group that bears that last number from all other groups that have 2w as the first two parts of their identifying symbol.

The woodland suitability group of any soil can be found by referring to the "Guide to Mapping Units" at the back of this survey.

In table 3 the woodland suitability groups in Louisa County are listed and the soils in the groups are described. Potential productivity is estimated for significant species, and recommendations are given for species to favor in management. Then the woodland suitability groups are rated as to hazards and limitations to use. These ratings are slight, moderate, or severe.

Erosion hazard refers to the potential hazard of soil losses in well-managed woodland. The hazard is *slight* if expected losses are small; *moderate* if some losses are expected and care is needed during logging and construction to reduce the risk of erosion; and *severe* if special methods of operation are necessary to prevent excessive losses. In Louisa County only steep soils are subject to severe erosion.

Equipment limitations are rated on the basis of soil characteristics that restrict or prohibit the use of common equipment for tending and harvesting the trees. In this county soil characteristics that have the most limiting effect are drainage, depth to the water table, slope, and texture of the surface layer. The limitation is *slight* if no restriction is on the kind of equipment or the time of year it is used; *moderate* if use of equipment is restricted for less than 3 months a year; and *severe* if special equipment is needed and its use is restricted for more than 3 months a year.

Seedling mortality refers to the proportion of planted seedlings expected to die, as influenced by the kind of soil. Plant competition is disregarded for this rating. Considered in the ratings are depth to the water table, hazard of flooding, drainage, soil depth, structure, and degree of erosion. Normal rainfall, good planting stock, and proper planting are assumed. Mortality is *slight* if the expected loss is less than 25 percent of the planted seedlings; *moderate* if 25 to 50 percent; and *severe* if more than 50 percent. Special preparation of the site is needed before planting on all soils rated severe and on most soils rated moderate.

Plant competition refers to the degree to which unwanted plants may invade an area when openings are made in the canopy. Considered in the ratings are available water capacity, fertility, drainage, and degree of erosion. The rating is *slight* if competition from other plants is not expected to be a problem; *moderate* if plant competition generally will delay but not prevent development of fully stocked stands of desirable trees; and *severe* if expected plant competition may prevent establishment of a desirable stand unless intensive site preparation, weeding, and similar practices are used to control undesirable plants.

Windthrow hazard is rated on the basis of soil characteristics that affect the development of tree roots and the ability of the soil to hold trees firmly. The hazard is *slight* if most trees withstand wind; *moderate* if some trees are blown down during periods of excessive soil wetness and strong wind; and *severe* if many trees are blown down during periods of excessive soil wetness and moderate or strong wind.

Wildlife [3]

The wildlife population in any area depends primarily on the availability of food, cover, and water in a suitable combination. 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 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 of parks, nature areas, or other recreational or educational developments in which the wildlife population is important, and it is important in planning the acquisition of land for development of wildlife habitat or for protection of wildlife.

Interpretations of the suitability of soils for wildlife are helpful in selecting sites that are adaptable to wildlife management and in determining the level of management needed to achieve satisfactory results. Interpretations may also reveal factors that make a particular area unsuited for a specific kind of wildlife.

Table 4 rates the soils of Louisa County according to their suitability for seven elements of wildlife habitat and for three kinds of wildlife (*1*). The levels of suitability are expressed by an adjective rating. *Good* means that habitat generally can be easily created, improved, or maintained; the soils have few or no limitations that affect management; and satisfactory results

[3] By R. F. DUGAN, biologist, Soil Conservation Service.

can be expected. *Fair* means that habitat can be created, improved, or maintained; however, the soils have moderate limitations that affect management and a moderate intensity of management and fairly frequent attention are generally required for satisfactory results. *Poor* means that habitat can be created, improved, or maintained on these soils; however, the soils have rather severe limitations, habitat management is difficult and expensive and requires intensive effort, and results are not always satisfactory. *Very poor* means that under the prevailing soil conditions, creating, improving, or maintaining habitat is impractical and unsatisfactory results are probable.

The seven elements of wildlife habitat rated in table 4 are described in the following paragraphs.

Grain and seed crops are domestic grains or other seed-producing annuals planted for wildlife food. Examples are corn, sorghum, wheat, oats, barley, millet, buckwheat, soybeans, cowpeas, and sunflowers.

Domestic grasses and legumes are domestic perennial grasses and herbaceous legumes planted for wildlife food or cover. Some examples are fescue, orchardgrass, bluegrass, timothy, reed canarygrass, clover, alfalfa, lespedeza, trefoil, and crownvetch.

Wild herbaceous plants are native or naturally established dryland herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. Some examples are partridgepea, bluestem, wild millet, goldenrod, wild strawberry, broomsedge, beggarweed, pokeweed, ragweed, dandelion, wheatgrasses, and gramas.

Hardwood plants are nonconiferous trees and associated woody understory plants that provide cover for wildlife or that produce nuts, buds, catkins, twigs, bark, or foliage used as food by wildlife. Many of these plants have secondary value as nesting or escape cover. Such plants are often established naturally but may be planted or transplanted. Examples are oak, beech, hickory, maple, birch, locust, dogwood, viburnum, honeysuckle, grape, sumac, blackberry, autumn-olive, multiflora rose, and shrub lespedeza.

Coniferous plants are cone-bearing trees, shrubs, and ground cover that furnish wildlife cover or supply food in the form of browse, seeds, or fruitlike cones. These are commonly established naturally but may be planted. Examples are pine, spruce, hemlock, fir, cedar, juniper, larch, yew, and cypress.

Wetland plants are annual or perennial wild herbaceous plants, exclusive of submerged or floating aquatics, that grow on moist to wet sites. Wetland plants produce food or cover used extensively by wetland wildlife. Examples are smartweeds, wildrice, rushes, sedges, reeds, cutgrass, arrowhead, and wild millet.

Shallow water areas are areas of water that have an average depth of less than 5 feet and that are useful to wildlife. They may be formed by dams or levees, sometimes with some excavations, or by water control devices in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, wildlife ponds, and beaver ponds.

The three kinds of wildlife for which the soils are rated in table 4 are defined in the following paragraphs.

***Figure 4.*—Sewage lagoon in an area of Lignum, York, and Worsham soils.**

Open-land wildlife consists of birds and mammals that normally live in croplands, pastures, meadows, lawns, and areas overgrown with grasses, herbs, shrubs, and vines. Examples are rabbit, quail, pheasant, mourning dove, field sparrow, meadowlark, killdeer, red fox, and woodchuck. Ratings in this column represent weighted averages of the ratings for grain and seed crops, domestic grasses and legumes, wild herbaceous plants, and hardwood or coniferous plants.

Woodland wildlife consists of birds and mammals that normally live in areas of hardwoods, of coniferous trees and shrubs, or of a mixture of both. Examples are wild turkey, white-tailed deer, ruffed grouse, gray squirrel, gray fox, raccoon, wood thrush, vireos, warblers, and woodpeckers. Ratings in this column represent weighted averages of the ratings for domestic grasses and legumes, wild herbaceous plants, and hardwood or coniferous plants.

Wetland wildlife consists of birds and mammals that normally live in swamps, marshes, or areas of open water. Examples are ducks, coots, herons, geese, snipe, rails, kingfishers, mink, muskrat, and beaver. Ratings in this column were obtained by averaging the ratings for wetland plants and shallow water areas.

Engineering Uses of the Soils [4]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among soil properties important in engineering are permeability, strength, compaction characteristics, drainage, shrink-swell potential, grain size, plasticity, and reaction. Also important are depth to the water table, depth to bedrock, and slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse (fig. 4).

[4] RICHARD A. GALLO, engineer, Soil Conservation Service, helped to prepare this section.

TABLE 3.—*Management of the*

[Not placed in a woodland suitability group because they are too variable to estimate are Cut

Woodland suitability group, description of soils, and map symbols	Potential productivity		Species to favor—	
	Species	Estimated site index	In existing stands	For planting
Group 1w1. Deep, somewhat poorly drained to well-drained soils on flood plains: high available water capacity; slopes of 0 to 2 percent. Ch, CO.	Upland oaks Yellow-poplar	85+ 95+	Upland oaks, yellow-poplar, black walnut.	Loblolly pine, yellow-poplar, black walnut.
Group 1o1. Deep, well-drained soils on flood plains: medium to high available water capacity; slopes of 0 to 2 percent. Cn, To, Ts.	Upland oaks Yellow-poplar	85+ 95+	Upland oaks, black walnut, yellow-poplar, ash.	Loblolly pine, yellow-poplar, black walnut.
Group 2w1. Deep, somewhat poorly drained to moderately well drained soils on flood plains: low to medium available water capacity; slopes of 0 to 7 percent. ClB, FrB.	Upland oaks Virginia pine	75–85 70–80	Upland oaks, loblolly pine, Virginia pine.	Loblolly pine
Group 2w2. Deep, poorly drained soils on flood plains: medium to high available water capacity; slopes of 0 to 7 percent. We, WH, WoB. For Chewacla part of WH, see group 1w1.	Upland oaks Virginia pine	75–85 65–75	Upland oaks, Virginia pine.	Loblolly pine
Group 2o1. Deep, moderately well drained to well drained soils on terraces, in depressions, and at the base of slopes: medium to high available water capacity; slopes of 2 to 7 percent. AbB, AcB, AeB, AlB, WkB.	Upland oaks Yellow-poplar	75–85 85–95	Upland oaks, yellow-poplar, black walnut, Virginia pine.	Loblolly pine, yellow-poplar, black walnut.
Group 3w1. Deep, moderately well drained soils in depressions, along drainageways, and on uplands: high available water capacity; slopes of 2 to 7 percent. LgB.	Upland oaks Virginia pine	65–75 65–75	Upland oaks, Virginia pine.	Loblolly pine
Group 3d1. Moderately deep, well-drained to excessively drained soils on uplands: low available water capacity; slopes of 2 to 25 percent. AsB, AsC, AsD.[2]	Upland oaks Virginia pine Shortleaf pine	65–75 65–75 65–75	Virginia pine, shortleaf pine, upland oaks.	Loblolly pine
Group 3c1. Deep, well-drained soils on uplands: medium available water capacity; slopes of 2 to 15 percent. MuB2, MuC2.	Upland oaks Virginia pine Shortleaf pine Loblolly pine	65–75 65–75 65–75 75–85	Virginia pine, shortleaf pine, loblolly pine, upland oaks.	Loblolly pine, Virginia pine.
Group 3r1. Deep, well-drained soils on uplands: medium to high available water capacity; slopes of 7 to 25 percent. NaD2, PaD2, TaD2, WaD2, ZoC2.	Upland oaks Virginia pine	65–75 65–75	Upland oaks, Virginia pine.	Loblolly pine
Group 3o1. Deep, well-drained soils on uplands: medium to high available water capacity; slopes of 2 to 15 percent. AnB2, AnC2, CcB2, CcC2, CuB2, CuC2, DuB, FlB2, FlC2, GrB2, GrC2, MaB2, MaC2, MsB2, MsC2, NoB2, NoC2, PaB2, PaC2, TaB2, TaC2, TuB, WaB2, WaC2, YoB, ZoB, ZoB2.	Upland oaks Virginia pine Shortleaf pine Loblolly pine	65–75 65–75 65–75 75–85	Upland oaks, loblolly pine, Virginia pine, shortleaf pine.	Loblolly pine
Group 4w1. Deep, poorly drained to moderately well drained soils in depressions, along drainageways, on upland flats, and on uplands: medium available water capacity; slopes of 0 to 7 percent. Eb, Fo, IdB, IdB2, IdC2,[3] IrA, IrB, Iv, OrB,[4] OxB,[4] RoB.[5] For Poindexter part of OxB, see Group 4o1.	Upland oaks Virginia pine Loblolly pine	55–65 55–65 55–65	Upland oaks, Virginia pine.	Virginia pine, loblolly pine.
Group 4d1. Shallow, somewhat excessively drained soils on uplands: low available water capacity; slopes of 2 to 15 percent. MnB, MnC, MoC.	Upland oaks Virginia pine Shortleaf pine Loblolly pine	55–65 55–65 55–65 65–75	Shortleaf pine, Virginia pine, upland oaks.	Loblolly pine

soils as woodland

and fill land, Fluvaquents (FN), Quarry, Mine dump, and Rock outcrop parts of AV and SP]

Hazards and limitations					
Erosion hazard	Equipment limitations	Seedling mortality	Plant competition		Windthrow hazard
			Conifers	Hardwoods	
Slight	Moderate	Slight	Severe	Severe	Slight.
Slight	Slight	Slight	Severe	Severe	Slight.
Slight	Moderate	Slight	Severe	Severe	Slight.
Slight	Severe	Severe	Severe	Severe	Moderate.
Slight	Slight	Slight	Severe	Severe	Slight.
Slight	Moderate	Moderate	Severe	Moderate	Moderate.
Slight	Slight	Severe	Moderate	Slight	Moderate.
Slight	Moderate	Slight	Slight	Moderate	Slight.
Moderate	Moderate	Slight	Moderate	Slight	Slight.
Slight	Slight	Slight	Moderate	Slight	Slight.
Slight	Severe	Moderate	Severe	Moderate	Moderate.
Slight	Slight	Severe	Slight	Slight	Moderate.

TABLE 3.—*Management of the*

Woodland suitability group, description of soils, and map symbols	Potential productivity		Species to favor—	
	Species	Estimated site index	In existing stands	For planting
Group 4d2. Shallow, somewhat excessively drained soils on uplands: low available water capacity; slopes of 15 to 45 percent. MnD, MnE,[1] MoD.	Upland oaks Virginia pine Shortleaf pine Loblolly pine	55–65 55–65 55–65 65–75	Shortleaf pine, Virginia pine, upland oaks.	Loblolly pine
Group 4c1. Deep, well-drained soils on uplands: medium to high available water capacity; slopes of 2 to 15 percent. ApB3, ArC3, CeB3, CfC3, CwB3, CwC3, GvB3, GvC3, MdB3, MdC3, MvC3, NsB3, NsC3, TmB3, TmC3.	Upland oaks Virginia pine Loblolly pine	55–65 55–65 65–75	Loblolly pine, Virginia pine, upland oaks.	Loblolly pine, Virginia pine.
Group 4c2. Deep, well-drained soils on uplands: medium to high available water capacity; slopes of 15 to 25 percent. PcD3, TmD3, WdD3.	Upland oaks Virginia pine Loblolly pine	55–65 55–65 65–75	Loblolly pine, Virginia pine, upland oaks.	Loblolly pine, Virginia pine.
Group 4r1. Moderately deep, well-drained soils on uplands: low to medium available water capacity; slopes of 7 to 45 percent. PxC, PxD, SeC, SeD, SeE.	Shortleaf pine Virginia pine Upland oaks	55–65 55–65 55–65	Loblolly pine, Virginia pine, upland oaks.	Loblolly pine, Virginia pine.
Group 4o1. Moderately deep, well-drained soils on uplands: low to medium available water capacity; slopes of 2 to 7 percent. PxB, SeB.	Shortleaf pine Virginia pine Upland oaks	55–65 55–65 55–65	Loblolly pine, Virginia pine, upland oaks.	Loblolly pine, Virginia pine.
Group 5d1. Moderately deep to shallow, well-drained to excessively drained soils on uplands: low to medium available water capacity; slopes of 7 to 45 percent. AsC3,[6] AsD3,[7] AV,[8] PxC3, SeC3, SP.[8]	Upland oaks Virginia pine	45–55 45–55	Upland oaks, Virginia pine.	Virginia pine, loblolly pine.

[1] MnE is rated severe for erosion hazard and equipment limitations.
[2] AsD is rated moderate for erosion hazard and equipment limitations.
[3] IdC2 has moderate erosion hazard.
[4] OrB and OxB are rated moderate for equipment limitations.

soils as woodland—Continued

Hazards and limitations					
Erosion hazard	Equipment limitations	Seedling mortality	Plant competition		Windthrow hazard
			Conifers	Hardwoods	
Moderate	Moderate	Severe	Slight	Slight	Moderate.
Slight	Moderate	Slight	Slight	Slight	Slight.
Moderate	Severe	Slight	Slight	Slight	Slight.
Moderate	Moderate	Slight	Slight	Slight	Slight.
Slight	Slight	Slight	Slight	Slight	Slight.
Slight	Severe	Moderate	Slight	Slight	Slight.

[5] RoB is rated severe for seedling mortality and hardwood plant competition.
[6] AsC3 is rated slight for equipment limitations.
[7] AsD3 is rated moderate for equipment limitations.
[8] AV and SP are rated moderate to severe for windthrow hazard.

TABLE 4.—*Suitability of soils for elements of*

[Absence of an entry indicates that

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood plants
Abell: AbB, AcB	Good	Good	Good	Good
Abell, dark surface variant: AeB	Good	Good	Good	Good
Altavista: AlB	Good	Good	Good	Good
Appling:				
AnB2, ApB3	Good	Good	Good	Good
AnC2, ArC3	Fair	Good	Good	Good
Ashlar:				
AsB	Fair	Good	Good	Good
AsC	Fair	Fair	Fair	Fair
AsC3, AsD	Poor	Fair	Fair	Poor
AsD3	Poor	Poor	Fair	Poor
AV	Very poor	Very poor	Fair	Poor
Cecil:				
CcB2, CeB3	Good	Good	Good	Good
CcC2, CfC3	Fair	Good	Good	Good
Chewacla: Ch	Poor	Fair	Fair	Good
Colfax: ClB	Fair	Good	Good	Fair
Congaree:				
Cn	Good	Good	Good	Good
CO	Poor	Fair	Fair	Good
Cullen:				
CuB2, CwB3	Good	Good	Good	Good
CuC2, CwC3	Fair	Good	Good	Good
Cut and fill land				
Durham: DuB	Good	Good	Good	Good
Elbert: Eb	Poor	Fair	Fair	Fair
Fluvanna:				
FlB2	Good	Good	Good	Good
FlC2	Fair	Good	Good	Good
Fluvaquents: FN	Very poor	Very poor	Very poor	Very poor
Forestdale: Fo	Poor	Fair	Fair	Fair
Fork: FrB	Fair	Good	Good	Good
Grover:				
GrB2, GvB3	Good	Good	Good	Good
GrC2, GvC3	Fair	Good	Good	Good
Iredell:				
IdB, IdB2, IrB	Fair	Good	Good	Good
IdC2	Fair	Good	Good	Good
IrA	Fair	Good	Good	Good
Iredell, silty subsoil variant: Iv	Fair	Good	Good	Good
Lignum: LgB	Fair	Good	Good	Good
Madison:				
MaB2, MdB3	Good	Good	Good	Good
MaC2, MdC3	Fair	Good	Good	Good
Manteo:				
MnB, MnC, MnD, MoC, MoD	Poor	Poor	Fair	Fair
MnE	Very poor	Poor	Fair	Fair
Masada:				
MsB2	Good	Good	Good	Good
MsC2	Fair	Good	Good	Good
Mecklenburg:				
MuB2	Good	Good	Good	Good
MuC2, MvC3	Fair	Good	Good	Good
Mine dump				
Nason:				
NaD2	Poor	Fair	Good	Good
NoB2, NsB3	Good	Good	Good	Good
NoC2, NsC3	Fair	Good	Good	Good
Orange: OrB, OxB	Fair	Good	Good	Good
Pacolet:				
PaB2	Good	Good	Good	Good
PaC2	Fair	Good	Good	Good
PaD2, PcD3	Poor	Fair	Good	Good

wildlife habitat and for kinds of wildlife

properties are too variable to rate accurately]

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow water areas	Open-land	Woodland	Wetland
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Poor	Very poor	Very poor	Fair	Poor	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Fair	Fair	Fair	Fair	Fair.
Fair	Poor	Very poor	Good	Fair	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Fair	Fair	Fair	Good	Fair.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Fair	Good	Good	Poor	Fair	Good.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Very poor	Good	Good	Very poor	Very poor	Good.
Fair	Good	Good	Fair	Fair	Good.
Good	Fair	Fair	Good	Good	Fair.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Fair	Fair	Good	Good	Fair.
Good	Fair	Poor	Good	Good	Poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Fair	Very poor	Very poor	Poor	Fair	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.

TABLE 4—*Suitability of soils for elements of*

Soil series and map symbols	Elements of wildlife habitat			
	Grain and seed crops	Domestic grasses and legumes	Wild herbaceous plants	Hardwood plants
Poindexter:				
PxB	Fair	Good	Good	Good
PxC	Fair	Good	Good	Good
PxC3	Poor	Fair	Fair	Fair
PxD	Poor	Fair	Good	Good
Quarry				
Roanoke: RoB	Poor	Fair	Good	Fair
Sekil:				
SeB	Fair	Good	Good	Good
SeC	Fair	Fair	Fair	Fair
SeC3	Poor	Poor	Fair	Poor
SeD	Poor	Fair	Fair	Poor
SeE	Very poor	Poor	Fair	Poor
SP	Very poor	Very poor	Fair	Poor
Tatum:				
TaB2, TmB3	Good	Good	Good	Good
TaC2, TmC3	Fair	Good	Good	Good
TaD2, TmD3	Poor	Fair	Good	Good
Toccoa:				
To	Poor	Fair	Good	Good
Ts	Good	Good	Good	Good
Turbeville: TuB	Fair	Good	Good	Good
Wedowee:				
WaB2	Good	Good	Good	Good
WaC2	Fair	Good	Good	Good
WaD2, WdD3	Poor	Fair	Good	Good
Wehadkee:				
We	Very poor	Poor	Poor	Fair
WH	Very poor	Poor	Poor	Fair
Wickham: WkB	Good	Good	Good	Good
Worsham: WoB	Poor	Fair	Fair	Fair
York: YoB	Good	Good	Good	Good
Zion:				
ZoB, ZoB2	Fair	Good	Good	Good
ZoC2	Fair	Good	Good	Good

wildlife habitat and for kinds of wildlife—Continued

Elements of wildlife habitat—Continued			Kinds of wildlife		
Coniferous plants	Wetland plants	Shallow water areas	Open-land	Woodland	Wetland
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Fair	Poor	Very poor	Fair	Fair	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Fair	Very poor	Very poor	Fair	Fair	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Poor	Very poor	Very poor	Fair	Poor	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Poor	Very poor	Very poor	Poor	Poor	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Fair	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Fair	Good	Very poor.
Fair	Good	Good	Poor	Fair	Good.
Fair	Good	Fair	Poor	Fair	Fair.
Good	Poor	Very poor	Good	Good	Very poor.
Fair	Poor	Very poor	Fair	Fair	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Poor	Very poor	Good	Good	Very poor.
Good	Very poor	Very poor	Good	Good	Very poor.

Information in this section can help those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the soils on which they are built to predict performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 5, 6, and 7, which show, respectively, several estimated soil properties significant to engineering, interpretations for various engineering uses, and interpretations for various town and country uses.

This information, along with the soil map, soil descriptions, and other parts of this survey, can be used to make interpretations in addition to those given in tables 5, 6, and 7, and it also can be used to make other useful maps.

This information, however, does not eliminate need for further investigations at sites selected for engineering works. Inspection of sites is needed because many areas of a given soil may contain small areas of other kinds of soil that have strongly contrasting properties and different behavior for engineering.

Some of the terms used in this soil survey have special meaning to soil scientists that is not known to all engineers. The Glossary defines many of these terms commonly used in soil science.

Engineering classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*3*, *10*), used by SCS engineers, the Department of Defense, and others, and the AASHO system (*2*), adopted by the American Association of State Highway Officials.

The Unified system classifies soils according to particle-size distribution, plasticity, liquid limit, and organic-matter content. Soils are grouped in 15 classes. Eight classes are coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes are fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class is highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML–CL.

The AASHO system classifies soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups, A–1 to A–7, on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, the best soils for subgrade. At the other extreme, in group A–7, are clay soils that have low strength when wet, the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The estimated AASHO classification, without group index numbers, is given in table 5 for all soils mapped in the survey area.

Estimated properties

Estimates of several soil properties significant in engineering are given in table 5 (*6*). These estimates are made for typical soil profiles by layers sufficiently different to have different significance for engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 5.

Depth to seasonal high water table is the distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Depth to bedrock is the distance from the surface of the soil to the upper surface of rock.

Texture is described in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loam." Some of the terms used on the USDA textural classification are defined in the Glossary.

Permeability is that quality of a soil that enables it to transmit water or air. It is estimated on the basis of soil characteristics observed in the field, particularly structure and texture. The estimates do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed as pH. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content; that is, the extent to which the soil shrinks as it dries out or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-

swell potential indicates a hazard to maintenance of structures built in, on, or of material that has this rating.

Corrosivity, as used in table 5, is potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Corrosion of uncoated steel is related to such soil properties as drainage, texture, total acidity, and electrical conductivity. Ratings of soils for corrosivity of concrete are based mainly on texture and acidity. Installations that intersect soil boundaries or horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one horizon. A corrosivity rating of low indicates a low probability of soil-induced corrosion damage. A rating of high indicates a high probability of damage, so that protective measures for steel and more resistant types of concrete should be used to avoid or minimize damage.

Compaction, or moisture-density, data are important in earthwork. If a soil material is compacted at successively higher moisture content, assuming that the compactive force remains constant, the density of the compacted material increases until the *optimum moisture content* is reached. After that, density decreases with increase in moisture content. The highest dry density obtained in the compactive test is the *maximum dry density.* As a rule, an earthwork is strongest if the soil is compacted to the maximum dry density.

Engineering interpretations

The estimated interpretations in table 6 are based on the engineering properties of the soils shown in table 5, on test data for soils in this survey area and in others nearby, and on the experience of engineers and soil scientists with the soils of Louisa County. Following are explanations of the columns in table 6.

Features affecting winter grading determine the ease with which soils can be moved and crossed by conventional construction equipment during cold weather. Slope, texture, depth to water table, susceptibility to formation of large frozen clods, and the kind and amount of clay affect a soil for winter grading.

Susceptibility to frost action refers to the probable effects on structures of the freezing of soil material and its subsequent thawing. These effects are important mainly in selecting sites for roads, highways, and runways, but they are also important in planning any structure that is supported or abutted by a soil that freezes. The action not only pertains to the heaving of soil as freezing progresses, but also to the excessive wetting and loss of soil strength during thaw.

Road fill is material used in road embankments. The suitability ratings reflect (1) the predicted performance of soil after it has been placed in an embankment that has been properly compacted and adequately drained and (2) the relative ease of excavating the material at borrow areas.

Sand and gravel are used in great quantities in many kinds of construction. The ratings indicate where to look for probable sources. A soil rated as a good or fair source of sand or gravel generally has a layer at least 3 feet thick, the top of which is less than 6 feet deep. The ratings do not take into account thickness of the overburden, location of the water table, or other factors that affect mining of the materials; nor do the ratings indicate quality of the deposit.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material, as for preparing a seedbed; by the natural fertility of the material, or the response of plants to fertilizer; and by the absence of substances toxic to plants. Texture of the soil material and its content of stones affect suitability. Also considered in the ratings is damage that will result in an area from which topsoil is taken.

Pond reservoir areas hold water behind a dam or an embankment. Soils suitable for pond reservoir areas have low seepage, which is related to the permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments and dikes require soil material that is resistant to seepage and piping and that is of favorable stability, shrink-swell potential, shear strength, and compactibility. Stones or organic material in a soil are unfavorable.

Drainage for crops and pasture is affected by permeability, texture, and structure; depth to heavy clay, rock, or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; availability of outlets for drainage; and other properties.

Irrigation of a soil is affected by slope, susceptibility to stream overflow, hazard of water erosion or soil blowing, texture, content of stones, depth of root zone, rate of water intake at the surface, permeability of soil layers below the surface layer and in fragipans or other layers that restrict movement of water, available water capacity, need for drainage, depth to water table or bedrock, and other features.

Terraces and diversions are embankments, or ridges, constructed across the slope to intercept runoff and seepage so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for terraces and diversions provides outlets for runoff and is not difficult to vegetate.

Layout and construction of *grassed waterways* are affected by such soil properties as texture, depth, and erodibility of the soil material; presence of stones or rock outcrops; and slope. Other factors that affect waterways are seepage, natural drainage, available water capacity, susceptibility to siltation, and ease of establishing and maintaining vegetation.

Town and country planning

This section was prepared chiefly for planners, developers, landscape architects, builders, zoning officials, realtors, landowners, and others interested in

TABLE 5.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such to other series that appear in the first column of this table.

Soil series and map symbols	Depth to—		Depth from surface	Classification—			Coarse fraction more than 3 inches in diameter
	Seasonal high water table	Bedrock		USDA texture	Unified	AASHO	
	Ft	*Ft*	*In*				*Pct*
Abell: AbB, AcB	2–3½	>4	0–9	Fine sandy loam	SM or ML	A–4	0
			9–38	Sandy clay loam, clay loam.	SC or CL	A–6	0
			38–50	Sandy loam	SM	A–2 or A–4	0
Abell, dark surface variant: AeB	3–4	>5	0–11	Loam	ML or CL	A–4	0
			11–45	Clay loam	CL	A–6	0
			45–60	Sandy loam	SM	A–2 or A–4	0
Altavista: AlB	2–3	>5	0–12	Fine sandy loam	SM or ML	A–2, A–4	0
			12–47	Sandy clay loam, clay loam.	SC or CL	A–4 or A–6	0
			47–64	Sandy loam	SM	A–2	2–7
*Appling: AnB2, AnC2, ApB3, ArC3	>5	>5	0–9	Sandy loam	SM	A–2 or A–4	0
			9–57	Clay	MH or CH	A–7	0
For Wedowee part of ArC3, see Wedowee series.			57–80	Sandy loam	SM	A–2 or A–4	0
*Ashlar: AsB, AsC, AsC3, AsD, AsD3, AV.	>5	2–3½	0–18	Sandy loam	SM	A–2 or A–4	0
For Manteo part of AV, see Manteo series. Rock outcrop part of AV too variable to estimate.			18–34	Sandy loam	SM or SP-SM	A–2	0–4
			34	Bedrock.			
*Cecil: CcB2, CcC2, CeB3, CfC3	>5	>5	0–6	Sandy loam	SM	A–2 or A–4	0
			6–48	Clay	MH or CH	A–7	0
For Pacolet part of CfC3, see Pacolet series.	2		48–62	Sandy loam	SM	A–2 or A–4	0
Chewacla: Ch	[2] 1–2	>5	0–25	Silt loam	ML or CL	A–4	0
			25–48	Silty clay loam	ML or CL	A–6 or A–7	0
			48–52	Sandy loam	SM or SC	A–2 or A–4	0
Colfax: ClB	1–1½ (perched)	>4	0–11	Fine sandy loam	SM or ML	A–4	0
			11–28	Fine sandy loam, sandy clay loam.	SM, SC, or CL	A–4 or A–6	0
			28–50	Sandy loam, sandy clay loam (fragipan).	SM, SC, or CL	A–2, A–4, or A–6	0
			50–62	Sandy loam	SM or SC	A–2 or A–4	0
*Congaree: Cn, CO	[2] >4	>5	0–34	Silt loam	ML or CL	A–4	0
For Chewacla part of CO, see Chewacla series.			34–44	Very fine sandy loam.	ML or ML-CL	A–4	0
			44–58	Silt loam	ML or CL	A–4	0
Cullen: CuB2, CuC2, CwB3, CwC3	>5	>5	0–6	Loam	ML or CL	A–4 or A–6	0
			6–54	Clay	CH	A–7	0
			54–78	Sandy loam	SM	A–2 or A–4	0
Cut and fill land. Properties too variable to estimate.							
Durham: DuB	>5	>5	0–19	Fine sandy loam, sandy loam.	SM or ML-CL	A–2 or A–4	0
			19–46	Sandy clay loam	SM or CL	A–6	0
			46–54	Sandy loam	SM or SC	A–2 or A–4	0
Elbert: Eb	0–1	>3½	0–5	Silt loam	ML or CL	A–4 or A–6	0
			5–52	Clay	CH	A–7	0
			52–61	Sandy loam	SC	A–2	0

significant in engineering

mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring
The symbol < means less than; the symbol > means more than]

Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential		Optimum moisture content	Maximum dry density
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)					Uncoated steel	Concrete		
				In per hr	*In per in of soil*	*pH*				*Pct*	*Lb per cu ft*
100	100	70–85	40–55	0.6–6.0	0.10–0.15	6.1–6.5	Low	(1)	Moderate	10–16	115–125
100	100	80–100	36–80	0.6–2.0	0.13–0.19	4.5–6.0	Moderate	High	Moderate to high.	12–20	100–125
100	100	60–70	30–40	0.6–6.0	0.08–0.12	5.1–5.5	Low	High	High	10–14	115–130
100	100	85–95	60–75	0.6–6.0	0.14–0.17	6.1–6.5	Low	(1)	Low	12–18	110–125
100	100	90–100	70–80	0.6–2.0	0.16–0.19	5.1–6.0	Moderate	High	Moderate	16–20	100–115
100	100	60–70	30–40	2.0–6.0	0.08–0.12	5.1–5.5	Low	High	High	10–14	115–130
95–100	90–100	60–85	35–55	2.0–6.0	0.10–0.15	5.1–6.0	Low	(1)	Moderate to high.	10–16	115–125
95–100	90–100	70–100	40–80	0.6–2.0	0.13–0.19	5.1–5.5	Low to moderate.	Moderate	Moderate	12–20	100–125
85–95	80–90	45–55	20–30	2.0–6.0	0.08–0.12	5.6–6.0	Low	Moderate	Moderate	10–14	115–130
80–100	75–100	45–70	20–40	2.0–6.0	0.06–0.12	4.5–5.5	Low	(1)	High	10–14	115–130
80–100	75–100	70–100	55–95	0.6–2.0	0.08–0.14	5.1–5.5	Moderate	High	Moderate	18–25	90–110
80–100	75–100	45–70	20–40	0.6–6.0	0.06–0.12	5.1–5.5	Low	High	High	10–14	115–130
85–100	60–100	35–70	20–40	2.0–6.0	0.06–0.12	5.1–6.0	Low	Low	Moderate to high.	10–14	115–130
65–95	50–90	30–60	10–35	2.0–6.0	0.05–0.12	4.5–5.0	Low	Low	High	10–14	115–130
95–100	75–100	45–70	20–40	2.0–6.0	0.06–0.12	5.1–5.5	Low	(1)	High	10–14	115–130
95–100	75–100	70–100	55–95	0.6–2.0	0.08–0.14	5.1–5.5	Moderate	High	Moderate	18–25	90–110
90–100	75–100	45–70	20–40	2.0–6.0	0.06–0.12	5.1–5.5	Low	High	High	10–14	115–130
100	100	90–100	70–90	0.6–2.0	0.17–0.20	5.6–6.0	Low	High	Moderate	14–22	100–110
100	100	95–100	85–95	0.6–2.0	0.16–0.19	5.1–6.0	Moderate	High	Moderate	18–24	95–105
100	100	60–70	30–40	2.0–6.0	0.06–0.10	5.6–6.0	Low	High	Moderate	10–14	115–130
100	100	70–85	40–55	2.0–6.0	0.08–0.15	6.1–6.5	Low	(1)	Moderate	10–16	115–125
100	100	70–90	36–55	0.6–2.0	0.08–0.16	4.5–5.5	Low	High	Moderate to high.	10–18	110–125
100	100	60–90	30–55	0.06–0.2	0.04–0.08	4.5–5.0	Low	High	High	10–18	110–125
100	95–100	55–70	25–40	0.6–2.0	0.08–0.12	4.5–5.0	Low	High	High	10–14	115–130
100	100	90–100	70–90	0.6–2.0	0.17–0.20	5.6–6.5	Low	Low	Low to moderate.	14–22	100–110
100	100	85–95	51–65	0.6–2.0	0.15–0.18	5.6–6.0	Low	Low	Moderate	10–16	115–125
100	100	90–100	70–90	0.6–2.0	0.17–0.20	5.6–6.0	Low	Low	Moderate	14–22	100–110
100	100	85–95	60–75	2.0–6.0	0.14–0.17	5.1–5.5	Low	(1)	Moderate	12–18	110–125
100	100	90–100	75–95	0.6–2.0	0.10–0.14	5.1–6.0	Moderate	High	Moderate	18–25	90–110
100	100	60–70	30–40	0.6–6.0	0.08–0.12	5.6–6.0	Low	High	Moderate	10–14	115–130
100	100	60–85	30–55	2.0–6.0	0.08–0.15	5.1–6.0	Low	Low	Moderate to high.	10–16	115–130
100	100	80–90	36–55	0.6–2.0	0.13–0.16	4.5–5.0	Moderate	Low	High	12–18	110–125
100	100	60–70	30–40	2.0–6.0	0.08–0.12	4.5–5.0	Low	Low	High	10–14	115–130
100	100	90–100	70–90	2.0–6.0	0.17–0.20	4.5	Low	(1)	High	14–22	100–110
100	100	90–100	75–95	<0.06	0.10–0.14	4.5–7.3	High	High	Low to high	25–35	80–95
90–95	80–90	50–60	25–35	0.6–2.0	0.08–0.12	7.4–7.8	Low	High	Low	10–14	115–130

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Classification—			Coarse fraction more than 3 inches in diameter
	Seasonal high water table	Bedrock		USDA texture	Unified	AASHO	
	Ft	*Ft*	*In*				*Pct*
Enon	>5	>4	0–6	Loam	ML or CL	A–4 or A–6	0
			6–38	Clay	MH or CH	A–7	0–6
Mapped only in complexes with Mecklenburg soils.			38–52	Clay loam	ML or CL	A–6	4–10
Fluvanna: FlB2, FlC2	>5	>5	0–9	Fine sandy loam, loam.	SM or ML	A–2 or A–4	0
			9–35	Clay	MH or CH	A–7	0
			35–54	Silty clay loam	ML or CL	A–6 or A–7	0
Fluvaquents: FN. Properties too variable to estimate.							
Forestdale: Fo	[2] 0–1	>5	0–8	Silt loam	ML or CL	A–4	0
			8–55	Clay	MH or CH	A–7	0
			55–62	Sandy clay loam	SC or CL	A–6	0
Fork: FrB	1–2	>5	0–9	Fine sandy loam	SM or ML	A–4	0
			9–52	Clay loam, sandy clay loam.	SC or CL	A–2, A–4, or A–6	0
			52–64	Silty clay loam	ML or CL	A–6	2–8
Grover: GrB2, GrC2, GvB3, GvC3	>5	>5	0–6	Sandy loam	SC or SM	A–2 or A–4	0
			6–33	Sandy clay loam, clay loam.	SC or MH	A–6 or A–7	0
			33–62	Sandy loam	SC or SM	A–2, A–4, or A–5	0
Iredell: IdB, IdB2, IdC2, IrA, IrB	1–2½	3½–5+	0–11	Loam	ML or CL	A–4 or A–6	0
			11–27	Clay	CH	A–7	0
			27–60	Fine sandy loam	SM or ML	A–4	0
Iredell, silty subsoil variant: Iv	1–2½	3½–5+	0–12	Silt loam	ML or CL	A–4	0
			12–28	Silty clay loam	ML or CL	A–6 or A–7	0
			28–48	Clay	CH	A–7	0
			48–56	Sandy clay loam	SM or ML	A–4	0
Lignum: LgB	1–2	>4	0–8	Loam	ML or CL	A–4 or A–6	0
			8–17	Silty clay loam	ML or CL	A–6 or A–7	0
			17–43	Clay	MH	A–7	0
			43–52	Silt loam	ML or CL	A–4 or A–6	0
Madison: MaB2, MaC2, MdB3, MdC3	>5	>5	0–5	Sandy loam	SC or SM	A–2 or A–4	0
			5–24	Clay	MH	A–7	0
			24–72	Sandy loam	SC or SM	A–2 or A–4	0
Manteo: MnB, MnC, MnD, MnE, MoC, MoD.	>5	1–1½	0–16	Channery silt loam	ML or CL	A–4	15–25
			16–20	Very channery silt loam.	ML or CL	A–4	25–40
Masada: MsB2, MsC2	>5	>5	0–10	Fine sandy loam	SM or SC	A–2 or A–4	0
			10–48	Clay	MH or CH	A–7	0
			48–54	Extremely gravelly clay loam.	SW–SC or SC	A–2	5–10
*Mecklenburg: MuB2, MuC2, MvC3	>5	>4	0–6	Loam	ML or CL	A–4 or A–6	0
			6–38	Clay	MH or CH	A–7	0
For Enon part of MuB2, MuC2, and MvC3, see Enon series.			38–72	Sandy loam	SM or SC	A–2 or A–4	0
Mine dump. Properties too variable to estimate.							

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential		Optimum moisture content	Maximum dry density
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)					Uncoated steel	Concrete		
				In per hr	*In per in of soil*	*pH*				*Pct*	*Lb per cu ft*
100	100	85–95	60–75	2.0–6.0	0.14–0.17	6.6–7.3	Low	(1)	Low	12–18	110–125
100	100	90–100	75–95	0.06–0.2	0.10–0.14	5.1–6.5	High	High	Low to moderate.	18–25	90–110
100	100	90–100	70–80	0.2–0.6	0.16–0.19	5.1–5.5	Moderate	High	Moderate	16–20	100–115
95–100	80–100	55–95	30–75	2.0–6.0	0.10–0.17	4.5–5.0	Low	(1)	High	10–18	110–125
95–100	80–100	70–100	60–95	0.6–2.0	0.10–0.14	4.5–5.5	Moderate	High	Moderate to high.	18–25	90–110
95–100	80–100	75–100	65–95	0.6–2.0	0.16–0.19	4.5–5.0	Moderate	High	High	18–24	95–105
100	100	90–100	70–90	0.6–2.0	0.17–0.20	4.5–5.0	Low	(1)	High	14–22	100–110
100	100	90–100	75–95	<0.06	0.10–0.14	4.5–6.0	High	High	Moderate to high.	25–35	80–95
100	100	80–90	36–55	0.2–0.6	0.13–0.16	6.1–6.5	Moderate	High	Low	12–18	110–125
100	95–100	65–85	36–55	2.0–6.0	0.10–0.15	4.5–5.0	Low	(1)	High	10–16	115–125
100	95–100	75–100	30–80	0.6–2.0	0.13–0.19	4.5–6.5	Moderate	High	Low to high	12–20	100–125
90–100	75–85	70–80	65–75	0.6–2.0	0.14–0.19	6.6–7.3	Moderate	High	Low	18–24	95–105
100	100	60–70	30–40	>6.0	0.08–0.12	6.1–6.5	Low	(1)	Moderate	10–14	115–130
100	100	80–100	36–80	0.6–2.0	0.13–0.19	5.1–6.0	Low	Moderate	Moderate	12–20	100–125
100	100	60–70	30–40	2.0–6.0	0.08–0.12	4.5–5.0	Low	Moderate	High	10–14	115–130
100	100	85–95	60–75	2.0–6.0	0.14–0.17	5.6–6.5	Low	(1)	Moderate	12–18	110–125
100	100	90–100	75–95	0.06–0.2	0.10–0.14	6.1–7.3	High	High	Low	25–35	80–95
100	100	70–85	40–55	0.2–0.6	0.10–0.15	6.6–7.3	Low	High	Low	10–16	115–125
100	100	90–100	70–90	2.0–6.0	0.17–0.20	5.6–6.5	Low	(1)	Moderate	14–22	100–110
100	100	95–100	85–95	0.6–2.0	0.16–0.19	5.6–6.0	Moderate	High	Moderate	18–24	95–105
100	100	90–100	75–95	0.06–0.2	0.10–0.14	5.6–6.0	High	High	Moderate	25–35	80–95
100	100	80–90	36–55	0.2–0.6	0.13–0.16	6.6–7.3	Moderate	High	Low	12–18	110–125
95–100	80–100	65–95	51–75	0.6–2.0	0.14–0.17	4.5–5.0	Low	(1)	High	12–18	110–125
95–100	80–100	75–100	65–95	0.2–0.6	0.16–0.19	4.5–5.0	Moderate	High	High	18–24	95–105
95–100	80–100	70–100	60–95	0.06–0.6	0.10–0.14	4.5–5.0	Moderate	High	High	18–25	90–110
95–100	80–100	70–100	55–90	0.2–0.6	0.17–0.20	4.5–5.0	Low	High	High	14–22	100–110
100	100	60–70	30–40	>6.0	0.08–0.12	4.5–5.0	Low	(1)	High	10–14	115–130
100	100	90–100	75–95	0.6–2.0	0.10–0.14	4.5–5.0	Moderate	High	High	18–25	90–110
100	100	60–70	30–40	2.0–6.0	0.08–0.12	4.5–5.0	Low	High	High	10–14	115–130
95–100	90–100	80–100	60–90	2.0–6.0	0.10–0.16	4.5–5.0	Low	Low	High	14–22	100–110
95–100	80–90	70–85	55–80	2.0–6.0	0.07–0.13	4.5–5.0	Low	Low	High	14–22	100–110
90–95	70–90	50–75	30–50	2.0–6.0	0.08–0.15	6.1–6.5	Low	(1)	Moderate	10–16	115–125
90–95	70–90	60–85	51–80	0.6–2.0	0.08–0.14	5.1–5.5	Moderate	High	Moderate	18–25	90–110
70–85	20–50	15–45	10–35	0.6–2.0	0.06–0.12	5.1–5.5	Moderate	High	Moderate	16–20	100–115
100	100	85–95	60–75	2.0–6.0	0.14–0.17	6.1–6.5	Low	(1)	Low	12–18	110–125
100	100	90–100	75–95	0.06–0.2	0.10–0.14	5.1–6.0	High	High	Moderate	18–25	90–110
100	100	60–70	30–40	0.6–2.0	0.08–0.12	5.1–5.5	Low	High	High	10–14	115–130

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Classification—			Coarse fraction more than 3 inches in diameter
	Seasonal high water table	Bedrock		USDA texture	Unified	AASHO	
	Ft	*Ft*	*In*				*Pct*
Nason: NaD2, NoB2, NoC2, NsB3, NsC3.	>5	>4	0–14	Silt loam	ML or CL	A–4 or A–6	0–2
			14–48	Silty clay	MH	A–7	0
			48–62	Silt loam	ML or CL	A–4 or A–6	0
*Orange: OrB, OxB	1½–2½	3½–5	0–7	Silt loam	ML or CL	A–4 or A–6	0
For Poindexter part of OxB, see Poindexter series.			7–41	Clay	CH	A–7	0
			41–46	Sandy loam	SM or SC	A–2 or A–4	0
*Pacolet: PaB2, PaC2, PaD2, PcD3	>5	>5	0–6	Sandy loam	SM or SC	A–2 or A–4	0
For Cecil parts of PaB2, PaC2, PaD2, and PcD3, see Cecil series.			6–32	Clay loam, clay	MH or CH	A–7	0
			32–70	Sandy clay loam	SC or CL	A–6	0
Poindexter: PxB, PxC, PxC3, PxD	>5	2–5	0–14	Loam	ML or CL	A–4 or A–6	0
			14–26	Clay loam, silty clay loam.	CL	A–6	0
			26–40	Fine sandy loam	SC or CL	A–2 or A–4	0
Quarry. Properties too variable to estimate.							
Roanoke: RoB	0–1	>5	0–10	Silt loam	ML or CL	A–4 or A–6	0
			10–50	Clay, silty clay loam.	MH	A–7	0
			50–57	Silt loam	ML or CL	A–4 or A–6	0
Rock outcrop. Properties too variable to estimate. Mapped only in complexes with Ashlar, Manteo, Poindexter, and Sekil soils.							
*Sekil: SeB, SeC, SeC3, SeD, SeE, SP	>5	2–3½	0–14	Sandy loam	SC or SM	A–2 or A–4	0
For Poindexter part of SP, see Poindexter series. Rock outcrop part of SP too variable to estimate.			14–37	Gravelly sandy loam	SM	A–2	2–10
Tatum: TaB2, TaC2, TaD2, TmB3, TmC3, TmD3.	>5	>4	0–11	Silt loam	MC or CL	A–4 or A–6	0
			11–42	Silty clay, silty clay loam.	MH	A–7	0
			42–62	Silt loam	ML or CL	A–4 or A–6	0
Toccoa: To, Ts	[2] >4	>5	0–54	Fine sandy loam	SM or ML	A–4	0
			54–72	Very fine sandy loam.	SP-SM or SM	A–2	0–10
Turbeville: TuB	>5	>5	0–12	Fine sandy loam	SM or ML	A–4 or A–2	0
			12–64	Clay	MH	A–7	0
			64–72	Very gravelly clay loam.	SC	A–2 or A–4	10–20
*Wedowee: WaB2, WaC2, WaD2, WdD3.	>5	>5	0–11	Sandy loam	SC or SM	A–2 or A–4	0
For Appling parts of WaB2, WaC2, WaD2, and WdD3, see Appling series.			11–30	Sandy clay loam, clay loam.	SC or CL	A–2 or A–6	0
			30–42	Sandy clay loam	SC or CL	A–2 or A–4	0
*Wehadkee: We, WH	[2] 0–1	>5	0–18	Silt loam	ML or CL	A–4	0
For Chewacla part of WH, see Chewacla series.			18–52	Silty clay loam	ML or CL	A–6 or A–7	0
			52	Sand, silt, gravel.			
Wickham: WkB	>5	>5	0–7	Fine sandy loam	SM or ML	A–4	0
			7–52	Sandy clay loam, clay loam.	SC or CL	A–6	0
			52–72	Fine sandy loam	SM or ML	A–4	0

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential		Optimum moisture content	Maximum dry density
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)					Uncoated steel	Concrete		
				In per in	*In per in of soil*	*pH*				*Pct*	*Lb per cu ft*
95–100	70–100	65–100	50–90	2.0–6.0	0.14–0.20	4.5–5.0	Low	(1)	High	14–22	100–110
95–100	70–100	65–100	60–95	0.6–2.0	0.10–0.15	4.5–5.0	Moderate	High	High	20–25	90–100
95–100	70–100	60–100	50–90	0.6–2.0	0.14–0.20	4.5–5.0	Low	High	High	14–22	100–110
100	100	90–100	70–90	2.0–6.0	0.17–0.20	4.5–5.5	Low	(1)	Moderate	14–22	100–110
100	100	90–100	75–90	0.06–0.2	0.10–0.14	5.1–6.0	High	High	Moderate	25–35	80–95
100	100	60–70	30–40	0.6–2.0	0.08–0.12	5.6–6.0	Low	High	Moderate	10–14	115–130
100	100	60–70	30–40	>6.0	0.08–0.12	5.1–5.5	Low	(1)	High	10–14	115–130
100	100	90–100	70–95	0.6–2.0	0.10–0.19	5.1–6.0	Moderate	High	Moderate	16–25	90–115
100	100	80–90	36–55	0.6–2.0	0.13–0.16	5.1–5.5	Low	High	Moderate	12–18	110–125
95–100	80–100	70–95	51–75	2.0–6.0	0.12–0.17	5.6–6.0	Low	(1)	Moderate	12–18	110–125
95–100	80–100	70–100	55–95	0.6–2.0	0.13–0.19	5.6–6.5	Moderate	Moderate	Low to moderate.	16–24	95–115
95–100	80–100	55–85	30–55	2.0–6.0	0.08–0.15	6.6–7.3	Low	Moderate	Low	10–16	115–125
100	100	90–100	70–90	2.0–6.0	0.17–0.20	4.5–5.0	Low	(1)	High	14–22	100–110
100	100	90–100	75–95	0.06–0.2	0.10–0.19	4.5–5.0	High	High	High	18–25	90–110
100	100	90–100	70–90	0.2–0.6	0.17–0.20	4.5–5.0	Low	High	High	14–22	100–110
100	100	60–70	30–40	2.0–6.0	0.08–0.12	4.5–6.0	Low	Low	Moderate to high.	10–14	115–130
90–95	60–70	35–70	20–30	2.0–6.0	0.06–0.10	5.6–6.0	Low	Low	Moderate	10–14	115–130
95–100	70–100	60–100	50–90	2.0–6.0	0.14–0.20	4.5–5.0	Low	(1)	High	14–22	100–110
95–100	70–100	65–100	60–95	0.6–2.0	0.10–0.19	4.5–5.0	Moderate	High	High	18–25	90–105
95–100	70–100	60–100	50–90	0.6–2.0	0.14–0.20	4.5–5.0	Low	High	High	14–22	100–110
100	100	70–85	40–55	2.0–6.0	0.10–0.15	5.6–6.0	Low	Low	Moderate	10–16	115–125
40–70	25–50	20–45	10–30	2.0–6.0	0.06–0.12	5.6–6.0	Low	Low	Moderate	10–16	115–125
95–100	85–100	60–85	35–55	2.0–6.0	0.10–0.15	5.6–6.0	Low	(1)	Moderate	10–16	115–125
95–100	85–100	75–100	65–95	0.6–2.0	0.10–0.14	5.1–5.5	Moderate	High	Moderate	18–25	90–110
85–95	25–50	20–50	15–40	0.6–2.0	0.06–0.12	5.1–5.5	Moderate	High	Moderate	16–20	100–115
95–100	80–100	50–70	25–40	>6.0	0.07–0.12	5.1–6.0	Low	(1)	Moderate to high.	10–14	115–130
95–100	80–100	65–100	30–80	0.6–2.0	0.11–0.19	5.1–5.5	Moderate	Moderate	Moderate	12–20	100–125
95–100	80–100	65–90	30–55	0.6–2.0	0.11–0.16	5.1–5.5	Moderate	Moderate	Moderate	12–18	110–125
100	100	90–100	70–90	2.0–6.0	0.17–0.20	5.6–6.5	Low	High	Moderate	14–22	100–110
100	100	95–100	85–95	0.6–2.0	0.16–0.19	5.6–6.5	Moderate	High	Moderate	18–24	95–105
100	100	70–85	40–55	>6.0	0.10–0.15	5.6–6.0	Low	(1)	Moderate	10–16	115–125
100	100	80–100	36–80	0.6–2.0	0.13–0.19	5.1–6.0	Moderate	Moderate	Moderate	12–20	100–125
100	100	70–85	40–55	2.0–6.0	0.10–0.15	5.1–5.5	Low	Moderate	Moderate	10–16	115–125

TABLE 5.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	Classification—			Coarse fraction more than 3 inches in diameter
	Seasonal high water table	Bedrock		USDA texture	Unified	AASHO	
	Ft	*Ft*	*In*				*Pct*
Worsham: WoB	0–1	>5	0–8	Fine sandy loam	SM or ML	A–4	0
			8–57	Clay, sandy clay loam.	MH, SC, or CL	A–6 or A–7	0
			57–69	Sandy loam	SM or SC	A–2 or A–4	0
York: YoB	1½–2½	>5	0–11	Silt loam	ML or CL	A–4	0
			11–26	Silty clay loam	CL	A–6 or A–7	0
			26–32	Silt loam (fragipan)	ML or CL	A–4	0
			32–45	Clay loam, silt loam.	ML or CL	A–4 or A–6	0
Zion: ZoB, ZoB2, ZoC2	>5	2–3½	0–7	Loam	ML or CL	A–4 or A–6	0
			7–18	Clay loam, very gravelly clay loam.	SC or CL	A–2, A–6, or A–7	0
			18–27	Clay	MH or CH	A–7	0
			27–36	Sandy loam	SC or SM	A–2	0

[1] Corrosion potential is estimated only for the horizons in which conduits are likely to be buried.

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential		Optimum moisture content	Maximum dry density
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)					Uncoated steel	Concrete		
				In per hr	*In per in of soil*	*pH*				*Pct*	*Lb per cu ft*
100	100	70–85	40–55	2.0–6.0	0.10–0.15	5.1–5.5	Low	(1)	Moderate	10–16	115–125
100	100	80–100	36–95	0.06–0.2	0.10–0.16	5.1–5.5	High	High	Moderate	12–25	90–125
100	100	60–70	30–40	0.2–0.6	0.08–0.12	5.1–5.5	Low	High	Moderate	10–14	115–130
95–100	85–100	75–100	60–90	2.0–6.0	0.17–0.20	4.5–5.0	Low	(1)	High	14–22	100–110
95–100	85–100	75–100	75–95	0.6–2.0	0.16–0.19	5.1–5.5	Low	High	Moderate	18–24	95–105
95–100	85–100	75–100	60–90	0.2–0.6	0.12–0.15	5.1–5.5	Low	High	Moderate	14–22	100–110
95–100	85–100	75–100	60–95	0.2–0.6	0.16–0.20	5.1–5.5	Low	High	Moderate	14–22	100–115
95–100	85–100	75–95	51–75	0.6–2.0	0.14–0.17	6.6–7.3	Low	(1)	Low	12–18	110–125
95–100	40–90	35–90	30–70	0.6–2.0	0.08–0.16	6.1–6.5	Moderate	High	Low	16–20	100–115
95–100	80–100	75–100	60–95	0.06–0.2	0.10–0.14	5.6–6.5	High	High	Low to moderate.	18–25	90–110
95–100	80–95	50–65	25–35	0.6–2.0	0.08–0.12	6.1–6.5	Low	High	Low	10–14	115–130

[1] Subject to flooding.

TABLE 6.—*Interpretations of*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of more than one kind of soil. The soils in referring to other series that appear

Soil series and map symbols	Features affecting winter grading	Susceptibility to frost action	Suitability as source of—		
			Road fill	Sand and gravel	Topsoil
Abell: AbB, AcB	Fair trafficability; seasonal high water table; high moisture content.	High: seasonal high water table; high moisture content.	Fair: excessive clay and silt; moderate shrink-swell potential.	Unsuited	Fair in upper 24 inches.
Abell, dark surface variant: AeB.	Fair trafficability; seasonal high water table; high moisture content.	High: seasonal high water table; high moisture content.	Fair: excessive clay and silt; moderate shrink swell potential.	Unsuited	Fair in upper 24 inches.
Altavista: AlB	Fair trafficability; seasonal high water table; high moisture content.	High: seasonal high water table; high moisture content.	Fair: excessive clay and silt; moderate shrink-swell potential.	Poor: sand and gravel below a depth of 3½ feet in places.	Fair in upper 24 inches.
*Appling: AnB2, AnC2, ApB3, ArC3. For Wedowee part of ArC3, see Wedowee series.	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair: clayey subsoil; moderate shrink-swell potential; slope.	Unsuited	Poor: reclamation of borrow area difficult.
*Ashlar: AsB, AsC, AsC3, AsD, AsD3, AV. For Manteo part of AV, see Manteo series. Rock outcrop part of AV too variable to interpret.	Good trafficability; low plasticity, low moisture content.	Moderate to low: low moisture content.	Poor: rock at a depth of 2 to 3½ feet; slope.	Unsuited	Poor: reclamation of borrow area difficult; rock at a depth of 2 to 3½ feet; slope.
*Cecil: CcB2, CcC2, CeB3, CfC3. For Pacolet part of CfC3, see Pacolet series.	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair: clayey subsoil; moderate shrink-swell potential; slope.	Unsuited	Poor: reclamation of borrow area difficult.
Chewacla: Ch	Poor trafficability; seasonal high water table; high moisture content.	High: seasonal high water table; high moisture content.	Fair: excessive clay and silt; moderate shrink-swell potential; somewhat poorly drained.	Poor: sand and gravel below a depth of 4 feet in places.	Good in upper 25 inches.
Colfax: ClB	Poor trafficability; seasonal high water table; high moisture content; fragipan.	High: seasonal high water table; high moisture content.	Fair: excessive clay and silt; somewhat poorly drained.	Unsuited	Poor: reclamation of borrow area difficult; fragipan.
*Congaree: Cn, CO For Chewacla part of CO, see Chewacla series.	Fair trafficability; high moisture content.	High: high moisture content.	Poor: excessive clay and silt.	Poor: sand and gravel below a depth of 5 feet in places.	Good in upper 36 inches.

engineering properties of the soils

such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for in the first column of this table]

Soil features affecting—					
Impoundments		Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Pond reservoir areas	Embankments and dikes				
Seasonal high water table; moderate permeability.	Medium to low strength, compressibility, and permeability; medium susceptibility to piping; fair to good compaction.	Moderately well drained; moderate permeability.	Medium available water capacity; moderate intake rate; seasonal high water table.	Short slopes	Moderately well drained.
Seasonal high water table; moderate permeability.	Medium to low strength, compressibility, and permeability; medium susceptibility to piping; fair to good compaction.	Moderately well drained; moderate permeability.	High available water capacity; moderate intake rate; seasonal high water table.	Short slopes	Moderately well drained.
Seasonal high water table; moderate permeability.	Low to medium strength, compressibility, and permeability; medium susceptibility to piping; fair to good compaction.	Moderately well drained; moderate permeability.	Medium available water capacity; moderate intake rate; seasonal high water table.	All features favorable.	Moderately well drained.
Moderate permeability.	Low to medium strength; medium to high compressibility; low permeability; low to medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible on slopes.
Moderately rapid permeability; rock at a depth of 2 to 3½ feet.	Medium to low strength, compressibility, and permeability; medium to high susceptibility to piping; fair to good compaction.	Well drained to excessively drained.	Low available water capacity; rapid intake rate; rock at a depth of 2 to 3½ feet; slope; erodible.	Moderately rapid permeability; rock at a depth of 2 to 3½ feet; slope.	Not applicable.
Moderate permeability.	Low to medium strength; medium to high compressibility; low permeability; low to medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible on slopes.
Seasonal high water table; moderate permeability.	Low to medium strength, compressibility, and permeability; medium to high susceptibility to piping; fair compaction.	Somewhat poorly drained; moderate permeability; flooding.	High available water capacity; moderate intake rate; flooding.	Not applicable	Somewhat poorly drained; seepage; flooding; siltation of channels.
Seasonal high water table; slow permeability; fragipan.	Low to medium strength, compressibility, and permeability; medium susceptibility to piping; fair to good compaction.	Somewhat poorly drained; slow permeability; fragipan.	Low available water capacity; moderate intake rate; fragipan.	Not applicable	Somewhat poorly drained; low available water capacity; fragipan.
Moderate permeability.	Medium to low strength; compressibility, and permeability; medium to high susceptibility to piping; fair compaction.	Well drained; flooding.	High available water capacity; moderate intake rate; flooding.	Not applicable	Flooding; siltation of channels.

TABLE 6.—*Interpretations of*

Soil series and map symbols	Features affecting winter grading	Susceptibility to frost action	Suitability as source of—		
			Road fill	Sand and gravel	Topsoil
Cullen: CuB2, CuC2, CwB3, CwC3.	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Poor: reclamation of borrow area difficult.
Cut and fill land. Properties too variable to interpret.					
Durham: DuB	Fair trafficability; moderate moisture content.	Moderate: moderate moisture content.	Fair: moderate shrink-swell potential.	Unsuited	Good in upper 19 inches.
Elbert: Eb	Poor trafficability; seasonal high water table; plastic, clayey subsoil; high moisture content; ponding.	High: seasonal high water table; high moisture content.	Poor: plastic, clayey subsoil; high shrink-swell potential; somewhat poorly drained to poorly drained.	Unsuited	Poor: thin surface layer; somewhat poorly drained to poorly drained.
Enon Mapped only in complexes with Mecklenburg soils.	Poor trafficability; clayey subsoil; high moisture content.	High: high moisture content.	Poor: clayey subsoil; high shrink-swell potential.	Unsuited	Poor: reclamation of borrow area difficult.
Fluvanna: FlB2, FlC2	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Poor: reclamation of borrow area difficult.
Fluvaquents: FN. Properties too variable to interpret.					
Forestdale: Fo	Poor trafficability; seasonal high water table; plastic, clayey subsoil; high moisture content; ponding.	High: seasonal high water table; high moisture content.	Poor: plastic; clayey subsoil; high shrink-swell potential; poorly drained.	Poor: sand and gravel below a depth of 4 feet in places.	Poor: thin surface layer; poorly drained.
Fork: FrB	Poor trafficability; seasonal high water table; high moisture content.	High: seasonal high water table; high moisture content.	Fair: moderate shrink-swell potential; somewhat poorly drained.	Poor: sand and gravel below a depth of 4 feet in places.	Fair in upper 36 inches.
Grover: GrB2, GrC2, GvB3, GvC3.	Good trafficability; moderate moisture content.	Moderate: moderate moisture content.	Fair: excessive clay and silt; micaceous.	Unsuited	Fair in upper 18 inches.

engineering properties of the soils

Soil features affecting—					
Impoundments		Drainage for crops and pasutre	Irrigation	Terraces and diversions	Grassed waterways
Pond reservoir areas	Embankments and dikes				
Moderate permeability.	Medium to low strength; medium to high compressibility; low to medium permeability; low to medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible.
Moderate permeability.	Medium to low strength, compressibility, and permeability; medium susceptibility to piping; fair to good compaction.	Well drained	Medium available water capacity; moderate intake rate.	All features favorable.	Erodible.
Seasonal high water table; very slow permeability; rock at a depth of 3½ feet or more.	Medium to low strength; high compressibility; low permeability; low susceptibility to piping; fair to poor compaction.	Somewhat poorly drained to poorly drained; very slow permeability; ponding.	Not applicable	Not applicable	Somewhat poorly drained to poorly drained; seepage; ponding.
Slow permeability; rock at a depth of 4 feet or more.	Medium to low strength; high compressibility; low permeability; low susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; slow intake rate; erodible.	Slow permeability; rock at a depth of 4 feet or more; clayey subsoil.	Erodible.
Moderate permeability.	Low to medium strength; medium to high compressibility; low to medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; moderate intake rate.	All features favorable.	Erodible.
Seasonal high water table; very slow permeability.	Medium to low strength; high compressibility; low permeability; low susceptibility to piping; fair to poor compaction.	Poorly drained; very slow permeability; ponding.	Not applicable	Not applicable	Poorly drained; ponding.
Seasonal high water table; moderate permeability.	Medium to low strength and compressibility; low permeability; medium to low susceptibility to piping; fair to good compaction.	Somewhat poorly drained; moderate permeability.	Medium available water capacity; moderate intake rate; seasonal high water table.	Not applicable	Somewhat poorly drained.
Moderate permeability.	Medium to low strength and compressibility; low permeability; medium susceptibility to piping; fair to good compaction.	Well drained	Medium available water capacity; moderate intake rate.	All features favorable.	Erodible.

TABLE 6.—*Interpretations of*

Soil series and map symbols	Features affecting winter grading	Susceptibility to frost action	Suitability as source of—		
			Road fill	Sand and gravel	Topsoil
Iredell: IdB, IdB2, IdC2, IrA, IrB.	Poor trafficability; seasonal high water table; plastic, clayey subsoil; high moisture content; ponding where nearly level.	High: seasonal high water table; high moisture content.	Poor: plastic, clayey subsoil; high shrink-swell potential.	Unsuited	Poor: reclamation of borrow area difficult.
Iredell, silty subsoil variant: Iv	Poor trafficability; seasonal high water table; plastic, clayey subsoil; high moisture content; ponding where nearly level.	High: seasonal high water table; high moisture content.	Poor: plastic, clayey subsoil; high shrink-swell potential.	Unsuited	Poor: reclamation of borrow area difficult.
Lignum: LgB	Poor trafficability; seasonal high water table; clayey subsoil; high moisture content.	High: seasonal high water table; high moisture content.	Poor: clayey subsoil.	Unsuited	Poor: thin surface layer; reclamation of borrow area difficult.
Madison: MaB2, MaC2, MdB3, MdC3.	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair: clayey subsoil; moderate shrink-swell potential.	Unsuited	Poor: reclamation of borrow area difficult.
Manteo: MnB, MnC, MnD, MnE, MoC, MoD.	Good trafficability; low plasticity; moderate moisture content.	Moderate: moderate moisture content.	Poor: excessive clay and silt; rock at a depth of 1 to 1½ feet; slope.	Unsuited	Poor: rock at a depth of 1 to 1½ feet; coarse fragments; slope.
Masada: MsB2, MsC2	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair: clayey subsoil; moderate shrink-swell potential.	Poor: sand and gravel below a depth of 4 feet in places.	Poor: thin surface layer; reclamation of borrow area difficult.
*Mecklenburg: MuB2, MuC2, MvC3. For Enon part of MuB2, MuC2, and MvC3, see Enon series.	Poor trafficability; clayey subsoil; high moisture content.	High: high moisture content.	Poor: clayey subsoil; high shrink-swell potential.	Unsuited	Poor: reclamation of borrow area difficult.
Mine dump. Properties too variable to interpret.					
Nason: NaD2, NoB2, NoC2, NsB3, NsC3.	Fair trafficability; clayey subsoil; high moisture content.	High: high moisture content.	Poor: excessive clay and silt.	Unsuited	Fair in upper 12 inches where slopes are less than 15 percent. Poor where slopes are more than 15 percent.

engineering properties of the soils—Continued

Soil features affecting—					
Impoundments		Drainage for crops and pasutre	Irrigation	Terraces and diversions	Grassed waterways
Pond reservoir areas	Embankments and dikes				
Seasonal high water table; slow permeability; rock at a depth of 3½ to 5 feet or more.	Low to medium strength; medium to high compressibility; low permeability; low susceptibility to piping; fair to poor compaction.	Moderately well drained to somewhat poorly drained; slow permeability; ponding where nearly level.	Medium available water capacity; slow intake rate; seasonal high water table.	Slow permeability; rock at a depth of 3½ to 5 feet or more; clayey subsoil.	Erodible where sloping; moderately well drained to somewhat poorly drained; ponding where nearly level.
Seasonal high water table; slow permeability; rock at a depth of 3½ to 5 feet or more.	Low to medium strength; medium to high compressibility; low permeability; low susceptibility to piping; fair to poor compaction.	Moderately well drained; slow permeability; ponding where nearly level.	Medium available water capacity; slow intake rate; seasonal high water table.	Not applicable	Moderately well drained; ponding where nearly level.
Seasonal high water table; moderately slow to slow permeability; rock at a depth of 4 feet or more.	Medium to low strength; medium to high compressibility; low permeability; low to medium susceptibility to piping; fair to poor compaction.	Moderately well drained to somewhat poorly drained; moderately slow to slow permeability.	High available water capacity; moderate to slow intake rate; seasonal high water table.	Moderately slow to slow permeability; rock at a depth of 4 feet or more; clayey subsoil.	Erodible; moderately well drained to somewhat poorly drained.
Moderate permeability.	Low to medium strength; high to medium compressibility; low to medium permeability; medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible.
Moderately rapid permeability; rock at a depth of 1 to 1½ feet; slope.	Medium to low strength, compressibility, and permeability; medium to high susceptibility to piping; fair compaction.	Somewhat excessively drained.	Not applicable	Not applicable	Not applicable.
Moderate permeability.	Low to medium strength; high compressibility; low to medium permeability; low to medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; moderate intake rate.	All features favorable.	Erodible.
Slow permeability; rock at a depth of 4 feet or more.	Medium to low strength; high compressibility; low permeability; low susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; slow intake rate; erodible.	Slow permeability; rock at a depth of 4 feet or more; clayey subsoil.	Erodible.
Moderate permeability; rock at a depth of 4 feet or more.	Low to medium strength; medium to high compressibility; low to medium permeability; low to medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible.

TABLE 6.—*Interpretations of*

Soil series and map symbols	Features affecting winter grading	Susceptibility to frost action	Suitability as source of—		
			Road fill	Sand and gravel	Topsoil
*Orange: OrB, OxB. For Poindexter part of OxB, see Poindexter series.	Poor trafficability; seasonal high water table; plactic, clayey subsoil; high moisture content.	High: seasonal high water table; high moisture content.	Poor: plastic, clayey subsoil; high shrink-swell potential.	Unsuited	Poor: thin surface layer; reclamation of borrow area difficult.
*Pacolet: PaB2, PaC2, PaD2, PcD3. For Cecil part of PaB2, PaC2, PaD2, and PcD3, see Cecil series.	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair: clayey subsoil; moderate shrink-swell potential; slope.	Unsuited	Poor: reclamation of borrow area difficult.
Poindexter: PxB, PxC, PxC3, PxD.	Fair trafficability; moderate moisture content.	Moderate: moderate moisture content.	Fair: excessive clay and silt; moderate shrink-swell potential; rock at a depth of 2 to 5 feet; slope.	Unsuited	Poor: reclamation of borrow area difficult; slope.
Quarry. Properties too variable to interpret.					
Roanoke: RoB	Poor trafficability; seasonal high water table; plastic, clayey subsoil; high moisture content.	High: seasonal high water table; high moisture content.	Poor: plastic, clayey subsoil; high shrink-swell potential; poorly drained.	Poor: sand and gravel below a depth of 4 feet in places.	Poor: poorly drained.
Rock outcrop. Properties too variable to interpret. Mapped only in complexes with Ashlar, Manteo, Poindexter, and Sekil soils.					
*Sekil: SeB, SeC, SeC3, SeD, SeE, SP. For Poindexter part of SP, see Poindexter series. Rock outcrop part of SP too variable to interpret.	Good trafficability; low plasticity; low moisture content.	Moderate to low: low moisture content.	Poor: rock at a depth of 2 to 3½ feet; slope.	Unsuited	Poor: reclamation of borrow area difficult; rock at a depth of 2 to 3½ feet; slope.
Tatum: TaB2, TaC2, TaD2, TmB3, TmC3, TmD3.	Fair trafficability; clayey subsoil; high moisture content.	High: high moisture content.	Poor: excessive clay and silt.	Unsuited	Fair in upper 12 inches where slopes are less than 15 percent. Poor where slopes are more than 15 percent.
Toccoa: To, Ts	Good trafficability; low plasticity; moderate moisture content.	Moderate: moderate moisture content.	Good	Fair	Good in upper 36 inches.

engineering properties of the soils—Continued

Soil features affecting—					
Impoundments		Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Pond reservoir areas	Embankments and dikes				
Seasonal high water table; slow permeability; rock at a depth of 3½ to 5 feet.	Medium to low strength; high compressibility; low permeability; low susceptibility to piping; fair to poor compaction.	Somewhat poorly drained to moderately well drained.	Medium available water capacity; slow intake rate; seasonal high water table.	Slow permeability; rock at a depth of 3½ to 5 feet; clayey subsoil.	Erodible; somewhat poorly drained to moderately well drained.
Moderate permeability.	Low to medium strength; medium to high compressibility; low to medium permeability; low to medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible.
Moderate permeability; rock at a depth of 2 to 5 feet; slope.	Medium strength and compressibility; low to medium permeability; medium to high susceptibility to piping; fair compaction.	Well drained	Low to medium available water capacity; moderate intake rate; rock at a depth of 2 to 5 feet; erodible.	Moderate permeability; rock at a depth of 2 to 5 feet.	Not applicable.
Seasonal high water table; slow permeability.	Low strength; high compressibility; low to medium permeability; low to medium susceptibility to piping; poor compaction.	Poorly drained; slow permeability.	Not applicable	Not applicable	Poorly drained.
Moderately rapid permeability; rock at a depth of 2 to 3½ feet.	Medium to low strength, compressibility, and permeability; medium to high susceptibility to piping; fair to good compaction.	Well drained	Low available water capacity; rapid intake rate; rock at a depth of 2 to 3½ feet; slope; erodible.	Moderately rapid permeability; rock at a depth of 2 to 3½ feet; slope.	Not applicable.
Moderate permeability; rock at a depth of 4 feet or more.	Low to medium strength; medium to high compressibility; low to medium permeability; low to medium susceptibility to piping; fair to poor compaction.	Well drained	High available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible.
Moderately rapid permeability.	Medium strength; low to medium compressibility; medium permeability; medium to high susceptibility to piping; good to fair compaction.	Well drained; flooding.	Low to medium available water capacity; rapid intake rate; flooding.	Not applicable	Low to medium available water capacity; flooding; siltation of channels.

TABLE 6.—*Interpretations of*

Soil series and map symbols	Features affecting winter grading	Susceptibility to frost action	Suitability as source of—		
			Road fill	Sand and gravel	Topsoil
Turbeville: TuB	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair to poor: clayey subsoil; moderate shrink-swell potential.	Poor: gravel below a depth of 5 feet in places.	Fair in upper 12 inches.
*Wedowee: WaB2, WaC2, WaD2, WdD3. For Appling part of WaB2, WaC2, WaD2, and WdD3, see Appling series.	Fair trafficability; clayey subsoil; moderate moisture content.	Moderate: moderate moisture content.	Fair: excessive clay and silt; moderate shrink-swell potential; slope.	Unsuited	Fair in upper 24 inches where slopes are less than 15 percent. Poor where slopes are more than 15 percent.
*Wehadkee: We, WH For Chewacla part of WH, see Chewacla series.	Poor trafficability; seasonal high water table; high moisture content.	High: seasonal high water table; high moisture content.	Poor: excessive clay and silt; poorly drained.	Poor: sand and gravel below a depth of 4 feet in places.	Poor: poorly drained.
Wickham: WkB	Fair trafficability; moderate moisture content.	Moderate: moderate moisture content.	Fair: excessive clay and silt; moderate shrink-swell potential.	Fair: sand below a depth of 4 feet in places.	Good in upper 36 inches.
Worsham: WoB	Poor trafficability; seasonal high water table; clayey subsoil; high moisture content.	High: seasonal high water table; high moisture content.	Poor: clayey subsoil; high shrink-swell potential; poorly drained.	Unsuited	Poor: poorly drained.
York: YoB	Poor trafficability; seasonal high water table; high moisture content; fragipan.	High: seasonal high water table; high moisture content.	Fair: excessive clay and silt.	Unsuited	Poor: reclamation of borrow area difficult; fragipan.
Zion: ZoB, ZoB2, ZoC2	Poor trafficability; clayey subsoil; high moisture content.	High: high moisture content.	Poor: clayey subsoil; high shrink-swell potential; rock at a depth of 2 to 3½ feet.	Unsuited	Poor: reclamation of borrow area difficult.

engineering properties of the soils—Continued

Soil features affecting—					
Impoundments		Drainage for crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Pond reservoir areas	Embankments and dikes				
Moderate permeability.	Low strength; high compressibility; low to medium permeability; medium to low susceptibility to piping; poor compaction.	Well drained	Medium available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible.
Moderate permeability.	Medium to low strength and compressibility; low permeability; medium to low susceptibility to piping; good to fair compaction.	Well drained	Medium available water capacity; moderate intake rate; erodible.	All features favorable.	Erodible.
Seasonal high water table; moderate permeability.	Low to medium strength, compressibility, and permeability; medium to high susceptibility to piping; fair compaction.	Poorly drained; moderate permeability; flooding.	Not applicable	Not applicable	Poorly drained; flooding; siltation of channels.
Moderate permeability.	Medium to low strength; medium compressibility; low permeability; medium to low susceptibility to piping; good to fair compaction.	Well drained	Medium available water capacity; moderate intake rate.	All features favorable.	All features favorable.
Seasonal high water table; slow permeability.	Low to medium strength; medium to high compressibility; low to medium permeability; medium susceptibility to piping; fair to poor compaction.	Poorly drained; slow permeability.	Not applicable	Not applicable	Poorly drained.
Seasonal high water table; moderately slow permeability; fragipan.	Medium to low strength; medium compressibility; low to medium permeability; medium to high susceptibility to piping; fair compaction.	Moderately well drained; moderately slow permeability; fragipan.	Medium available water capacity; slow intake rate; fragipan; erodible.	Moderately slow permeability; fragipan.	Moderately well drained; erodible; fragipan.
Slow permeability; rock at a depth of 2 to 3½ feet.	Low to medium strength; high compressibility; low to medium permeability, low to medium susceptibility to piping; fair to poor compaction.	Well drained	Medium available water capacity; slow intake rate; rock at a depth of 2 to 3½ feet.	Slow permeability; rock at a depth of 2 to 3½ feet; clayey subsoil.	Erodible.

TABLE 7.—*Limitations of the soils*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such
to other series that appear in

Soil series and map symbols	Estimated degree and kinds of limitation for—				
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings [1] (with basements)	Dwellings [1] (without basements)
Abell: AbB, AcB	Moderate: moderately well drained; rock at a depth of 4 feet or more.	Severe: moderate permeability; seepage.	Moderate: moderately well drained.	Moderate: moderately well drained; moderate shrink-swell potential; rock at a depth of 4 feet or more.	Moderate: moderate shrink-swell potential.
Abell, dark surface variant: AeB.	Moderate: moderately well drained.	Severe: moderate permeability; seepage.	Moderate: moderately well drained.	Moderate: moderately well drained; moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
Altavista: AlB	Moderate: moderately well drained; moderate permeability.	Severe: moderate permeability; seepage.	Moderate: moderately well drained.	Moderate: moderately well drained; moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
*Appling: AnB2, ApB3	Moderate: moderate permeability.[2]	Moderate: moderate permeability; slope.[2]	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
AnC2, ArC3 For Wedowee part of ArC3, see Wedowee series.	Moderate: moderate permeability; slope.[2]	Severe: slope [2]	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
*Ashlar: AsB	Severe: rock at a depth of 2 to 3½ feet.	Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet.	Severe: rock at a depth of 2 to 3½ feet.	Severe: rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet.
AsC, AsC3	Severe: rock at a depth of 2 to 3½ feet.	Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet; slope.	Severe: rock at a depth of 2 to 3½ feet.	Severe: rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet; slope.
AsD, AsD3, AV For Manteo part of AV, see Manteo series. Rock outcrop part of AV too variable to interpret.	Severe: rock at a depth of 2 to 3½ feet; slope.	Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet; slope.	Severe: rock at a depth of 2 to 3½ feet; slope.	Severe: rock at a depth of 2 to 3½ feet; slope.	Severe: slope
*Cecil: CcB2, CeB3	Moderate: moderate permeability.	Moderate: moderate permeability; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
CcC2, CfC3 For Pacolet part of CfC3, see Pacolet series.	Moderate: moderate permeability; slope.	Severe: slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
Chewacla: Ch	Severe: somewhat poorly drained; flooding.	Severe: seasonal high water table; moderate permeability; flooding.	Severe: somewhat poorly drained; flooding.	Severe: somewhat poorly drained; seasonal high water table; flooding.	Severe: seasonal high water table; flooding.

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mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring the first column of this table]

Estimated degree and kinds of limitation for—Continued					
Sanitary landfills (trench-type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Severe: moderate permeability; rock at a depth of 4 feet or more; seepage.	Moderate: excessive clay and silt; moderate shrink-swell potential.	Slight	Moderate: moderately well drained; slope.	Slight	Slight.
Severe: moderate permeability; seepage.	Moderate: excessive clay and silt; moderate shrink-swell potential.	Slight	Moderate: moderately well drained; slope.	Slight	Slight.
Severe: seasonal high water table; moderate permeability; seepage.	Moderate: excessive clay and silt; moderate shrink-swell potential.	Slight	Moderate: moderately well drained; slope.	Slight	Slight.
Moderate: clayey subsoil.[2]	Moderate: clayey subsoil; moderate shrink-swell potential.	Moderate: surface layer of sandy loam or sandy clay loam.	Moderate: slope	Slight	Slight.
Moderate: clayey subsoil.[2]	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: surface layer of sandy loam or sandy clay loam; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet.	Moderate: surface layer of sandy loam; rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet; slope.	Slight	Slight.
Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet; slope.	Moderate: surface layer of sandy loam; rock at a depth of 2 to 3½ feet; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet; slope.	Severe: slope; rock outcrop in places.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Moderate: surface layer of sandy loam or clay loam.	Moderate: slope	Slight	Slight.
Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: surface layer of sandy loam or clay loam.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: seasonal high water table; moderate permeability; flooding.	Severe: excessive clay and silt; flooding.	Severe: flooding	Moderate: somewhat poorly drained; flooding.	Severe: flooding	Moderate: somewhat poorly drained; flooding.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Estimated degree and kinds of limitation for—				
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings [1] (with basements)	Dwellings [1] (without basements)
Colfax: ClB	Severe: somewhat poorly drained; slow permeability; fragipan.	Severe: seasonal high water table; seepage.	Severe: somewhat poorly drained; fragipan.	Severe: somewhat poorly drained; seasonal high water table; fragipan.	Severe: seasonal high water table; fragipan.
*Congaree: Cn, CO. For Chewacla part of CO, see Chewacla series.	Severe: flooding	Severe: moderate permeability; flooding.	Severe: flooding	Severe: flooding	Severe: flooding
Cullen:					
CuB2, CwB3	Moderate: moderate permeability.	Moderate: moderate permeability; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
CuC2, CwC3	Moderate: moderate permeability; slope.	Severe: slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
Cut and fill land. Properties too variable to interpret.					
Durham: DuB	Slight [2]	Severe: moderate permeability.	Slight [2]	Slight	Slight
Elbert: Eb	Severe: somewhat poorly drained to poorly drained; very slow permeability.	Severe: seasonal high water table; seepage.	Severe: somewhat poorly drained to poorly drained; plastic, clayey subsoil.	Severe: somewhat poorly drained to poorly drained; high shrink-swell potential; rock at a depth of 3½ feet or more.	Severe: somewhat poorly drained to poorly drained; seasonal high water table; high shrink-swell potential.
Enon. Mapped only in complexes with Mecklenburg soils.	Severe: slow permeability.	Moderate where slopes are 2 to 7 percent. Severe where slopes are 7 to 15 percent.	Severe: clayey subsoil.	Severe: high shrink-swell potential.	Severe: high shrink-swell potential.
Fluvanna:					
FlB2	Moderate: moderate permeability.	Moderate: moderate permeability; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
FlC2	Moderate: moderate permeability; slope.	Severe: slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
Fluvaquents: FN	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
Forestdale: Fo	Severe: poorly drained; very slow permeability; flooding.	Severe: seasonal high water table; flooding.	Severe: poorly drained; clayey subsoil; flooding.	Severe: poorly drained; high shrink-swell potential; flooding.	Severe: poorly drained; seasonal high water table; high shrink-swell potential; flooding.
Fork: FrB	Severe: somewhat poorly drained.	Severe: seasonal high water table; moderate permeability; seepage.	Severe: somewhat poorly drained.	Severe: somewhat poorly drained.	Moderate: seasonal high water table; moderate shrink-swell potential.

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Estimated degree and kinds of limitation for—Continued					
Sanitary landfills (trench-type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Severe: seasonal high water table; rock at a depth of 4 feet or more.	Moderate: excessive clay and silt; somewhat poorly drained; fragipan.	Moderate: somewhat poorly drained; fragipan.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained; slow permeability.	Moderate: somewhat poorly drained.
Severe: moderate permeability; flooding.	Severe: excessive clay and silt; flooding.	Moderate: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight on CuB2. Moderate on CwB3: surface layer of clay loam.	Moderate: slope.	Slight on CuB2. Moderate on CwB3: surface layer of clay loam.	Slight on CuB2. Moderate on CwB3: surface layer of clay loam.
Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate on CuC2: slope. Moderate on CwC3: slope; surface layer of clay loam.	Severe: slope.	Moderate: slope.	Moderate on CuC2: slope. Moderate on CwC3: slope; surface layer of clay loam.
Severe: moderate permeability.[2]	Moderate: excessive clay and silt.	Slight.	Moderate: slope.	Slight.	Slight.
Severe: seasonal high water table; plastic, clayey subsoil.	Severe: somewhat poorly drained to poorly drained; plastic, clayey subsoil; high shrink-swell potential.	Severe: somewhat poorly drained to poorly drained; ponding.	Severe: somewhat poorly drained to poorly drained; very slow permeability; ponding.	Severe: somewhat poorly drained to poorly drained; very slow permeability; ponding.	Severe: somewhat poorly drained to poorly drained; ponding.
Severe: clayey subsoil; rock at a depth of 4 feet or more.	Severe: clayey subsoil; high shrink-swell potential.	Slight on MuB2. Moderate on MuC2: slope. Moderate on MvC3: slope; surface layer of clay loam.	Moderate where slopes are 2 to 7 percent. Severe where slopes are 7 to 15 percent.	Slight on MuB2. Moderate on MuC2: slope. Moderate on MvC3: slope; surface layer of clay loam.	Slight on MuB2. Moderate on MuC2: slope. Moderate on MvC3: slope; surface layer of clay loam.
Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight.	Moderate: slope.	Slight.	Slight.
Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Severe: poorly drained; seasonal high water table; clayey subsoil; flooding.	Severe: poorly drained; clayey subsoil; high shrink-swell potential; flooding.	Severe: poorly drained; ponding; flooding.	Severe: poorly drained; very slow permeability; ponding; flooding.	Severe: poorly drained; very slow permeability; ponding; flooding.	Severe: poorly drained; ponding; flooding.
Severe: moderate permeability; seepage.	Moderate: somewhat poorly drained; clay content.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; slope.	Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Estimated degree and kinds of limitation for—				
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings [1] (with basements)	Dwellings [1] (without basements)
Grover:					
GrB2, GvB3	Slight [2]	Moderate: moderate permeability; slope.[2]	Slight	Slight	Slight
GrC2, GvC3	Moderate: slope [2]	Severe: slope [2]	Moderate: slope	Moderate: slope	Moderate: slope
Iredell:					
IdB, IdB2, IrB	Severe: slow permeability; moderately well drained to somewhat poorly drained.	Severe: seasonal high water table; rock at a depth of 3½ to 5 feet or more.	Severe: moderately well drained to somewhat poorly drained; plastic, clayey subsoil.	Severe: moderately well drained to somewhat poorly drained; high shrink-swell potential.	Severe: high shrink-swell potential.
IdC2	Severe: slow permeability; moderately well drained to somewhat poorly drained.	Severe: seasonal high water table; rock at a depth of 3½ to 5 feet or more; slope.	Severe: moderately well drained to somewhat poorly drained; plastic, clayey subsoil.	Severe: moderately well drained to somewhat poorly drained; high shrink-swell potential.	Severe: high shrink-swell potential.
IrA	Severe: slow permeability; moderately well drained to somewhat poorly drained; ponding.	Severe: seasonal high water table; rock at a depth of 3½ to 5 feet or more.	Severe: moderately well drained to somewhat poorly drained; plastic, clayey subsoil.	Severe: moderately well drained to somewhat poorly drained; high shrink-swell potential; ponding.	Severe: high shrink-swell potential; ponding.
Iredell, silty subsoil variant: Iv.	Severe: slow permeability; moderately well drained; ponding where nearly level.	Severe: seasonal high water table; rock at a depth of 3½ to 5 feet or more.	Severe: moderately well drained; plastic, clayey subsoil.	Severe: high shrink-swell potential; ponding where nearly level.	Severe: high shrink-swell potential.
Lignum: LgB	Severe: moderately slow to slow permeability; moderately well drained to somewhat poorly drained.	Moderate: slope	Severe: moderately well drained to somewhat poorly drained; clayey subsoil.	Severe: moderately well drained to somewhat poorly drained.	Moderate: seasonal high water table; moderate shrink-swell potential.
Madison:					
MaB2, MdB3	Moderate: moderate permeability.	Moderate: moderate permeability; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
MaC2, MdC3	Moderate: moderate permeability; slope.	Severe: slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
Manteo:					
MnB	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.
MnC, MoC	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.
MnD, MnE, MoD	Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: rock at a depth of 1 to 1½ feet; slope.

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Estimated degree and kinds of limitation for—Continued					
Sanitary landfills (trench-type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Severe: moderate permeability.[2]	Moderate: clay content.	Moderate: surface layer of sandy loam and sandy clay loam.	Moderate: slope	Slight	Slight.
Severe: moderate permeability.[2]	Moderate: clay content; slope.	Moderate: surface layer of sandy loam and sandy clay loam; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: seasonal high water table; plastic, clayey subsoil; rock at a depth of 3½ to 5 feet or more.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Moderate: moderately well drained to somewhat poorly drained.	Moderate: moderately well drained to somewhat poorly drained; slow permeability; slope.	Moderate: moderately well drained to somewhat poorly drained; slow permeability; slope.	Moderate: moderately well drained to somewhat poorly drained.
Severe: seasonal high water table; plastic, clayey subsoil; rock at a depth of 3½ to 5 feet or more.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Moderate: moderately well drained to somewhat poorly drained; slope.	Severe: slope	Moderate: moderately well drained to somewhat poorly drained; slow permeability; slope.	Moderate: moderately well drained to somewhat poorly drained; slope.
Severe: seasonal high water table; plastic, clayey subsoil; rock at a depth of 3½ to 5 feet or more.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Severe: ponding	Moderate: moderately well drained to somewhat poorly drained; slow permeability; ponding.	Severe: ponding	Moderate: moderately well drained to somewhat poorly drained; ponding.
Severe: seasonal high water table; plastic, clayey subsoil; rock at a depth of 3½ to 5 feet or more.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Severe: ponding where nearly level.	Moderate: moderately well drained; slow permeability; ponding where nearly level.	Severe: ponding where nearly level.	Moderate: moderately well drained; ponding where nearly level.
Severe: seasonal high water table; clayey subsoil; rock at a depth of 4 feet or more.	Moderate: moderately well drained to somewhat poorly drained; clayey subsoil; moderate shrink-swell potential.	Moderate: moderately well drained to somewhat poorly drained.	Moderate: moderately well drained to somewhat poorly drained; moderately slow to slow permeability; slope.	Moderate: moderately well drained to somewhat poorly drained; moderately slow to slow permeability; slope.	Moderate: moderately well drained to somewhat poorly drained.
Moderate: moderate permeability.[2]	Moderate: clayey subsoil; moderate shrink-swell potential.	Moderate: surface layer of sandy loam and clay loam.	Moderate: slope	Slight on MaB2. Moderate on MdB3: surface layer of clay loam.	Slight on MaB2. Moderate on MdB3: surface layer of clay loam.
Moderate: moderate permeability.[2]	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: surface layer of sandy loam and clay loam; slope.	Severe: slope	Moderate on MaC2: slope. Moderate on MdC3: slope; surface layer of clay loam.	Moderate on MaC2: slope. Moderate on MdC3: slope; surface layer of clay loam.
Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Moderate: coarse fragments.	Moderate: coarse fragments.
Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet.	Severe: rock at a depth of 1 to 1½ feet; slope.	Moderate: coarse fragments; slope.	Moderate: coarse fragments; slope.
Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: rock at a depth of 1 to 1½ feet; slope.	Severe: coarse fragments; slope.	Severe: coarse fragments; slope.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Estimated degree and kinds of limitation for—				
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings [1] (with basements)	Dwellings [1] (without basements)
Masada:					
MsB2	Moderate: moderate permeability.	Moderate: moderate permeability; slope.	Severe: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
MsC2	Moderate: moderate permeability; slope.	Severe: slope	Severe: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
*Mecklenburg:					
MuB2	Severe: slow permeability.	Moderate: rock at a depth of 4 feet or more; slope.	Severe: clayey subsoil.	Severe: high shrink-swell potential.	Severe: high shrink-swell potential.
MuC2, MvC3 For Enon part of MuB2, MuC2, and MvC3, see Enon series.	Severe: slow permeability.	Severe: slope	Severe: clayey subsoil.	Severe: high shrink-swell potential.	Severe: high shrink-swell potential.
Mine dump. Properties too variable to interpret.					
Nason:					
NaD2	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
NoB2, NsB3	Moderate: moderate permeability.	Moderate: moderate permeability; rock at a depth of 4 feet or more; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
NoC2, NsC3	Moderate: moderate permeability; slope.	Severe: slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
Orange: OrB, OxB For Poindexter part of OxB, see Poindexter series.	Severe: somewhat poorly drained to moderately well drained; slow permeability.	Moderate: slope	Severe: somewhat poorly drained to moderately well drained; plastic, clayey subsoil.	Severe: somewhat poorly drained to moderately well drained; seasonal high water table; high shrink-swell potential.	Severe: high shrink-swell potential.
*Pacolet:					
PaB2	Moderate: moderate permeability.[2]	Moderate: moderate permeability; slope.[2]	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
PaC2	Moderate: moderate permeability; slope.[2]	Severe: slope [2]	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate; moderate shrink-swell potential; slope.
PaD2, PcD3 For Cecil part of PaB2, PaC2, PaD2, and PcD3, see Cecil series.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

for town and country planning—Continued

Estimated degree and kinds of limitation for—Continued					
Sanitary landfills (trench-type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Severe: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope.
Severe: clayey subsoil; rock at a depth of 4 feet or more.	Severe: clayey subsoil; high shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Severe: clayey subsoil; rock at a depth of 4 feet or more.	Severe: clayey subsoil; high shrink-swell potential.	Moderate on MuC2: slope. Moderate on MvC3: slope; surface layer of clay loam.	Severe: slope	Moderate on MuC2: slope. Moderate on MvC3: slope; surface layer of clay loam.	Moderate on MuC2: slope. Moderate on MvC3: slope; surface layer of clay loam.
Moderate: clayey subsoil; rock at a depth of 4 feet or more.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Moderate: clayey subsoil; rock at a depth of 4 feet or more.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight on NoB2. Moderate on NsB3: surface layer of silty clay loam.	Moderate on NoB2: slope. Moderate on NsB3: slope; surface layer of silty clay loam.	Slight on NoB2. Moderate on NsB3: surface layer of silty clay loam.	Slight on NoB2. Moderate on NsB3: surface layer of silty clay loam.
Moderate: clayey subsoil; rock at a depth of 4 feet or more.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate on NoC2: slope. Moderate on NsC3: slope; surface layer of silty clay loam.	Severe: slope	Moderate on NoC2: slope. Moderate on NsC3: slope; surface layer of silty clay loam.	Moderate on NoC2: slope. Moderate on NsC3: slope; surface layer of silty clay loam.
Severe: seasonal high water table; plastic, clayey subsoil; rock at a depth of 3½ to 5 feet.	Severe: plastic, clayey subsoil; high shrink-swell potential.	Moderate: somewhat poorly drained to moderately well drained.	Moderate: somewhat poorly drained to moderately well drained; slow permeability; slope.	Moderate: somewhat poorly drained to moderately well drained.	Moderate: somewhat poorly drained to moderately well drained.
Moderate: clayey subsoil.[2]	Moderate: clayey subsoil; moderate shrink-swell potential.	Moderate: surface layer of sandy loam.	Moderate: slope	Slight	Slight.
Moderate: clayey subsoil.[2]	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: surface layer of sandy loam; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: clayey subsoil; slope.[2]	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Estimated degree and kinds of limitation for—				
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings [1] (with basements)	Dwellings [1] (without basements)
Poindexter:					
PxB	Severe: rock at a depth of 2 to 5 feet.	Severe: moderate permeability; rock at a depth of 2 to 5 feet.	Severe: rock at a depth of 2 to 5 feet.	Severe: rock at a depth of 2 to 5 feet.	Moderate: moderate shrink-swell potential; rock at a depth of 2 to 5 feet.
PxC, PxC3	Severe: rock at a depth of 2 to 5 feet.	Severe: rock at a depth of 2 to 5 feet; slope.	Severe: rock at a depth of 2 to 5 feet.	Severe: rock at a depth of 2 to 5 feet.	Moderate: moderate shrink-swell potential; rock at a depth of 2 to 5 feet; slope.
PxD	Severe: rock at a depth of 2 to 5 feet; slope.	Severe: rock at a depth of 2 to 5 feet; slope.	Severe: rock at a depth of 2 to 5 feet; slope.	Severe: rock at a depth of 2 to 5 feet; slope.	Severe: slope
Quarry: Properties too variable to interpret.					
Roanoke: RoB	Severe: poorly drained; slow permeability.	Moderate: slope	Severe: poorly drained; clayey subsoil.	Severe: poorly drained; high shrink-swell potential.	Severe: poorly drained; seasonal high water table; high shrink-swell potential.
Rock outcrop. Properties too variable to interpret. Mapped only in complexes with Ashlar, Manteo, Poindexter, and Sekil soils.					
*Sekil:					
SeB	Severe: rock at a depth of 2 to 3½ feet.	Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet.	Severe: rock at a depth of 2 to 3½ feet.	Severe: rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet.
SeC, SeC3	Severe: rock at a depth of 2 to 3½ feet.	Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet; slope.	Severe: rock at a depth of 2 to 3½ feet.	Severe: rock at a depth of 2 to 3½ feet.	Moderate: rock at a a depth of 2 to 3½ feet; slope.
SeD, SeE, SP. For Poindexter part of SP, see Poindexter series. Rock outcrop part of SP too variable to interpret.	Severe: rock at a depth of 2 to 3½ feet; slope.	Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet; slope.	Severe: rock at a depth of 2 to 3½ feet; slope.	Severe: rock at a depth of 2 to 3½ feet; slope.	Severe: slope

for town and country planning—Continued

Estimated degree and kinds of limitation for—Continued					
Sanitary landfills (trench-type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Severe: moderate permeability; rock at a depth of 2 to 5 feet.[2]	Moderate: moderate shrink-swell potential; rock at a depth of 2 to 5 feet.	Moderate: rock at a depth of 2 to 5 feet.	Moderate: rock at a depth of 2 to 5 feet; slope.	Slight	Slight.
Severe: moderate permeability; rock at a depth of 2 to 5 feet.	Moderate: moderate shrink-swell potential; rock at a depth of 2 to 5 feet; slope.	Moderate: rock at a depth of 2 to 5 feet; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: moderate permeability; rock at a depth of 2 to 5 feet.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: poorly drained; seasonal high water table; clayey subsoil.	Severe: poorly drained; clayey subsoil; high shrink-swell potential.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.
Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet.	Moderate: surface layer of sandy loam; rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet; slope.	Slight	Slight.
Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet.	Moderate: rock at a depth of 2 to 3½ feet; slope.	Moderate: surface layer of sandy loam; rock at a depth of 2 to 3½ feet; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Severe: moderately rapid permeability; rock at a depth of 2 to 3½ feet; slope.	Severe: slope; rock outcrop in places.	Severe: slope	Severe: slope	Severe: slope	Severe: slope.

TABLE 7.—*Limitations of the soil*

Soil series and map symbols	Estimated degree and kinds of limitation for—				
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings [1] (with basements)	Dwellings [1] (without basements)
Tatum: TaB2, TmB3	Moderate: moderate permeability.	Moderate: moderate permeability; rock at a depth of 4 feet or more; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
TaC2, TmC3	Moderate: moderate permeability; slope.	Severe: slope	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
TaD2, TmD3	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Toccoa: To, Ts	Severe: flooding [2]	Severe: moderately rapid permeability; flooding.[2]	Severe: flooding	Severe: flooding	Severe: flooding
Turbeville: TuB	Moderate: moderate permeability.	Moderate: moderate permeability; slope.	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
*Wedowee: WaB2	Moderate: moderate permeability.[2]	Moderate: moderate permeability; slope.[2]	Moderate: clayey subsoil.	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
WaC2	Moderate: moderate permeability; slope.[2]	Severe: slope [2]	Moderate: clayey subsoil; slope.	Moderate: moderate shrink-swell potential; slope.	Moderate: moderate shrink-swell potential; slope.
WaD2, WdD3 For Appling part of WaB2, WaC2, WaD2, and WdD3, see Appling series.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
*Wehadkee: We, WH For Chewacla part of WH, see Chewacla series.	Severe: poorly drained; flooding.	Severe: seasonal high water table; moderate permeability; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; seasonal high water table; flooding.	Severe: poorly drained; seasonal high water table; flooding.
Wickham: WkB	Moderate: moderate permeability.	Moderate: moderate permeability; slope.	Slight	Moderate: moderate shrink-swell potential.	Moderate: moderate shrink-swell potential.
Worsham: WoB	Severe: poorly drained; slow permeability.	Moderate: slope	Severe: poorly drained; clayey subsoil.	Severe: poorly drained; high shrink-swell potential.	Severe: poorly drained; seasonal high water table; high shrink-swell potential.
York: YoB	Severe: moderately well drained; moderately slow permeability; fragipan.	Severe: seasonal high water table.	Moderate: moderately well drained; fragipan.	Moderate: moderately well drained; seasonal high water table; fragipan.	Moderate: seasonal high water table; fragipan.

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Estimated degree and kinds of limitation for—Continued					
Sanitary landfills (trench-type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Moderate: clayey subsoil; rock at a depth of 4 feet or more.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight on TaB2. Moderate on TmB3: surface layer of silty clay loam.	Moderate on TaB2: slope. Moderate on TmB3: slope; surface layer of silty clay loam.	Slight on TaB2. Moderate on TmB3: surface layer of silty clay loam.	Slight on TaB2. Moderate on TmB3: surface layer of silty clay loam.
Moderate: clayey subsoil; rock at a depth of 4 feet or more.	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate on TaC2: slope. Moderate on TmC3: slope; surface layer of silty clay loam.	Severe: slope	Moderate on TaC2: slope. Moderate on TmC3: slope; surface layer of silty clay loam.	Moderate on TaC2: slope. Moderate on TmC3: slope; surface layer of silty clay loam.
Moderate: clayey subsoil; rock at a depth of 4 feet or more.	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: moderately rapid permeability; flooding.[2]	Severe: flooding	Moderate: flooding	Moderate: flooding	Severe: flooding	Moderate: flooding.
Moderate: clayey subsoil.	Moderate: clayey subsoil; moderate shrink-swell potential.	Slight to moderate: slope.	Moderate to severe: slope.	Slight to moderate: slope.	Slight to moderate: slope.
Moderate: clayey subsoil.[2]	Moderate: clayey subsoil; moderate shrink-swell potential.	Moderate: surface layer of sandy loam.	Moderate: slope	Slight	Slight.
Moderate: clayey subsoil.[2]	Moderate: clayey subsoil; moderate shrink-swell potential; slope.	Moderate: surface layer of sandy loam; slope.	Severe: slope	Moderate: slope	Moderate: slope.
Moderate: clayey subsoil; slope.[2]	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope.
Severe: poorly drained; seasonal high water table; flooding.	Severe: poorly drained; excessive clay and silt; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; flooding.	Severe: poorly drained; flooding.
Moderate: moderate permeabillty.[2]	Moderate: moderate shrink-swell potential.	Slight	Moderate: slope	Slight	Slight.
Severe: poorly drained; seasonal high water table; clayey subsoil.	Severe: poorly drained; clayey subsoil; high shrink-swell potential.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.	Severe: poorly drained.
Moderate: seasonal high water table; fragipan.	Moderate: excessive clay and silt; fragipan.	Moderate: seasonal high water table; fragipan.	Moderate to severe: slope.	Slight to moderate: slope.	Slight to moderate: slope.

TABLE 7.—*Limitations of the soils*

Soil series and map symbols	Estimated degree and kinds of limitation for—				
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings [1] (with basements)	Dwellings [1] (without basements)
Zion:					
ZoB, ZoB2	Severe: slow permeability.	Severe: rock at a depth of 2 to 3½ feet.	Severe: clayey subsoil; rock at a depth of 2 to 3½ feet.	Severe: high shrink-swell potential; rock at a depth of 2 to 3½ feet.	Severe: high shrink-swell potential.
ZoC2	Severe: slow permeability.	Severe: rock at a depth of 2 to 3½ feet; slope.	Severe: clayey subsoil; rock at a depth of 2 to 3½ feet.	Severe: high shrink-swell potential; rock at a depth of 2 to 3½ feet.	Severe: high shrink-swell potential.

[1] Rating also applies to small industrial, institutional, and commercial buildings of similar size.
[2] Possible hazard of polluting ground water or nearby streams.

using the soils in Louisa County for purposes other than farming (fig. 5).

Soil and water losses from areas being urbanized are often excessive. Constructing streets and roads, shopping centers, and large buildings; land shaping; and installing water and sewage lines remove the plant cover from the soil and leave it exposed to erosion for long periods. Increased runoff and downstream siltation extend the damage far beyond the construction area. Soil and water losses from these areas can be reduced by adequate management practices during construction.

Contractors and developers should expose the smallest practical area of soil at any one time and keep the exposure to the shortest practical time. They should also use temporary vegetation or mulching, or both, where needed; use sediment basins to control siltation; install measures to control increased runoff; and retain and protect natural vegetation.

Table 7 shows the estimated degree and kinds of limitations of the soils in the county for septic tank absorption fields; sewage lagoons; shallow excavations; dwellings with and without basements; sanitary landfills; local roads and streets; lawns, gardens, and landscaping; playgrounds; camp areas; and picnic areas. The degree of limitation is given as slight, moderate, or severe. The limitation is slight if soil properties are generally favorable and limitations are minor and can be easily overcome. The limitation is moderate if it can be overcome or modified by planning, by design, or by special maintenance. The limitation is severe if costly soil reclamation, special design, intense maintenance, or a combination of these is required.

***Figure 5.*—Trailer camp on a Tatum silt loam.**

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil (*11*). The soil material from a depth of 18 inches to a depth of 6 feet is evaluated. The properties considered are those that affect both absorption of effluent and construction and operation of the system. Properties and features that affect absorption are permeability, depth to water table or rock, and susceptibility to flooding. Slope affects difficulty of layout and construction and also the risk of erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage 2 to 5 feet deep long enough for bacteria to decompose the solids. A lagoon has a nearly level floor and sides of compacted soil material. The assumptions are made that the sides, or embankments, are compacted to medium density and that the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, organic matter, and slope. If the floor needs to be leveled, depth to and condition of bedrock become important. The main properties that affect the embankment are interpreted from the Unified classification. The amount of stones, if any, influences the ease of excavation and compaction of the embankment material.

Shallow excavations require digging or trenching to a depth of less than 6 feet, as excavations for pipelines, sewer lines, telephone and power transmission lines, basements, open ditches, and cemeteries. Desira-

for town and country planning—Continued

Estimated degree and kinds of limitation for—Continued					
Sanitary landfills (trench-type)	Local roads and streets	Lawns, gardens, and landscaping	Playgrounds	Camp areas	Picnic areas
Severe: clayey subsoil; rock at a depth of 2 to 3½ feet.	Severe: clayey subsoil; high shrink-swell potential.	Moderate: rock at a depth of 2 to 3½ feet.	Moderate: slow permeability; rock at a depth of 2 to 3½ feet; slope.	Moderate: slow permeability.	Slight.
Severe: clayey subsoil; rock at a depth of 2 to 3½ feet.	Severe: clayey subsoil; high shrink-swell potential.	Moderate: rock at a depth of 2 to 3½ feet; slope.	Severe: slope	Moderate: slow permeability; slope.	Moderate: slope.

ble soil properties are good workability, moderate resistance to sloughing, gentle slopes, absence of rock outcrops or big stones, and freedom from flooding and from a high water table.

Dwellings, as rated in table 7, are not more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to the capacity of the soil to support load and to resist settling under load and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Sanitary landfill is a method of disposing of refuse. The waste is spread in thin layers, compacted, and covered with soil material throughout the disposal period. Landfill areas are subject to heavy vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated, the ratings in table 7 apply only to a depth of about 6 feet, and therefore limitation ratings of slight or moderate may not be valid if trenches are to be much deeper than that. For some soils reliable predictions can be made to a depth of 10 or 15 feet, but every potential site should be investigated before being selected.

Local roads and streets, as rated in table 7, have an all-weather surface that is expected to carry automobile traffic all year. They have a subgrade of underlying material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a flexible or rigid surface, commonly of asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load-supporting capacity, stability of the subgrade, and workability and quantity of available cut and fill material. The AASHO and Unified classifications of the soil material and the shrink-swell potential indicate traffic-supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

The limitations for *lawns, gardens, and landscaping* are based on depth to seasonal high water table, slope, depth to rock, surface rockiness, surface stoniness, surface texture, and the hazards of flooding. These areas require moderate trafficability. Soil at the site is used, and no fill or topsoil is imported.

Lawns, gardens, and landscaping in subdivisions or other built-up areas often pose special problems. Soil material excavated for foundations and basements is usually spread over the surrounding area. This results in a range of texture in the surface layer, generally from loamy to clayey. In addition, the surface layer is often compacted by machinery and other traffic during construction. Lawns and recreation areas are subject to a variety of uses that compact the surface layer and wear away the grass cover. Preparing a good seedbed, seeding adapted grasses, applying lime and fertilizer, watering as needed, and regulating use help to alleviate these problems.

Playgrounds are used intensively for baseball, football, badminton, and similar games. Soils used for this purpose need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry. If grading and leveling are required, depth to rock is important.

Camp areas are used intensively for tents and small camp trailers and the accompanying activities of out-

door living. Little preparation of the site is required, other than shaping and leveling for tents and for parking. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have gentle slopes, good drainage, a surface free of rocks and coarse fragments, freedom from flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry.

Picnic areas are attractive natural or landscaped tracts used primarily for preparing meals and eating outdoors. These areas are subject to heavy foot traffic, but most of the vehiclular traffic is confined to access roads. The best soils are firm when wet but not dusty when dry, are free of flooding during the season of use, and do not have slopes or stoniness that greatly increases cost of leveling sites or of building access roads.

Formation and Classification of the Soils

This section has two parts. The first part discusses factors of soil formation and their effect on the soils in Louisa County. In the second part the soil series are placed in the higher categories of the soil classification system.

Formation of the Soils

The environmental factors mainly responsible for the formation of soils are parent material, relief, climate, plants and animals, and time. Climate and plants and animals are the active forces in soil formation. Their effect on the parent material is modified by relief and by the length of time the parent material has been in place. In some places one factor dominates in the formation of a soil and determines most of its properties, but normally the interaction of all factors determines the kind of soil that develops in any given place.

Parent material

The two broad classes of parent material in Louisa County are residual material and transported material. Residual material has weathered in place from the underlying rocks. Transported material—colluvium and alluvium—was moved by water or gravity and was laid down as unconsolidated deposits of clay, silt, sand, and rock fragments. The characteristics of residual material are related to the characteristics of the underlying rocks. The characteristics of transported material are related to the characteristics of the soils or rocks from which this material was derived.

The rocks of Louisa County are of the Precambrian, Lower Cambrian, Ordovician, and Triassic geologic periods, but they are mostly Precambrian (*4*). Igneous, metamorphic, and sedimentary rocks occur in the county, and all have been sources of parent material for the soils.

The igneous rocks of Louisa County are granite, gabbro, diorite, diabase, and others. These rocks are the source of parent material for Appling, Ashlar, Cecil, Colfax, Cullen, Durham, Elbert, Enon, Fluvanna, Grover, Iredell, Madison, Mecklenburg, Orange, Poindexter, Sekil, and Zion soils.

The metamorphic rocks are schist, phyllite, gneiss, and quartzite. These are the source of parent material for Lignum, Manteo, Nason, Pacolet, Tatum, Wedowee, and York soils and some of the soils listed in the igneous group.

The sedimentary rock is limestone. In this county none of the mapped soils formed directly in material weathered from limestone, because most of the limestone is covered by old alluvium on stream terraces. Such soils as the Masada and Turbeville soils formed in this old alluvium above the limestone.

Chewacla, Congaree, Toccoa, and Wehadkee soils formed in transported material on first bottoms. Altavista, Forestdale, Fork, Masada, Roanoke, Turbeville, and Wickham soils formed in transported material on stream terraces. Abell and Worsham soils formed in colluvium.

The characteristics of the underlying rock and 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, gabbro, which is resistant to weathering, underlies the Iredell soils and is at a depth of 3½ to 5 feet. On the other hand, granite gneiss, which weathers deeply, is the parent material of the deep Appling and Cecil soils and underlies these soils at a depth of 6 feet to more than 20 feet.

Many characteristics of a soil can be traced directly to the parent material. These include texture, mineral content, base saturation, the kind and quantity of clay, the amount of coarse fragments, color, drainage, natural fertility, and reaction.

Relief

Relief, or lay of the land, affects the formation of soils by causing differences in internal drainage, runoff, soil temperature, and geologic erosion. It can alter the effects of parent material on the development of soils to the extent that several different kinds of soil can form from the same parent material. In Louisa County relief ranges from nearly level to steep.

In steep areas the effects of relief are rapid runoff, little percolation of water through the soil, little movement of clay, little translocation of bases, and severe erosion that removes weathered rock and soil material as rapidly as they form. Ashlar and Manteo soils formed in this kind of environment and have weakly expressed horizons.

Gently sloping and sloping areas are well drained, and geologic erosion in these areas is generally slight. The soils in such areas generally have well-defined horizons. Examples are Cecil, Cullen, Tatum, and Turbeville soils.

Drainage is restricted in low, flat areas or depressions, and they are wet and often ponded. The mottled Elbert and Worsham soils formed in this kind of environment.

Low areas on floor plains are wet because they are flooded frequently and have a seasonal high water table. Wehadkee soils occur in such areas, and they are gray and mottled because of the excess water.

Relief also affects the amount of radiant energy absorbed by soils, and this energy, in turn, affects the native vegetation.

Climate

Climate is important in the formation of soils. It influences the weathering of minerals. Weathering is more rapid under a warm, humid climate than under a cold or a dry climate. The amount of precipitation and the length of the growing season influence the type and abundance of vegetation. Precipitation also affects the translocation and leaching of some products of weathering. Hard rains and frequent showers may cause excessive erosion.

Louisa County has a warm, humid, continental climate. The average temperature in summer is 76° F, and the average temperature in winter is 35°. The average annual rainfall is about 42 inches. Rainfall is well distributed throughout the year, but slightly more falls in spring and summer than in fall and winter.

The climate typical of this county favors intense leaching of soluble material and colloidal material in many soils, such as Appling, Cecil, Cullen, Madison, and Tatum soils. Leaching has kept free lime from accumulating in the soils, though calcium is part of some of the underlying rocks. Practically all of the soils are acid. Reaction ranges from extremely acid to slightly acid. Because the soils are frozen for only short periods and to no great depth, the amount of weathering and the translocation of materials are further increased. Weathering breaks down the rocks so that other forces of soil formation have a chance to act.

The climate varies locally as a result of differences in the degree and direction of slope and the position of the slope on the landscape. 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 Louisa County is given in the section "Additional Facts About the County."

Plants and animals

Biologic forces have had an important role in the formation of the soils in Louisa County. Trees, shrubs, grasses, and other herbaceous plants; micro-organisms; earthworms; and various other plants and animals are active in forming soil. The kinds of plants and animals that live on and in the soil are determined by environmental factors such as climate, parent material, relief, and age of the soil. Where the variation in either climate or vegetation is great enough to be significant, the general kind 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 is decomposed and mixed into the soil by chemical reaction and by the action of micro-organisms and earthworms. Decomposition is fairly rapid because of favorable temperature, generally abundant moisture, condition of the organic matter, and favorable population of micro-organisms in the soil. Organic matter has not accumulated in the soils of Louisa County to any great extent.

For a long time the vegetation in this county was a dense forest of hardwoods or of hardwoods and pine. The density of the stands, the proportion of different species, and the kind of ground cover varied somewhat, but vegetation would not account for all the differences in soil properties throughout the county.

Deciduous trees commonly have deep roots, and their leaves vary in content of plant nutrients. The leaves of deciduous trees, however, generally return more bases and more phosphorus to the soil than the needles of coniferous trees.

As farming developed in Louisa County, the activity of man influenced soil formation. Forests were cleared, and new kinds of plants were introduced. Cultivation and artificial drainage, as well as the use of lime and fertilizer, changed some characteristics of the soils.

Man's activity has accelerated erosion, which has thinned and otherwise changed the soil in many areas. Some of the material washed from sloping areas has been deposited in depressions and on flood plains. The young, or immature, Congaree and Toccoa soils formed in such material.

Time

Time is important in the formation of soils. However soils that formed in the same kind of parent material but on different topography do not necessarily develop equally in the same length of time. Where slopes are steep, for example, no definite horizons have had time to develop in Manteo soils, because material has been removed by erosion almost as rapidly as it has formed. In sloping areas there is time for soil development, as in the Nason soils in such positions.

Soils that formed in material resistant to weathering require more time to reach the same degree of maturity than soils that formed in easily weathered material. On flood plains the development of genetically related horizons may be slowed or prevented if alluvium is still being deposited, as on Toccoa soils.

Classification of the 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 relationships to one another and 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.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

The system of soil classification currently used was

adopted by the National Cooperative Soil Survey in 1965 (*7*). Because this system is under continual study, readers interested in developments of the current system should search the latest literature available (*9*).

Placement of some soil series in the current system of classification, especially in families, may change as more precise information becomes available.

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 soils of similar genesis, or mode of orgin, are grouped. In table 8 the soil series of Louisa County are placed in some categories of the current system. The classes are briefly defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol*, as Alf-i-sol.

SUBORDER. Each order is divided into suborders primarily on the basis of those soil characteristics that seem to produce classes that have the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging or soil differences resulting from climate or vegetation. The

TABLE 8.—*Classification of soil series*

Series	Family	Subgroup	Order
Abell	Fine-loamy, mixed, thermic	Aquic Hapludults	Ultisols.
Abell, dark surface variant.	Fine-loamy, mixed, thermic	Humic Hapludults	Ultisols.
Altavista	Fine-loamy, mixed, thermic	Aquic Hapludults	Ultisols.
Appling	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Ashlar	Coarse-loamy, mixed, thermic	Typic Dystrochrepts	Inceptisols.
Cecil	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Chewacla	Fine-loamy, mixed, thermic	Fluvaquentic Dystrochrepts	Inceptisols.
Colfax	Fine-loamy, mixed, thermic	Aquic Fragiudults	Ultisols.
Congaree	Fine-loamy, mixed, nonacid, thermic	Typic Udifluvents	Entisols.
Cullen	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Durham	Fine-loamy, siliceous, thermic	Typic Hapludults	Ultisols.
Elbert [1]	Fine, montmorillonitic, mesic	Typic Ochraqualfs	Alfisols.
Enon [2]	Fine, mixed, thermic	Ultic Hapludalfs	Alfisols.
Fluvanna	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Forestdale	Fine, montmorillonitic, thermic	Typic Ochraqualfs	Alfisols.
Fork	Fine-loamy, mixed thermic	Aeric Ochraqualfs	Alfisols.
Grover	Fine-loamy, micaceous, thermic	Typic Hapludults	Ultisols.
Iredell	Fine, montmorillonitic, thermic	Typic Hapludalfs	Alfisols.
Iredell, silty subsoil variant.	Fine-silty, mixed, thermic	Typic Hapludalfs	Alfisols.
Lignum	Clayey, mixed, thermic	Aquic Hapludults	Ultisols.
Madison	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Manteo	Loamy-skeletal, mixed, thermic	Lithic Dystrochrepts	Inceptisols.
Masada	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Mecklenburg [3]	Fine, mixed, thermic	Ultic Hapludalfs	Alfisols.
Nason	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Orange	Fine, montmorillonitic, thermic	Albaquic Hapludalfs	Alfisols.
Pacolet	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Poindexter	Fine-loamy, mixed, thermic	Typic Hapludalfs	Alfisols.
Roanoke	Clayey, mixed, thermic	Typic Ochraquults	Ultisols.
Sekil	Coarse-loamy, mixed, thermic	Ultic Hapludalfs	Alfisols.
Tatum	Clayey, mixed, thermic	Typic Hapludults	Ultisols.
Toccoa	Coarse-loamy, mixed, nonacid, thermic	Typic Udifluvents	Entisols.
Turbeville	Clayey, mixed, thermic	Typic Paleudults	Ultisols.
Wedowee	Clayey, kaolinitic, thermic	Typic Hapludults	Ultisols.
Wehadkee [4]	Fine-loamy, mixed, nonacid, thermic	Typic Fluvaquents	Entisols.
Wickham	Fine-loamy, mixed, thermic	Typic Hapludults	Ultisols.
Worsham	Clayey, mixed, thermic	Typic Ochraquults	Ultisols.
York	Fine-loamy, mixed, thermic	Typic Fragiudults	Ultisols.
Zion	Fine, mixed, thermic	Ultic Hapludalfs	Alfisols.

[1] Elbert soils in this county are taxadjuncts to the Elbert series because they have a subhorizon that is dominantly more than 2 in chroma at a depth of less than 30 inches.

[2] Enon soils in this county are taxadjuncts to the Enon series because they are strongly acid or medium acid rather than slightly acid or netural, as is defined in the range for the series.

[3] Mecklenburg soils in this county are taxadjuncts to the Mecklenburg series because they are strongly acid or medium acid rather than slightly acid or neutral, as is defined in the range for the series.

[4] The Wehadkee soils in this survey area are taxadjuncts to the Wehadkee series because they are 5GY, 5G, 5Y, or 5BG in hue below the A horizon rather than 10YR or neutral in hue, as is defined in the range for the series.

names of suborders have two syllables, as *Udalfs* (*Ud*, meaning humid, and *alf*, from Alfisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to separate great groups are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder, as *Hapludalfs* (*Hapl*, meaning simple horizons, and *Udalfs*).

SUBGROUP. Each great group is divided into subgroups, one representing the central (typical) segment of the group, and others, called intergrades, that have properties of the great group and also one or more properties of another great group, suborder, or order. Subgroups may also be made for properties that intergrade outside the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group, as *Typic Hapludalfs* (a typical Hapludalf).

FAMILY. Each subgroup is divided into families, primarily on the basis of properties important to the growth of plants or to the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae. An example is the *clayey, kaolinitic, thermic* family of Typic Hapludalfs.

Additional Facts About the County

Colonial Virginia was originally divided into eight shires after the English system. In 1642–43 Charles River, one of the original shires, was renamed York Shire. In 1654 New Kent County was formed from York Shire on the south side of the York River. Governor Spottswood approved an act establishing Hanover County on December 20, 1720. In 1738 the inhabitants of that part of Hanover County that is now Louisa County began to petition the House of Burgesses for a separate county. After several petitions an act was passed in the House of Burgesses, in December 1742, establishing Louisa County. The county was named for Princess Louisa, daughter of King George II.

The first settlers came into the area sometime after 1700, while it was still New Kent County. These early settlers made their homes along the larger streams in the area. Along these streams were the fertile bottom lands; and the streams provided water, transportation, and power. By 1738 the lands along many of the streams were patented, and many of these patents were operating plantations.

The first federal census, in 1790, showed a population of 8,467 in Louisa County. The population reached a peak of 18,442 in 1880. Since 1940 it has remained relatively stable. It was 14,004 in 1970.

Farming

Louisa County is mainly a farming area. About 42 percent of the land is in farms. The number of farms, the farm population, and the amount of land in farms are steadily decreasing. The average size of farms and the value of farms and farm buildings are increasing. Changes in land use account for part of the decrease in the number of farms and in the amount of land in farms. Some land has become commercial timberland, and some is used for highways, schools, urban development, and other purposes.

The acreage of corn has steadily decreased since about 1949, but yields have increased. Improved hybrids, conservation practices, better land use and greater use of lime and fertilizer have contributed to this increase.

Sun-cured tobacco, wheat, and soybeans are the most important cash crops. The acreage and population of these crops has declined since about 1949.

Most of the grain and hay crops grown in the county are used in the production of livestock. Most hay is fed to livestock on the farms where it is grown. Most hay is a mixture of orchardgrass and red clover, but some fescue and clover are also grown.

Physiography, Relief, Geology, and Drainage

Louisa County lies wholly within the Piedmont Plateau physiographic province (*5*). Geologically, Louisa County is quite old.

Louisa County is well dissected by streams. The interstream divides are generally fairly wide and are sloping or rolling. In areas along the lower tributaries of large streams, the divides are steep. Entrenchment along the lower tributaries of the major streams has been rapid. As a result, there are many bluffs and V-shaped valleys that have steep sides that rise abruptly from the flood plain. Elevation in the county ranges from about 180 feet to about 540 feet.

The county is a region of complex rocks and rock formations. Most of the rocks are igneous or metamorphic. Everona Limestone is sedimentary. The igneous rocks are mainly, granite, hornblende, diorite, and diabase. The metamorphic rocks are mainly sericite schist, phyllite, and gneiss.

Among the important minerals that have been mined in Louisa County are gold, iron, lead, copper, zinc, silver, manganese, barite, and clay. Limestone and granite have been quarried and crushed for road material, aggregate, and other uses. Vermiculite and talc are also in the county.

The North Anna, South Anna, and Little Rivers and their tributaries drain most of Louisa County. A small area in the southwestern part of the county is drained by the James River. In many small areas, totaling

about 15,000 acres, drainage is poor. Elbert, Forestdale, Wehadkee, and Worsham soils are among those that are poorly drained. Many of the poorly drained soils can be improved by artificial drainage.

Climate [5]

Louisa County is in the Central Piedmont. It has warm summers and relatively mild winters. Rainfall is normally adequate. The topography is rolling. Elevation ranges from about 180 to 540 feet. Differences in elevation are not large enough to cause significant differences in climate, and thus the climatic data in the tables may be considered generally applicable to the whole county. The Atlantic Ocean has only a small, moderating effect on the climate, because the county is well inland. The county lies in the path of warm, moist air currents moving north and cold, dry air currents moving south. These alternating currents frequently bring sharp changes in weather, but the Appalachian Mountains tend to soften winter storms that influence the area.

Average annual temperature varies slightly from year to year but averages about 56° F. Temperatures of more than 95° and less than 15° are infrequent, and temperatures of more than 100° and less than 0 are quite rare. Prolonged periods of very hot or very cold weather are unusual, but relatively warm spells in winter and relatively cool, dry spells in summer do relieve the normal weather regime.

Monthly averages of daily high and low temperatures are given in table 9. Average temperature is generally consistent in winter and in summer. The averages trend up and down in spring and fall. September usually remains quite warm, and mild weather often extends into November.

The growing season, defined as the period between the average dates of the last freezing temperature in spring and the first freezing temperature in fall, is 167 days. This growing season is long enough to allow proper maturation of many crops. The pasture season is slightly longer, but feed and shelter for livestock are necessary in winter. Probabilities of freezing temperatures occurring after the average date in spring and before the average date in fall, given in table 10, apply to most farming areas in the county. Local topography causes some variation. For example, low areas where cold air settles are subject to a greater hazard of freezing than higher lying areas.

Precipitation is well distributed throughout the year, ranging from 3.0 inches in October to 4.6 inches in July. Rainfall is greatest in July and August because of shower and thundershower activity, but it is variable in location and time and is usually insufficient because crop requirements and evaporation are also greatest at that time. Dry spells of various lengths do occur in which moisture demands exceed the available supply. At other times excessive rainfall results in considerable runoff and sometimes in local flooding.

The average number of thunderstorms is about 40 per year. Wind, lightning, and hail associated with thunderstorms occasionally cause damage. Hurricanes occasionally pass nearby, but winds are diminished and damage is usually from torrential rainfall. A few

[5] By CURTIS W. CROCKETT, climatologist for Virginia, National Weather Service, U.S. Department of Commerce.

TABLE 9.—*Temperature and precipitation*

[All data from Louisa, Virginia]

Month	Temperature				Precipitation				
	Average daily high	Average daily low	Two years in 10 will have at least 4 days with—		Average total	One year in 10 will have—		Days with snow cover of 1 inch or more	Average depth of snow on days with snow cover
			Maximum temperature equal to or higher than—	Minimum temperature equal to or lower than—		Less than—	More than—		
	°F	°F	°F	°F	*In*	*In*	*In*		*In*
January	47	26	65	8	3.1	1.3	5.3	5	4
February	49	27	65	10	3.1	1.7	5.4	4	6
March	58	34	76	18	3.9	2.1	5.4	2	7
April	70	43	86	29	3.1	1.5	4.2	0	0
May	78	53	90	39	3.4	1.3	4.8	0	0
June	85	61	94	48	3.4	1.6	4.8	0	0
July	88	65	97	54	4.6	1.3	8.0	0	0
August	86	63	95	53	4.5	1.6	6.8	0	0
September	80	56	91	43	3.2	1.0	6.4	0	0
October	70	45	84	30	3.0	1.2	4.7	0	0
November	59	36	73	22	3.1	1.3	5.7	(1)	2
December	47	27	65	12	3.4	2.0	4.8	3	4
Year	68	45	[2] 99	[3] 2	41.8	33.4	45.7	14	5

[1] Less than 0.5 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 Louisa, Virginia]

Probability	Dates for given probability and temperature				
	16° F	20° F	24° F	28° F	32° F
Spring:					
1 year in 10 later than	March 28	April 7	April 20	May 5	May 14
2 years in 10 later than	March 20	March 31	April 14	April 29	May 9
5 years in 10 later than	March 5	March 17	April 3	April 18	April 30
Fall:					
1 year in 10 earlier than	November 16	November 3	October 26	October 13	October 1
2 years in 10 earlier than	November 21	November 8	October 31	October 18	October 6
5 years in 10 earlier than	December 2	November 18	November 9	October 27	October 14

snowstorms occur each winter, and occasionally a heavy snowstorm will cause some damage and much inconvenience.

Relative humidity is high in the morning and low in the afternoon. Average values are in the seventies in the morning and drop to the fifties in the afternoon.

In general, southerly and northerly winds are about equally frequent over the county. Southerly winds prevail in the warm months, and northerly winds in the cold months. The winds blow from all directions at different times. Average windspeed is generally less than 12 miles per hour.

Clouds cover about six-tenths of the sky between sunrise and sunset. Cloud cover is least in fall and greatest in winter. Partly cloudy days are most frequent in summer, when the cover is cumulus-type clouds.

Water Supply

Water for farm and domestic use is obtained mainly from wells dug into the zone of weathered rock. This water is of fair quality, although it contains some dissolved lime and iron. Wells drilled into hard rock, and extending to a depth of 90 to 200 feet, generally produce limited amounts of water, which is of good quality. Wells drilled into granite can be expected to yield from 3 to 60 gallons per minute. Schist is considered to be a poor producer of water, but water from schist is generally of good quality.

Surface water supplies are adequate for present uses. The water is soft and of good quality. The flow of most streams becomes very low during periods of drought, and storage facilities are necessary to secure dependable supplies. Farm ponds supply water for irrigation, livestock, and recreation.

Louisa obtains its water from three deep wells and a spring. The water from the wells is untreated, but that from the spring is chlorinated. The water is pumped directly into a 75,000-gallon storage tank.

Mineral obtains its water from two wells and two springs. The water from the springs is collected in a 30,000-gallon storage reservoir, chlorinated, and pumped to an elevated 75,000-gallon storage tank.

In 1970 Gordonsville constructed a 75-acre storage reservoir on the South Anna River.

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Glossary

Acidity. See Reaction, soil.

Alkalinity. See Reaction, soil.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Channery. Containing thin, flat fragments of sandstone, limestone, or schist as much as 6 inches in length along the longer axis. A single piece is called a fragment.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of material commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Diabase. A basic igneous rock usually occurring in dikes or intrusive sheets and composed essentially of plagioclase feldspar and augite with small quantities of magnetite and spatite.

Diorite. A granitoid rock composed essentially of hornblende and feldspar that is mostly or wholly plagioclase with accessory biotite and augite or augite alone.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation 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 natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding 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 the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally 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. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Feldspar. General name for a group of abundant rock-forming minerals; including microcline, anorthoclase, plagioclase, celsian, orthoclase, and hyalophane.

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 of the soil are favorable.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flooding. The inundation of land by water, either overflow from streams or irrigation.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle, subsurface horizon that is very low in organic-matter content and clay but is rich in silt or very fine sand. The layer is seemingly cemented. When dry, it is hard or very hard and has a high bulk density in comparison with the horizon or horizons above it. When moist, the fragipan tends to rupture suddenly if pressure is applied, rather than to deform slowly. The layer is generally mottled, is slowly or very slowly permeable to water, and has few or many bleached fracture planes that form polygons. Fragipans are a few inches to several feet thick; they generally occur below the B horizon, 15 to 40 inches below the surface.

Gabbro. A plutonic rock consisting of calcic plagioclase and clinopyroxene, with or without orthopyroxene and olivine. Apatite and magnetite or ilmenite are common accessories. Loosely used for any coarse-grained dark igneous rock.

Gneiss. A coarse-grained, metamorphic rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate.

Granite. A plutonic rock consisting essentially of alkalic feldspar and quartz. Loosely used for any light-colored, coarse-grained igneous rock. *Granite gneiss* is a primary igneous gneiss of granitic composition.

Gravelly. Containing 15 to 50 percent, by volume, of rounded or angular rock fragments that are not prominently flattened and are up to 3 inches in diameter.

Ground water (geology). Water that fills all the unblocked pores of underlying material below the water table, which is the upper limit of saturation.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Hornblende. A variety of the mineral amphibole. Color between black and white, through various shades of green, inclining to blackish green. In part a normal metasilicate of calcium and magnesium, usually with other elements.

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 profile. The rate of movement is determined by the texture, structure, and other characteristics of the soil profile and underlying layers, and by 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.

Limestone. A general term for bedded rocks that consist predominantly of calcium carbonate.

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

Loess. Fine-grained material, dominantly of silt-sized particles, that has been deposited by wind.

Mica. Primary aluminosilicate minerals in which two silica layers alternate with one alumina layer. The layers separate readily into thin sheets or flakes.

Micaceous. Containing mica.

Mottling, soil. 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 millimeters 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.

Organic matter. A general term for plant and animal material, in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition.

Parent material. Disintegrated and partly weathered rock from which soil has formed.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phyllite. An argillaceous rock intermediate in metamorphic grade between slate and schist. The mica crystals impart a silky sheen to the surface of cleavage.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Quartz. Crystallized silicon dioxide. *Quartz diorite* is a plutonic rock that contains quartz, plagioclase, hornblende, and generally biotite. *Quartz monzonite* is a granite in which the percentage of soda-lime feldspar equals or exceeds the percentage of potash feldspar.

Quartzite. A compact, granular, metamorphosed sandstone.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	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 a land surface, considered collectively.

Rock. Any relatively homogeneous mineral mass; a combination of mineral materials that forms a portion of the earth's crust.

Runoff. 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. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Saprolite. Thoroughly decomposed, earthy, untransported rock.

Schist. A medium or coarse-grained metamorphic rock with subparallel orientation of the micaceous minerals that dominate in its composition.

Seepage. Slow escape of water from a soil along an extensive line of surface.

Sericite. A more or less fibrous form of mica, generally muscovite, often resulting from the alteration of feldspar. *Sericite schist* is a mica schist the mica of which is sericite.

Siliceous. Containing silica, which is a combination of silicon and oxygen. The mineral form of silica is quartz.

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

Slickensides. Polished and grooved surfaces produced by one soil mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on relatively steep slopes and in swelling clays, where there is marked change in moisture content.

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 on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles, less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows: *Very coarse sand* (2.0 to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.05 to 0.002 millimeter); and *clay* (less than 0.002 millimeter). The separates recognized by the International Society of Soil Science are as follows: I (2.0 to 0.2 millimeter); II (0.2 to 0.02 millimeter); III (0.02 to 0.002 millimeter); IV (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in 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 plants and animal life characteristics of the soil are largely confined to the solum.

Stone line. A concentration of coarse rock fragments in soils that generally represents an old weathering surface. 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.

Stones. Rock fragments greater than 10 inches in diameter if rounded and greater than 15 inches along the longer axis if flat.

Stripcropping. Growing crops in a systematic arrangement of strips, or bands, to serve as vegetative barriers to water erosion and soil blowing.

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

either *single grain* (each grain by itself, as in dune sand) or *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 solum below plow depth.

Substratum. Technically, the part of the soil below the solum.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that 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, 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."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Upland (geology). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

Vermiculite. Any of a group of platy minerals, hydrous silicates of aluminum, magnesium, and iron chiefly, closely related to the chlorites and montmorillonites. Characterized by exfoliating markedly when heated; the expanded material is used for heat insulation.

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.

Weathering. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of 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, page 7.
Predicted yields, table 2, page 50.
Woodland, table 3, page 56.
Wildlife habitat, table 4, page 60.
Engineering uses of the soils, tables 5 and 6, pages 66 through 83.
Limitations of soils for town and country planning, table 7, page 84.

Map symbol	Mapping unit	Page	Capability unit		Woodland group
			Symbol	Page	Symbol
AbB	Abell fine sandy loam, 2 to 7 percent slopes	8	IIw-2	44	2o1
AcB	Abell silt loam, 2 to 7 percent slopes	8	IIw-2	44	2o1
AeB	Abell loam, dark surface variant, 2 to 7 percent slopes	9	IIw-2	44	2o1
AlB	Altavista fine sandy loam, 2 to 7 percent slopes	9	IIe-2	43	2o1
AnB2	Appling sandy loam, 2 to 7 percent slopes, eroded	10	IIe-1	43	3o1
AnC2	Appling sandy loam, 7 to 15 percent slopes, eroded	10	IIIe-1	44	3o1
ApB3	Appling sandy clay loam, 2 to 7 percent slopes, severely eroded	10	IIIe-2	44	4c1
ArC3	Appling-Wedowee sandy clay loams, 7 to 15 percent slopes, severely eroded	10	IVe-1	46	4c1
AsB	Ashlar sandy loam, 2 to 7 percent slopes	11	IIIe-6	45	3d1
AsC	Ashlar sandy loam, 7 to 15 percent slopes	11	IVe-3	47	3d1
AsC3	Ashlar sandy loam, 7 to 15 percent slopes, severely eroded	11	VIe-2	48	5d1
AsD	Ashlar sandy loam, 15 to 25 percent slopes	11	VIe-2	48	3d1
AsD3	Ashlar sandy loam, 15 to 30 percent slopes, severely eroded	11	VIIe-1	48	5d1
AV	Ashlar-Manteo-Rock outcrop complex	12	VIs-1	48	5d1
CcB2	Cecil sandy loam, 2 to 7 percent slopes, eroded	12	IIe-1	43	3o1
CcC2	Cecil sandy loam, 7 to 15 percent slopes, eroded	12	IIIe-1	44	3o1
CeB3	Cecil clay loam, 2 to 7 percent slopes, severely eroded	12	IIIe-2	44	4c1
CfC3	Cecil-Pacolet clay loams, 7 to 15 percent slopes, severely eroded	13	IVe-1	46	4c1
Ch	Chewacla silt loam	13	IIIw-1	46	1w1
ClB	Colfax fine sandy loam, 2 to 7 percent slopes	14	IIIw-2	46	2w1
Cn	Congaree silt loam	14	IIw-1	44	1o1
CO	Congaree-Chewacla complex	14	IIIw-1	46	1w1
CuB2	Cullen loam, 2 to 7 percent slopes, eroded	15	IIe-1	43	3o1
CuC2	Cullen loam, 7 to 15 percent slopes, eroded	15	IIIe-1	44	3o1
CwB3	Cullen clay loam, 2 to 7 percent slopes, severely eroded	15	IIIe-2	44	4c1
CwC3	Cullen clay loam, 7 to 15 percent slopes, severely eroded	15	IVe-1	46	4c1
DuB	Durham fine sandy loam, 2 to 5 percent slopes	16	IIe-2	43	3o1
Eb	Elbert silt loam	17	Vw-1	48	4w1
FlB2	Fluvanna fine sandy loam, 2 to 7 percent slopes, eroded	18	IIe-1	43	3o1
FlC2	Fluvanna fine sandy loam, 7 to 15 percent slopes, eroded	18	IIIe-1	44	3o1
FN	Fluvaquents	18	VIIw-1	49	---
Fo	Forestdale silt loam	19	Vw-1	48	4w1
FrB	Fork fine sandy loam, 0 to 5 percent slopes	20	IIIw-2	46	2w1
GrB2	Grover sandy loam, 2 to 7 percent slopes, eroded	20	IIe-2	43	3o1
GrC2	Grover sandy loam, 7 to 15 percent slopes, eroded	20	IIIe-1	44	3o1
GvB3	Grover sandy clay loam, 2 to 7 percent slopes, severely eroded	20	IIIe-2	44	4c1
GvC3	Grover sandy clay loam, 7 to 15 percent slopes, severely eroded	20	IVe-1	46	4c1
IdB	Iredell sandy loam, 2 to 7 percent slopes	21	IIIe-5	45	4w1
IdB2	Iredell sandy loam, 2 to 7 percent slopes, eroded	21	IIIe-5	45	4w1
IdC2	Iredell sandy loam, 7 to 15 percent slopes, eroded	21	IVe-4	47	4w1
IrA	Iredell loam, 0 to 2 percent slopes	22	IIIw-2	46	4w1
IrB	Iredell loam, 2 to 7 percent slopes	22	IIIe-5	45	4w1
Iv	Iredell silt loam, silty subsoil variant	22	IVw-1	47	4w1
LgB	Lignum loam, 2 to 7 percent slopes	23	IIIw-2	46	3w1
MaB2	Madison sandy loam, 2 to 7 percent slopes, eroded	24	IIe-1	43	3o1
MaC2	Madison sandy loam, 7 to 15 percent slopes, eroded	24	IIIe-1	44	3o1
MdB3	Madison clay loam, 2 to 7 percent slopes, severely eroded	24	IIIe-2	44	4c1
MdC3	Madison clay loam, 7 to 15 percent slopes, severely eroded	24	IVe-1	46	4c1

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Capability unit		Woodland group
			Symbol	Page	Symbol
MnB	Manteo channery silt loam, 2 to 7 percent slopes	25	IVe-3	47	4d1
MnC	Manteo channery silt loam, 7 to 15 percent slopes	25	VIe-2	48	4d1
MnD	Manteo channery silt loam, 15 to 25 percent slopes	25	VIIe-1	48	4d2
MnE	Manteo channery silt loam, 25 to 45 percent slopes	25	VIIe-1	48	4d2
MoC	Manteo very channery silt loam, 7 to 15 percent slopes	25	VIs-1	48	4d1
MoD	Manteo very channery silt loam, 15 to 25 percent slopes	25	VIIs-1	49	4d2
MsB2	Masada fine sandy loam, 2 to 7 percent slopes, eroded	26	IIe-1	43	3o1
MsC2	Masada fine sandy loam, 7 to 15 percent slopes, eroded	26	IIIe-1	44	3o1
MuB2	Mecklenburg-Enon loams, 2 to 7 percent slopes, eroded	27	IIe-4	43	3c1
MuC2	Mecklenburg-Enon loams, 7 to 15 percent slopes, eroded	27	IIIe-4	45	3c1
MvC3	Mecklenburg-Enon clay loams, 7 to 15 percent slopes, severely eroded	27	IVe-1	46	4c1
NaD2	Nason loam, 15 to 25 percent slopes, eroded	28	IVe-2	47	3r1
NoB2	Nason silt loam, 2 to 7 percent slopes, eroded	28	IIe-3	43	3o1
NoC2	Nason silt loam, 7 to 15 percent slopes, eroded	29	IIIe-3	45	3o1
NsB3	Nason silty clay loam, 2 to 7 percent slopes, severely eroded	29	IIIe-2	44	4c1
NsC3	Nason silty clay loam, 7 to 15 percent slopes, severely eroded	29	IVe-1	46	4c1
OrB	Orange silt loam, 2 to 7 percent slopes	30	IIIe-5	45	4w1
OxB	Orange-Poindexter complex, 2 to 7 percent slopes	30	IIIe-5	45	---
	Orange part	--	-----	--	4w1
	Poindexter part	--	-----	--	4o1
PaB2	Pacolet-Cecil sandy loams, 2 to 7 percent slopes, eroded	30	IIe-1	43	3o1
PaC2	Pacolet-Cecil sandy loams, 7 to 15 percent slopes, eroded	31	IIIe-1	44	3o1
PaD2	Pacolet-Cecil sandy loams, 15 to 25 percent slopes, eroded	31	IVe-2	47	3r1
PcD3	Pacolet-Cecil clay loams, 15 to 25 percent slopes, severely eroded	31	VIe-1	48	4c2
PxB	Poindexter loam, 2 to 7 percent slopes	31	IIIe-6	45	4o1
PxC	Poindexter loam, 7 to 15 percent slopes	31	IVe-3	47	4r1
PxC3	Poindexter loam, 7 to 15 percent slopes, severely eroded	32	VIe-2	48	5d1
PxD	Poindexter loam, 15 to 25 percent slopes	32	VIe-2	48	4r1
RoB	Roanoke silt loam, local alluvium, 2 to 7 percent slopes	32	Vw-1	48	4w1
SeB	Sekil sandy loam, 2 to 7 percent slopes	33	IIIe-6	45	4o1
SeC	Sekil sandy loam, 7 to 15 percent slopes	33	IVe-3	47	4r1
SeC3	Sekil sandy loam, 7 to 15 percent slopes, severely eroded	33	VIe-2	48	5d1
SeD	Sekil sandy loam, 15 to 25 percent slopes	33	VIe-2	48	4r1
SeE	Sekil sandy loam, 25 to 45 percent slopes	33	VIIe-1	48	4r1
SP	Sekil-Poindexter-Rock outcrop complex	34	VIs-1	48	5d1
TaB2	Tatum silt loam, 2 to 7 percent slopes, eroded	34	IIe-3	43	3o1
TaC2	Tatum silt loam, 7 to 15 percent slopes, eroded	34	IIIe-3	45	3o1
TaD2	Tatum silt loam, 15 to 25 percent slopes, eroded	35	IVe-2	47	3r1
TmB3	Tatum silty clay loam, 2 to 7 percent slopes, severely eroded	35	IIIe-2	44	4c1
TmC3	Tatum silty clay loam, 7 to 15 percent slopes, severely eroded	35	IVe-1	46	4c1
TmD3	Tatum silty clay loam, 15 to 25 percent slopes, severely eroded	35	VIe-1	48	4c2
To	Toccoa loamy fine sand	35	IIIs-1	46	1o1
Ts	Toccoa fine sandy loam	36	IIw-1	44	1o1
TuB	Turbeville fine sandy loam, 2 to 12 percent slopes	36	IIe-1	43	3o1
WaB2	Wedowee-Appling sandy loams, 2 to 7 percent slopes, eroded	37	IIe-1	43	3o1
WaC2	Wedowee-Appling sandy loams, 7 to 15 percent slopes, eroded	37	IIIe-1	44	3o1
WaD2	Wedowee-Appling sandy loams, 15 to 25 percent slopes, eroded	37	IVe-2	47	3r1
WdD3	Wedowee-Appling sandy clay loams, 15 to 25 percent slopes, severely eroded	37	VIe-1	48	4c2
We	Wehadkee silt loam	38	IVw-1	47	2w2
WH	Wehadkee-Chewacla complex	38	IVw-1	47	---
	Wehadkee part	--	-----	--	2w2
	Chewacla part	--	-----	--	1w1
WkB	Wickham fine sandy loam, 2 to 7 percent slopes	39	IIe-1	43	2o1
WoB	Worsham fine sandy loam, 2 to 7 percent slopes	39	Vw-1	48	2w2
YoB	York silt loam, 2 to 10 percent slopes	40	IIIw-2	46	3o1
ZoB	Zion loam, 2 to 7 percent slopes	41	IIe-4	43	3o1
ZoB2	Zion loam, 2 to 7 percent slopes, eroded	41	IIIe-4	45	3o1
ZoC2	Zion loam, 7 to 15 percent slopes, eroded	41	IVe-4	47	3r1

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