United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
North Carolina
Department of
Environment, Health, and
Natural Resources; North
Carolina Agricultural
Research Service; North
Carolina Cooperative
Extension Service;
Lincoln County Board of
Commissioners; and
Lincoln Soil and Water
Conservation District

Soil Survey of Lincoln County, North Carolina

How To Use This Soil Survey

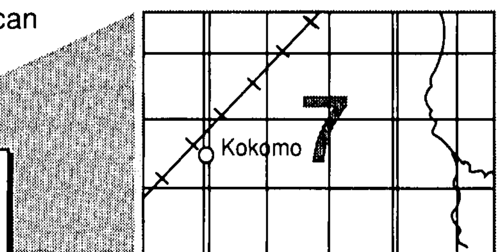
General Soil Map

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

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

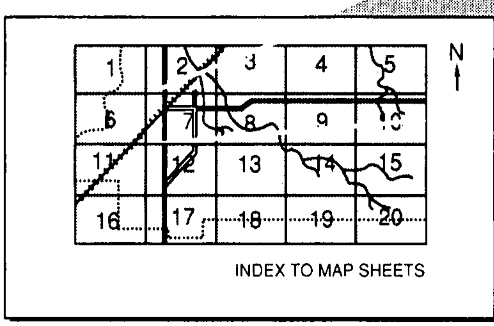
Detailed Soil Maps

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

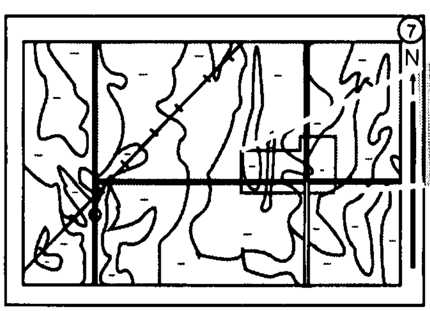


MAP SHEET

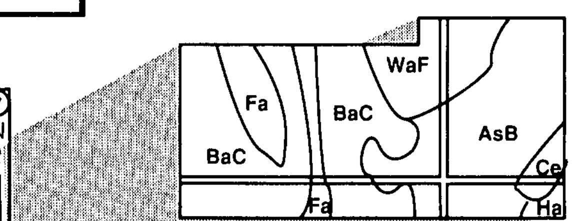
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



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



MAP SHEET



AREA OF INTEREST

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

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

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the North Carolina Agricultural Research Service, and local agencies. 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 1988. Soil names and descriptions were approved in 1989. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1989. This soil survey was made cooperatively by the Soil Conservation Service; the North Carolina Department of Environment, Health, and Natural Resources; the North Carolina Agricultural Research Service; and the North Carolina Cooperative Extension Service. It is part of the technical assistance furnished to the Lincoln Soil and Water Conservation District. The Lincoln County Board of Commissioners provided financial assistance for the survey.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

The first soil survey of Lincoln County was published in 1916 by the U.S. Department of Agriculture *(14)*. This survey updates the first survey, provides more detailed maps on aerial photographs, and contains more interpretive information.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: Stripcropping in a field of alfalfa and small grain in Lincoln County.

Contents

Issued January 1995

Index to Map Units

Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Lincoln County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow over bedrock. Some are too unstable to be used as a foundation for buildings or roads. Some clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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

Coy A. Garrett
State Conservationist
Soil Conservation Service

Soil Survey of
Lincoln County, North Carolina

By William E. Woody, Soil Conservation Service

Soils Surveyed by William E. Woody, Soil Conservation Service, and David V. McCloy, North Carolina Department of Environment, Health, and Natural Resources

United States Department of Agriculture, Soil Conservation Service,
in cooperation with
North Carolina Department of Environment, Health, and Natural Resources;
North Carolina Agricultural Research Service; North Carolina Cooperative Extension Service; Lincoln County Board of Commissioners; and Lincoln Soil and Water Conservation District

LINCOLN COUNTY is in the south-central part of the Southern Piedmont area in North Carolina (fig. 1). In 1990, it had a population of 50,319. Lincolnton, the county seat and largest town, had a population of 6,847.

The county has a total area of 196,262 acres, or 307 square miles. This total includes 7,220 acres of water areas.

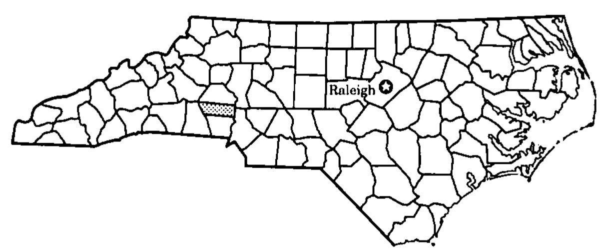


Figure 1.—Location of Lincoln County in North Carolina.

General Nature of the County

This section gives general information concerning Lincoln County. It describes history and development; physiography, relief, and drainage; water resources; geology and mineral resources; and climate.

History and Development

Spanish expeditions passed through the area that is now Lincoln County from Florida between 1528 and 1568. The first English explorers arrived in 1701. The early settlers were Scotch-Irish, German, French, and English. They first acquired land in the 1740's and 1750's. The Scotch-Irish and Germans came from Pennsylvania and Virginia. The French and English came from the eastern parts of the Carolinas. Until approximately 1761, the settlers were in conflict with the original Cherokee inhabitants of the area near the Catawba and Yadkin Rivers *(4, 8)*.

In 1778, a petition requesting the creation of a new county west of the Catawba River was presented to the Colonial Assembly of North Carolina. At this time Tryon County was abolished and Lincoln County was established. Until the formation of Cleveland County in 1841, Lincoln County included all of what is now Lincoln, Catawba, and Gaston counties and a large part of Cleveland County. It was one of the largest, wealthiest, and most populous counties in North Carolina. In 1842, Catawba County was organized from part of Lincoln County. In 1846, Gaston county was organized from another part.

Lincoln County and the town of Lincolnton, which is the county seat, were named in honor of Revolutionary War hero General Benjamin Lincoln. He was the commanding general of the Southern Department of the Continental Army. Later, he was a member of the convention that ratified the Constitution of the United States *(4, 12)*.

Lincoln County ranked high among the counties of western North Carolina in agricultural development long before the Civil War. The leading crops were corn, wheat, rye, and oats. The production of cotton, which was introduced before the nineteenth century, reached 506 bales by 1850 *(8, 14)*. Cotton was a staple cash crop by 1890. The first cotton mill in the county was established in 1813. Since the 1950's, the agricultural production of the county has changed from a predominance of cotton to more diversified products, including dairy cows, swine, small grain, soybeans, corn, broilers, truck crops, and beef cattle *(8)*. A large apple industry is in the western part of the county, which is now the second largest apple producing county in North Carolina.

Although agriculture is still an important part of the local economy, manufacturing is becoming increasingly important. It has become the largest source of employment in the county. Textiles are the single largest sector. In 1980, retail sales were 146 million dollars and gross farm income was 25 million dollars.

Physiography, Relief, and Drainage

The topography of Lincoln County is predominantly rolling to hilly. Elevation ranges from 650 feet above sea level at the southeast corner of the county to 1,480 feet at the northwest corner on Buffalo Knob. The valleys of the larger streams are worn so deep that the velocity of the streams has been reduced. Recurrent overflows have resulted in large areas of bottom land. These areas are extensive along the South Fork of the Catawba River, particularly in the central and northern parts of the county *(7)*.

The county is well drained. All of the streams in the county are perennial. Generally, drainage is into the Catawba River. Except for the drainage west of North Carolina Highway 274 that flows into Buffalo Creek, all of the surface water in the western part of the county flows into the South Fork of the Catawba River, mostly through Howards Creek and Indian Creek. This fork also receives the water from Clarks Creek and its tributaries. The eastern part of the county drains directly into the Catawba River or into Dutchmans Creek, which eventually empties into the Catawba River *(7)*.

Water Resources

Lincoln County has an abundant supply of water from rivers, streams, lakes, and ground water. Most rural, domestic water is supplied by wells. Municipal and county water systems are supplied by surface water from Lake Norman, the South Fork of the Catawba River, and Indian Creek.

Bored wells and drilled wells are the two types of wells in the county. Bored wells are the most common. They generally range from 20 to 60 feet in depth and from 18 to 24 inches in diameter. Drilled wells are less common than bored wells because of higher expenses. They are, however, more reliable than bored wells. The average yield of a well in the county is 12 gallons per minute. Part of the reason for this low average is that a majority of the wells are domestic wells that are not designed for large yields and may not have been tested at maximum capacity *(7)*.

Lake Norman, which is the largest lake in North Carolina, makes up about 5,376 acres of the county. It is on the eastern boundary of the county. It was formed by damming the Catawba River in 1961 for electrical power plants. Bodies of water less than 40 acres in size make up about 1,824 acres of the county.

Geology and Mineral Resources

P.A. Carpenter, III, geologist, North Carolina Department of Environment, Health, and Natural Resources, helped prepare this section.

Lincoln County is located on the boundary between three geologic belts. These are the Inner Piedmont belt, the Kings Mountain belt, and the Charlotte belt. Included in these belts are felsic, intermediate, and mafic, igneous, intrusive rocks. Felsic rocks are light colored, and mafic rocks are dark. Also included are intrusive, volcanic, and sedimentary rocks, which have been altered by intense heat and pressure to form gneisses, schists, and phyllites (metamorphic rocks). Most of the rocks in these belts are deeply weathered, leaving decomposed rocks and thick soil profiles at the land surface.

The Inner Piedmont belt is in the western half of the county. It is separated from the Kings Mountain belt, which is to the east, by the Kings Mountain fault. The most common rocks in the Inner Piedmont belt are layered biotite and hornblende gneisses and mica schists. These gneisses and schists were intruded by Toluca granite and Cherryville granite, which are major felsic, granitic bodies.

The Kings Mountain belt, which is northeast-trending, is approximately 12 miles wide in the county. Rocks in this belt are of volcanic and sedimentary origin but have been metamorphosed to sericite mica, phyllite, sericite schist, and quartz-sericite schist.

The Charlotte belt is in the extreme eastern part of the county. Rocks in this belt are primarily metamorphosed, felsic and intermediate, igneous, and intrusive.

The county has been mined or quarried for a variety of rocks. It lies near the northern end of the "Tin-Spodumene belt," which contains one of the largest reserves of lithium in the world. Tin- and lithium-bearing minerals occur in pegmatites (very coarse grained granitic rocks), primarily along the boundary between the Inner Piedmont and Kings Mountain belts. Originally tin was mined, but only lithium is currently produced. Small tin- and lithium-bearing pegmatites are common southeast of Lincolnton. Lithium is used principally by the aluminum, glass, and ceramic industries; in lithium greases; and in storage batteries *(13)*.

Lincoln County was an important producer of iron in the late 1700's and early 1800's. The major period of production was from 1820 to 1840. At this time metallic iron was produced at a rate of as much as 900 tons per year from deposits east of Lincolnton. Small deposits of marble are in the county. They were quarried for lime and as fluxing material for the iron industry. Prior to the Civil War, small amounts of gold were produced from at least seven mines in the county *(13)*.

Climate

Lincoln County has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short. Cold waves are rare and moderate in 1 or 2 days. Precipitation is fairly heavy throughout the year, and prolonged droughts are rare. Precipitation in the summer, mainly in the form of afternoon thunderstorms, is adequate for most locally grown crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Lincolnton, North Carolina, in the period 1952 to 1984. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter, the average temperature is 41 degrees F and the average daily minimum temperature is 30 degrees. The lowest temperature on record, which occurred at Lincolnton on January 11, 1982, is -2 degrees. In summer, the average temperature is 76 degrees and the average daily maximum temperature is 87 degrees. The highest recorded temperature, which occurred at Lincolnton on July 29, 1952, is 105 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 48 inches. Of this, 25 inches, or 52 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 12 inches. The heaviest 1-day rainfall during the period of record was 4.16 inches at Lincolnton on April 29, 1975. Thunderstorms occur on about 42 days each year.

Severe local storms, including tornadoes, occasionally strike in or near the county. They are short of duration and cause variable and spotty damage. Every few years in summer or autumn, a tropical depression or remnant of a hurricane that has moved inland causes extremely heavy rains for 1 to 3 days.

The average seasonal snowfall is 7 inches. The greatest snow depth at any one time during the period of record was 13 inches. On an average of 3 days a year at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 9.0 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in Lincoln County. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They studied many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil (fig. 2). It extends from the surface down into the unconsolidated material from which the soil formed. The

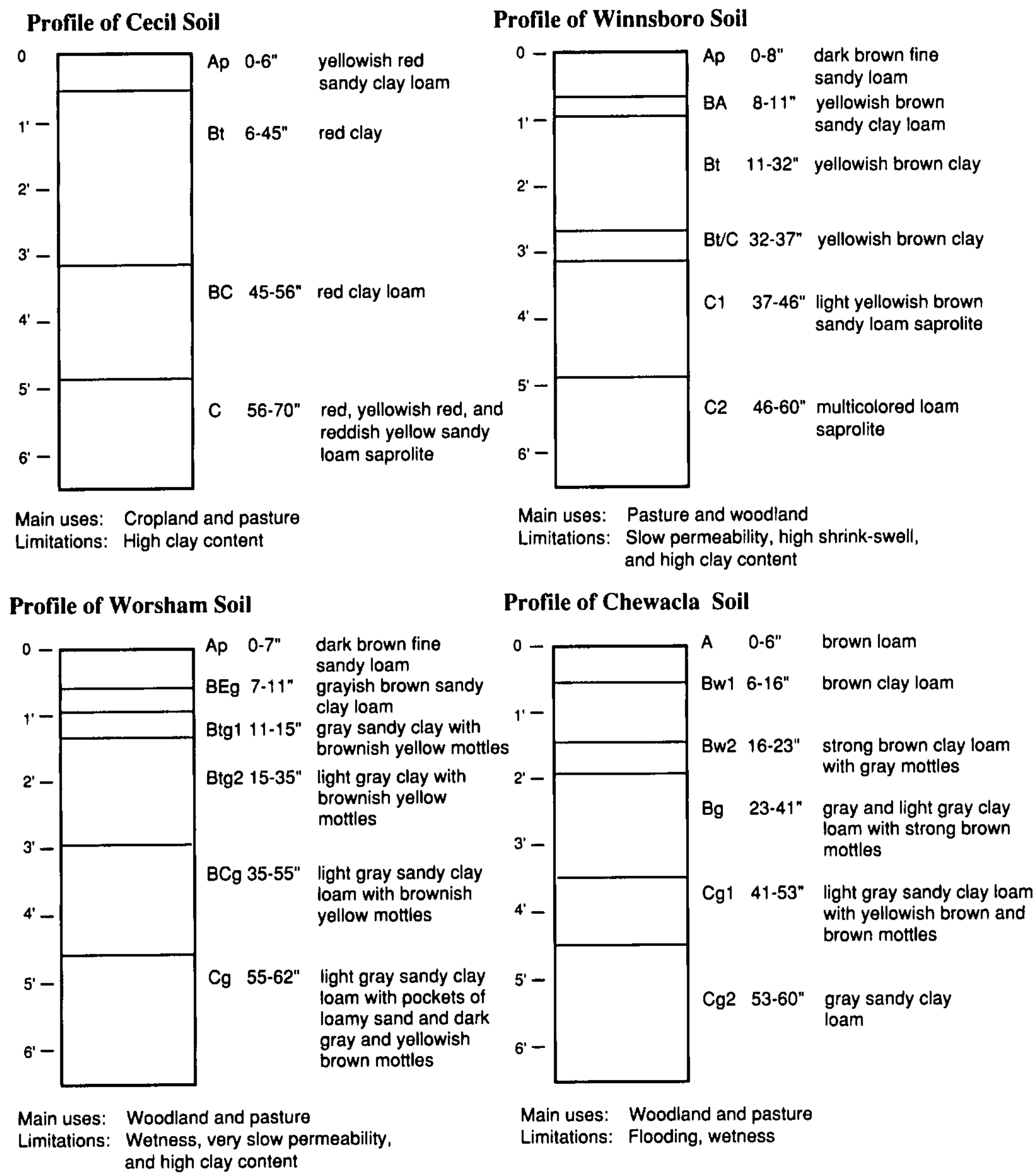


Figure 2.—The soil profiles, major uses, and limitations of four contrasting soils in Lincoln County.

unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Soils occur in an orderly pattern that results from the combined influence over time of climate, parent material, relief, and plants and animals. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. This model enables the soil scientists to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify the soils. After describing the soils and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. The data from these analyses and tests and from field-observed characteristics and soil properties are used to predict behavior of the soils under different uses. Interpretations are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

Soil boundaries are drawn on aerial photographs and each delineation is identified as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in accurately locating boundaries.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by two or three kinds of soils. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called minor soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are identified in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

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

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Some of the boundaries on the general soil map of Lincoln County do not exactly match those on the general soil map of Catawba and Gaston Counties. The differences are a result of changes in the proportion of similar soil series in the corresponding general soil map units.

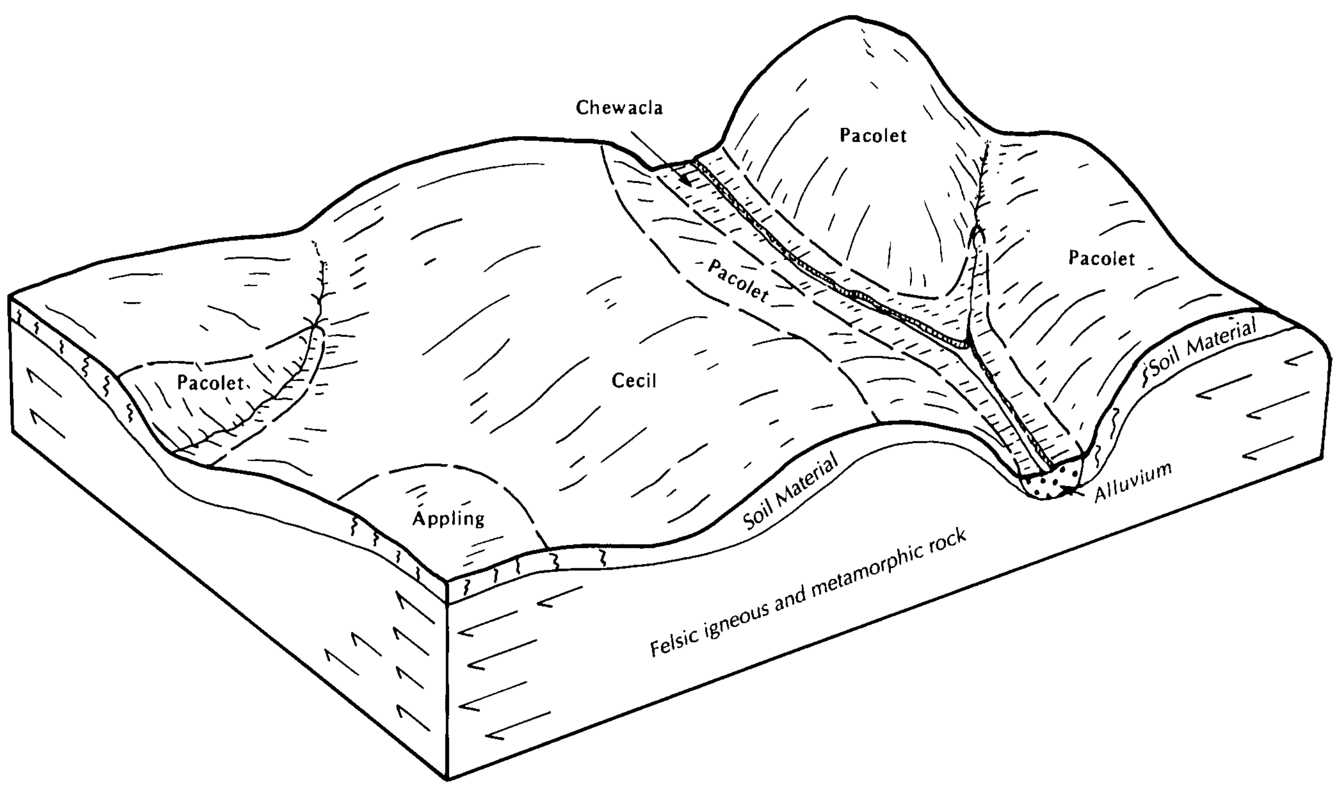


Figure 3.—Relationship of soils and parent material in the Cecil-Pacolet general soil map unit.

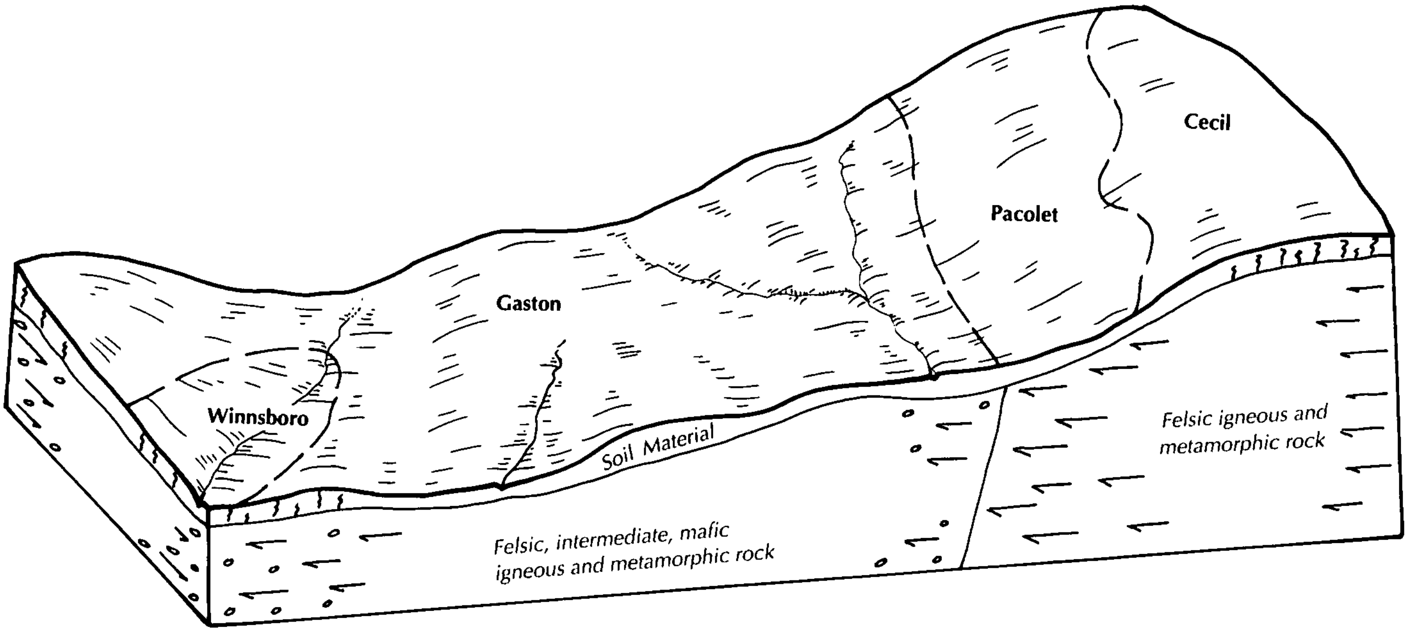


Figure 4.—Relationship of soils and parent material in the Gaston-Pacolet-Cecil general soil map unit.

1. Cecil-Pacolet

Gently sloping to steep, well drained soils that have a loamy surface layer and a predominantly clayey subsoil; formed in material weathered from felsic, igneous and metamorphic rock; on uplands

These soils are mainly in the central, northwestern, and northeastern parts of the county. The landscape consists of broad ridges and side slopes.

This map unit makes up 60 percent of the county. It is about 46 percent Cecil soils, 43 percent Pacolet soils, and 11 percent soils of minor extent (fig. 3).

The Cecil soils are on gently sloping, broad ridges. They have a surface layer of yellowish red sandy clay loam or brown sandy loam and a red subsoil that is predominantly clay.

The Pacolet soils are on gently sloping to steep side slopes and narrow ridges. They have a surface layer of reddish brown sandy clay loam or brown sandy loam and a red subsoil that is predominantly clay.

The minor soils include Appling, Gaston, Madison, Rion, Helena, Worsham, and Chewacla soils. Appling soils are on smooth ridges. Helena and Worsham soils are around the head of drainageways and along the drainageways. Chewacla soils are on flood plains. Gaston soils are on the lower parts of broad ridges. Madison and Rion soils are on narrow ridges and side slopes.

The Cecil soils are used mainly as cropland or pasture. The Pacolet soils are used mainly as woodland. The gently sloping Cecil soils and the gently sloping to strongly sloping Pacolet soils are well suited or moderately suited to cropland, pasture, woodland, and urban development. The moderately steep and steep Pacolet soils are moderately suited to woodland and pasture and poorly suited to cropland and urban development. The hazard of erosion and the slope are the main management concerns.

2. Gaston-Pacolet-Cecil

Gently sloping to steep; well drained soils that have a loamy surface layer and a predominantly clayey subsoil; formed in material weathered from felsic, intermediate, and mafic, igneous and metamorphic rock; on uplands

These soils are mainly in the eastern and north-central parts of the county. The landscape consists of broad to narrow ridges and side slopes.

This map unit makes up 15 percent of the county. It is about 45 percent Gaston soils, 23 percent Pacolet soils, 22 percent Cecil soils, and 10 percent soils of minor extent (fig. 4).

The Gaston soils are on broad ridges and strongly sloping and moderately steep side slopes. They formed in material weathered from intermediate and mafic rock. They have a surface layer of dark reddish brown sandy clay loam or dark brown loam and a dark red and red subsoil that is predominantly clay.

The Pacolet soils are on strongly sloping to steep side slopes and narrow ridges. They formed in material weathered from felsic rock. They have a surface layer of brown sandy loam or reddish brown sandy clay loam and a red subsoil that is predominantly clay.

The Cecil soils are on the higher parts of broad ridges. They formed in material weathered from felsic rock. They have a surface layer of brown sandy loam or yellowish red sandy clay loam and a red subsoil that is predominantly clay.

The minor soils include Winnsboro, Madison, Zion, Mocksville, Helena, and Worsham soils. Winnsboro soils are in gently sloping areas. Madison soils are on narrow ridges and side slopes. Zion and Mocksville soils are on moderately steep and steep side slopes. Winnsboro, Zion, and Mocksville soils are predominantly in an area west of Triangle. Helena and Worsham soils are around the head of drainageways and along the drainageways.

The gently sloping areas of Gaston and Cecil soils are used mainly as cropland or pasture. The rest of this unit is used mainly as woodland. The gently sloping to strongly sloping areas of Gaston and Pacolet soils and the gently sloping areas of Cecil soils are well suited or moderately suited to cropland, pasture, woodland, and urban development. A moderate shrink-swell potential is a limitation in the Gaston soils. The moderately steep and steep Gaston and Pacolet soils are poorly suited to cropland and urban development. They are moderately suited to woodland. The hazard of erosion and the slope are the main management concerns.

3. Pacolet-Madison-Rion

Gently sloping to steep, well drained soils that have a loamy surface layer and a clayey or loamy subsoil; formed in material weathered from felsic, igneous and metamorphic rock; on uplands

These soils are mainly northeast of Lincolnton. The landscape consists of broad, smooth ridges; narrow ridges; and side slopes.

This map unit makes up 11 percent of the county. It is about 65 percent Pacolet soils, 18 percent Madison soils, 7 percent Rion soils, and 10 percent soils of minor extent (fig. 5).

The Pacolet soils are on gently sloping to steep side slopes and narrow ridges. They have a surface layer of reddish brown sandy clay loam or brown sandy loam and a red subsoil that is predominantly clay.

The Madison soils are on gently sloping to moderately steep side slopes and narrow ridges. They have a surface layer of yellowish red sandy clay loam or yellowish brown sandy loam and a subsoil that is predominantly red clay. They have a high content of mica flakes.

The Rion soils are on gently sloping narrow ridges

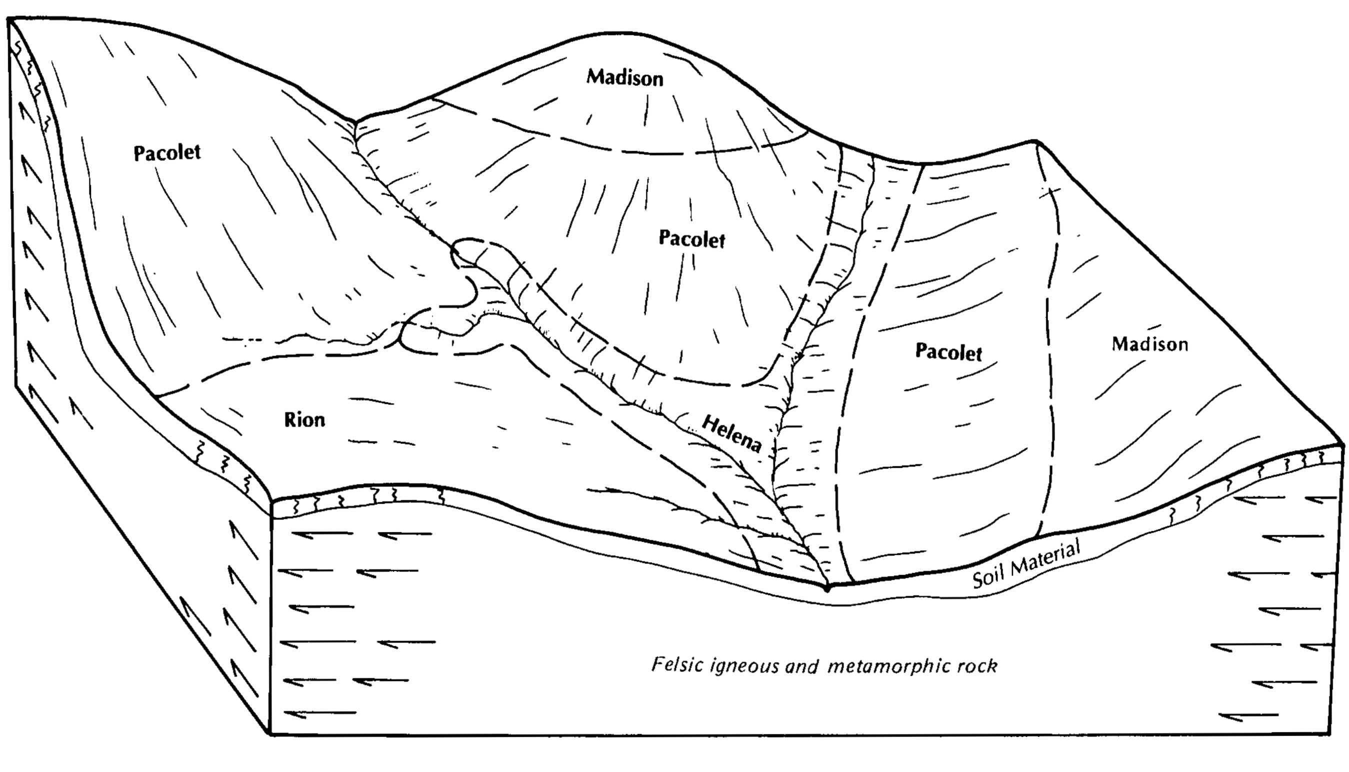


Figure 5.—Relationship of soils and parent material in the Pacolet-Madison-Rion general soil map unit.

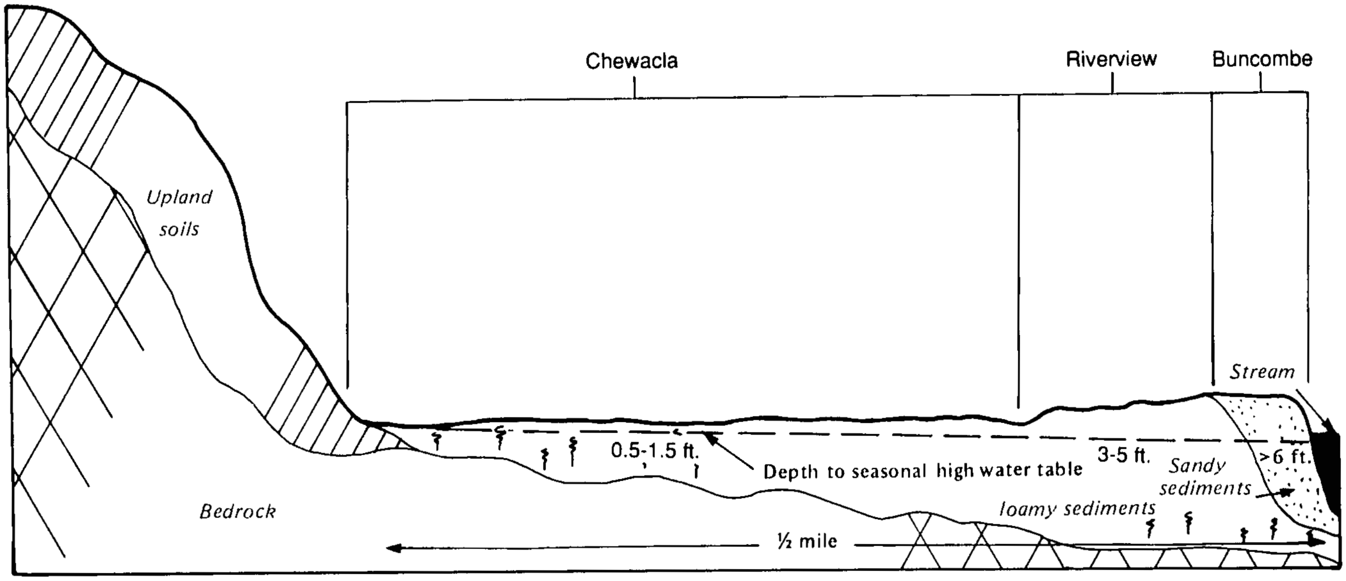


Figure 6.—Relationship of soils, parent material, and seasonal high water table in the Chewacla-Riverview general soil map unit.

and strongly sloping side slopes. They have a surface layer of yellowish brown sandy loam and a brownish yellow subsoil that is predominantly sandy clay loam.

The minor soils include Helena and Worsham soils around the head of drainageways and along the drainageways and Cecil and Appling soils on broad, smooth ridges.

The gently sloping areas of this unit are used mainly as cropland or pasture. The strongly sloping and moderately steep areas are used mainly as woodland. The gently sloping and strongly sloping areas of the major soils are well suited or moderately suited to cropland, pasture, woodland, and urban development. The strongly sloping and moderately steep areas are moderately suited to woodland and poorly suited to cropland, pasture, and urban development. The hazard of erosion and the slope are the main management concerns.

4. Chewacla-Riverview

Nearly level, somewhat poorly drained to well drained soils that have a loamy surface layer and a loamy subsoil; formed in recent alluvium; on flood plains

These soils are along the major streams in the county. The largest areas are along the South Fork of the Catawba River and Clark Creek. Areas of the unit are long and narrow and are at the lowest elevations in the county.

This map unit makes up 6 percent of the county. It is about 63 percent Chewacla soils, 15 percent Riverview soils, and 22 percent soils of minor extent (fig. 6).

The Chewacla soils are somewhat poorly drained. They are in the lower areas away from the larger stream channels. They have a surface layer of brown loam and a subsoil that is strong brown, brown, light gray, and gray clay loam.

The Riverview soils are well drained. They are in the slightly higher areas near the larger stream channels. They have a surface layer of dark yellowish brown loam and a subsoil that is brown and strong brown loam and sandy loam.

The minor soils include Buncombe soils along stream channels and Altavista soils on stream terraces at the slightly higher elevations.

The Chewacla soils, which are used mainly as woodland, are moderately suited to woodland. They are poorly suited to cropland and pasture unless drained and protected from flooding. Flooding and wetness are the main management concerns. The Riverview soils, which are used mainly as pasture and cropland, are well suited to cropland, pasture, and woodland. They are poorly suited to urban development. Occasional flooding is the main management concern.

5. Georgeville

Gently sloping to moderately steep, well drained soils that have a loamy surface layer and a predominantly clayey subsoil; formed in material weathered from sericite schist and phyllite; on uplands

These soils are mainly in the south-central part of the county. The landscape consists of broad to narrow ridges and strongly sloping and moderately steep side slopes.

This map unit makes up 5 percent of the county. It is about 90 percent Georgeville soils and 10 percent soils of minor extent.

The Georgeville soils have a surface layer of strong brown loam or yellowish red clay loam and a red subsoil that is predominantly clay.

The minor soils include Helena and Worsham soils around the head of drainageways and along the drainageways.

About three-fourths of the acreage in this unit is used as woodland. The gently sloping and strongly sloping Georgeville soils are well suited or moderately suited to cropland, pasture, woodland, and urban development. The moderately steep Georgeville soils are moderately suited to woodland and pasture and poorly suited to cropland and urban development. The hazard of erosion and the slope are the main management concerns.

6. Pacolet-Madison-Urban land

Gently sloping to strongly sloping, well drained soils that have a loamy surface layer and a predominantly clayey subsoil and Urban land; formed in material weathered from felsic, igneous and metamorphic rock; on uplands

This unit is in the commercial, industrial, and residential areas of Lincolnton and other communities in the county. It makes up 3 percent of the county. It is about 30 percent Pacolet soils, 25 percent Madison soils, 10 percent Urban land, and 35 percent soils of minor extent.

The Pacolet soils are on narrow ridges and strongly sloping side slopes. They have a surface layer of reddish brown sandy clay loam and a red subsoil that is predominantly clay.

The Madison soils are on narrow ridges and strongly sloping side slopes. They have a surface layer of yellowish red sandy clay loam and a subsoil that is predominantly red clay. They have a high content of mica flakes.

The Urban land consists of areas covered by impervious material.

The minor soils include Rion soils, which are located mainly in northeast Lincolnton, and Helena and Worsham soils around the head of drainageways and along the drainageways.

This unit is used almost entirely for urban purposes and is highly unlikely to be used for cropland, pasture, or woodland. The hazard of erosion, the slope, and surface runoff are the main management concerns. The gently sloping to strongly sloping Madison and Pacolet soils are well suited or moderately suited to urban development.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit is given under the heading "Use and Management of the Soils."

The map units on the detailed soil maps represent areas on the landscape and consist mainly of one or more soils for which the units are named.

Symbols identifying the soils precede the map unit names in the map unit descriptions. The descriptions include general facts about the soils and give the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series.* Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases.* Most of the areas shown on the detailed soil maps are named as phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Pacolet sandy clay loam, 8 to 15 percent slopes, eroded, is a phase of the Pacolet series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more dominant soils, or miscellaneous land areas, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. The Zion-Winnsboro-Mocksville complex, 8 to 15 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

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

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and suitabilities for many uses. The "Glossary" defines many of the terms used in describing the soils.

AaA—Altavista sandy loam, 0 to 2 percent slopes, rarely flooded. This map unit consists mainly of very deep, moderately well drained, nearly level Altavista and similar soils on stream terraces, mostly along the South Fork of the Catawba River and along Clark Creek. Some small areas are along other major creeks. Individual areas are irregular in shape and range from 4 to 30 acres in size.

Typically, the surface layer is yellowish brown sandy loam 10 inches thick. The subsoil is 47 inches thick. In sequence downward, it is yellowish brown sandy loam; yellowish brown sandy clay loam; yellowish brown sandy clay loam that has mottles in shades of gray, yellow, and red; and gray sandy clay loam that has mottles in shades of yellow and brown. The underlying material to a depth of 62 inches is gray sandy loam that has mottles in shades of brown and yellow.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 10 feet. The seasonal high water table is 1.5 to 2.5 feet below the surface. This soil is subject to rare flooding. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the well drained Masada soils on small knolls at the base of uplands and the somewhat poorly drained Chewacla soils along small drainageways and on the lower parts of the flood plains. Also included are small areas of poorly drained soils in depressions and along drainageways and moderately well drained soils that have a clayey subsoil. The dissimilar included soils make up about 5 to 10 percent of the unit.

This map unit is not very extensive in Lincoln County. Most of the acreage is used as cropland or pasture. The rest is used as woodland.

This map unit is well suited to cultivated crops, such as corn, soybeans, and small grain. Surface runoff and wetness are the main limitations. A drainage system that includes tile and open ditches may be needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is well suited to woodland. Loblolly pine, shortleaf pine, southern red oak, white oak, hickory, sweetgum, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, red maple, poison ivy, and honeysuckle. No major limitations affect woodland management.

This map unit is poorly suited to building site development and sanitary facilities. It is moderately suited to most types of recreational development. Seasonal wetness and rare flooding in low areas are the major management concerns. A drainage system that includes land grading improves surface drainage, and tile and open ditches help to lower the water table. The hazard of flooding should be determined before the use and management of specific sites are planned.

The capability subclass is IIw. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9A.

ApB—Appling sandy loam, 1 to 6 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Appling and similar soils on broad, smooth ridges in the uplands. It is in scattered areas throughout the county. Some of the larger units are around Flay. Individual areas are irregular in shape and range from 4 to 100 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 8 inches thick. The subsoil is 39 inches thick. In sequence downward, it is yellowish brown sandy clay loam, yellowish brown clay, yellowish brown clay loam, and yellowish red sandy clay loam. It has mottles in shades of red, brown, and yellow in the middle and lower parts. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of sandy loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 6 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along intermittent drainageways and at the head of drainageways. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Appling soil but have a subsoil that is red or less clayey, are moderately eroded, or contain more mica.

Most of the acreage in this unit is used as cropland or pasture. The rest is mainly used as woodland or for urban development.

This map unit is well suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is well suited to woodland. Loblolly pine, shortleaf pine, southern red oak, white oak, hickory, sweetgum, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, blackberry, eastern redcedar, running cedar, and red maple. No major limitations affect woodland management.

This map unit is well suited to building site development and recreational development. It is moderately suited to sanitary facilities, such as septic tank absorption fields and sewage lagoons. The moderate permeability, a high content of clay in the subsoil, and seepage are the main limitations. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

BnB—Buncombe sand, 0 to 5 percent slopes, rarely flooded. This map unit consists mainly of very deep, excessively drained Buncombe and similar soils in nearly level to gently sloping areas of flood plains adjacent to major creeks and rivers throughout the county. Some of the larger areas are northwest of Lincolnton, along the South Fork of the Catawba River. Individual areas are long and narrow and range from 5 to 80 acres in size.

Typically, the surface layer is dark yellowish brown sand 10 inches thick. The underlying material to a depth of 61 inches is yellowish brown and strong brown sand.

Permeability is rapid or very rapid. The shrink-swell potential is low in the subsoil. The seasonal high water table is more than 6 feet below the surface. This soil is subject to rare flooding for brief periods during winter and spring. The depth to bedrock is more than 10 feet. Reaction ranges from very strongly acid to slightly acid.

Included in this unit in mapping are small areas of dissimilar soils. These are the loamy, well drained Riverview soils throughout the unit and the loamy, somewhat poorly drained Chewacla soils in the slightly lower areas, generally away from the stream channel. Also included, generally in depressions, are a few areas of poorly drained and somewhat poorly drained soils that are loamy sands and sands. The dissimilar included soils make up about 10 to 15 percent of the unit.

Most of the acreage in this unit is used as pasture or a source of sand for construction material. The rest is used as woodland.

This map unit is poorly suited to most cultivated crops, such as corn and soybeans. These crops generally produce low yields because the soil is droughty and has a low available water capacity. The unit is moderately suited to hay and pasture. Tall fescue, sericea lespedeza, and bahiagrass are the main forage crops.

This map unit is moderately suited to woodland. Yellow-poplar, loblolly pine, eastern cottonwood, elm, sweetgum, northern red oak, southern red oak, and American sycamore are the most common trees. The most common understory plants are alder and red mulberry. The sandy surface layer is a moderate limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is poorly suited to building site development, sanitary facilities, and recreational development. The flooding, seepage, and the sandy surface layer are the major management concerns. The unit is a good source of sand for construction material.

The capability subclass is IIIs. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 8S.

CcB—Cecil sandy loam, 2 to 8 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Cecil and similar soils on broad ridges in the uplands. Some of the larger areas are in the western third of the county. Smaller areas are throughout the county. Individual areas are irregular in shape and range from 10 to 200 acres in size.

Typically, the surface layer is brown sandy loam 4 inches thick. The subsurface layer is yellowish brown sandy loam 3 inches thick. The subsoil is 52 inches thick. In the upper part it is red clay. In the lower part it is red clay loam that has reddish yellow mottles. The underlying material to a depth of 70 inches is red, yellowish red, and reddish yellow saprolite that has a texture of sandy loam. In some small areas the soil is moderately eroded and has a surface layer of sandy clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 6.5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and subsurface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along drainageways. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Cecil soil but have a clayey subsoil that is yellowish brown, dark red, or thinner; are moderately eroded; or contain more mica.

Most of the acreage in this unit is hardwood forest (fig. 7). The rest is used as cropland or pasture.

This map unit is well suited to woodland. Loblolly pine, southern red oak, northern red oak, white oak, hickory, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, eastern redcedar, red maple, and running cedar. No major limitations affect woodland management.

This map unit is well suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is well suited to building site development and recreational development. It is moderately suited to sanitary facilities, such as septic tank absorption fields and sewage lagoons. A high content of clay in the subsoil and the moderate permeability are the main limitations. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed.

Figure 7.—Hardwood trees in an area of Cecil sandy loam, 2 to 8 percent slopes.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

CeB2—Cecil sandy clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Cecil and similar soils on broad ridges in the uplands. It is located throughout the county. Some of the larger areas are in the western third of the county and the east-central part of the county. Individual areas are irregular in shape and range from 10 to 200 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is yellowish red sandy clay loam 6 inches thick. The subsoil is 50 inches thick. In the upper part it is red clay. In the lower part it is red clay loam that has reddish yellow mottles. The underlying material to a depth of 70 inches is red, yellowish red, and reddish yellow saprolite that has a texture of sandy loam. In some small areas the soil is severely eroded and has a surface layer of sandy clay or clay.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 6.5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of further erosion is severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along drainageways. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Cecil soil but have a subsoil that is yellowish brown, dark red, or thinner; are moderately eroded; or contain more mica.

Most of the acreage in this unit is used as cropland or pasture. The rest is used as woodland.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, the texture of the surface layer, surface runoff, and the hazard of further erosion are the main management concerns. Maintaining good tilth is difficult because of the surface layer of sandy clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Conservation practices that maintain a plant cover help to control erosion and add organic matter to the soil. The unit is moderately suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, southern red oak, northern red oak, white oak, hickory, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, eastern redcedar, red maple, and running cedar. A high content of clay in the surface layer is the main limitation affecting woodland management.

This map unit is well suited to building site development and recreational development. It is moderately suited to sanitary facilities, such as septic tank absorption fields and sewage lagoons. A high content of clay in the subsoil and the moderate permeability are the main limitations. The removal of vegetation at construction sites causes a severe hazard of further erosion. Erosion-control measures are needed.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7C.

ChA—Chewacla loam, 0 to 2 percent slopes, frequently flooded. This map unit consists mainly of very deep, somewhat poorly drained, nearly level Chewacla and similar soils on flood plains along creeks and rivers throughout the county. Some of the larger areas are along the South Fork of the Catawba River, Clark Creek, Indian Creek, and Killian Creek. Individual areas are long and irregular in width. They range from 5 to more than 150 acres in size.

Typically, the surface layer is brown loam 6 inches thick. The subsoil is 35 inches thick. In sequence downward, it is brown clay loam, strong brown clay loam that has gray and reddish yellow mottles, and gray and light gray clay loam that has strong brown mottles. The underlying material to a depth of 60 inches is gray sandy clay loam that has yellowish brown and brown mottles.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The seasonal high water table is within a depth of 0.5 foot to 1.5 feet. This soil is frequently flooded for brief periods, mostly during winter and spring. The depth to bedrock is more than 5 feet. Reaction ranges from very strongly acid to slightly acid.

Included in this unit in mapping are small areas of dissimilar soils. These are the well drained Riverview soils in the slightly higher areas closer to stream channels; the excessively drained, sandy Buncombe soils adjacent to the stream channel; and the moderately well drained Altavista soils on small stream terraces. Also included are some small areas of poorly drained, loamy soils in depressions and close to side slopes. These poorly drained soils make up as much as 10 percent of some mapped areas. The dissimilar included soils make up about 10 to 15 percent of the unit.

Most of the acreage in this unit is used as woodland. The rest is used as pasture or cropland.

This map unit is moderately suited to woodland. Loblolly pine, yellow-poplar, American sycamore, sweetgum, water oak, green ash, and eastern cottonwood are the major canopy trees. The most common understory plants are flowering dogwood, willow oak, sourwood, American holly, arrowhead, and poison ivy. Wetness is the main limitation affecting woodland management. It limits the use of equipment.

Unless drained and protected from flooding during the growing season, this soil is poorly suited to cultivated crops. The wetness and the frequent flooding are the main management concerns (fig. 8). The major crops are corn, soybeans, and small grain. This soil is moderately suited to pasture. Tall fescue and ladino clover are the main forage crops. Proper rotation and timely deferment of grazing during wet periods help to reduce compaction and maintain tilth. A lack of suitable outlets is a limitation affecting the installation of drainage systems.

This map unit is poorly suited to building site development, sanitary facilities, and recreational development because of the wetness and the flooding.

The capability subclass is IVw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 7W.

GaD—Gaston loam, 15 to 25 percent slopes. This map unit consists mainly of very deep, well drained, moderately steep Gaston and similar soils on side slopes in the uplands. Most areas are around Triangle and in the northwest-central part of the county, along the South Fork of the Catawba River. Individual areas are oblong and irregular in width. They range from 5 to 50 acres in size.

Typically, the surface layer is dark brown loam 6 inches thick. The subsoil is 46 inches thick. It is dark red clay in the upper part, red clay in the next part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is red and yellowish red saprolite that has a texture of loam. In some small areas the soil is moderately eroded and has a surface layer of sandy clay loam.

Permeability is moderate. The shrink-swell potential is moderate in the subsoil. The depth to bedrock is more than 6 feet. The water table is below a depth of 6 feet. Reaction is strongly acid to slightly acid. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of

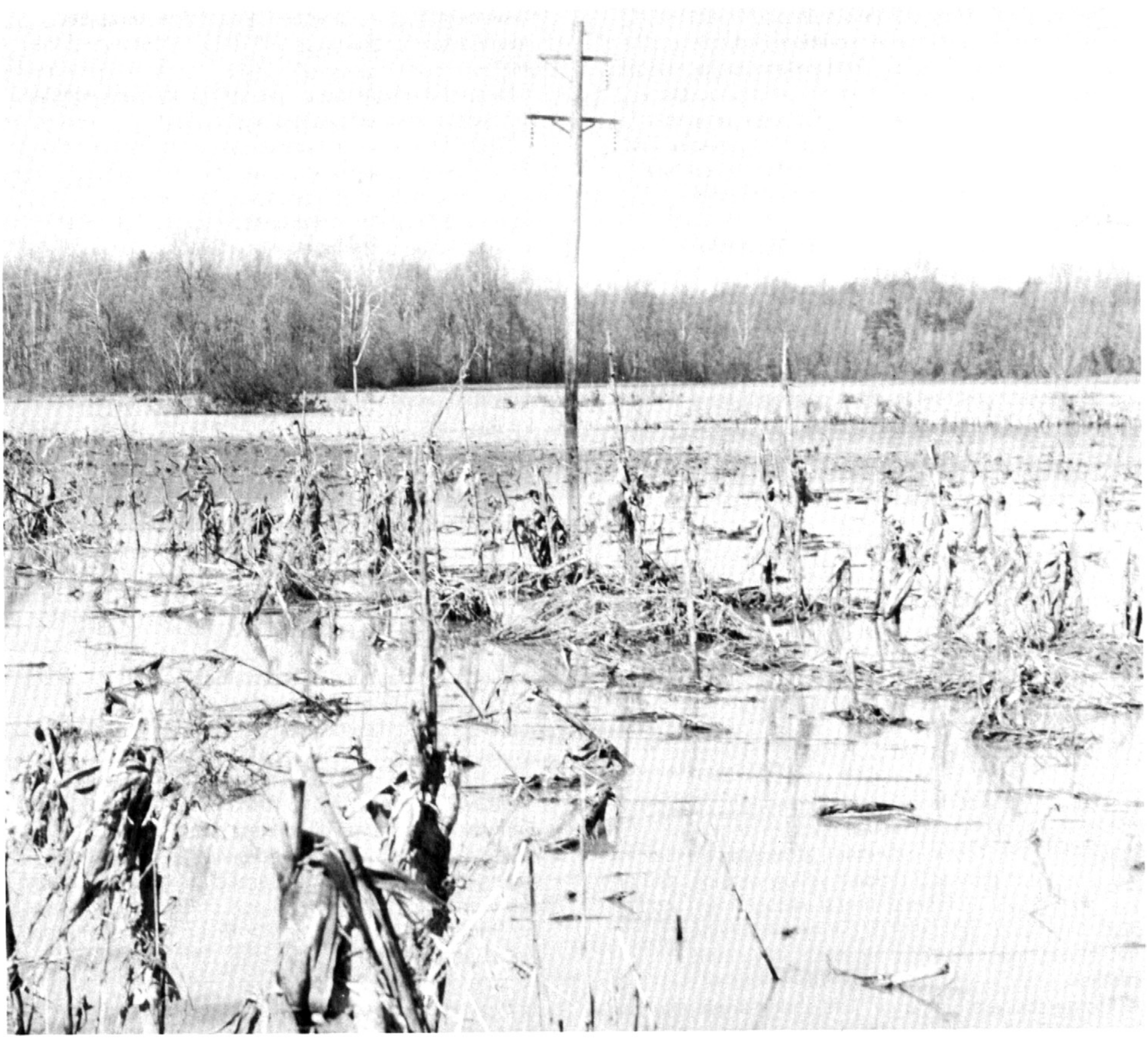


Figure 8.—Flooding in a cultivated area of Chewacla loam, 0 to 2 percent slopes, frequently flooded.

dissimilar soils. These are Winnsboro soils on the lower parts of the slope and Zion soils at the end of narrow ridges. Winnsboro and Zion soils have a yellowish brown subsoil. Winnsboro soils have a high shrink-swell potential in the subsoil and are slowly permeable. Zion soils have bedrock within a depth of 40 inches. The dissimilar included soils make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Gaston soil but have a subsoil that is yellowish brown, lighter red, or thinner; are moderately eroded; or contain more mica.

Most of the acreage in this unit is used as woodland. The rest is used mainly as pasture.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, hickory, yellow-poplar, and sweetgum are the most common trees. The most common understory plants are flowering dogwood, American holly, eastern redcedar, sourwood, eastern hophornbeam, muscadine grape, and brackenfern. The slope, the hazard of erosion, and an equipment limitation are the main management concerns.

This map unit is moderately suited to pasture. Tall fescue and ladino clover are the main forage crops. The slope, surface runoff, and a very severe hazard of erosion are the main management concerns. Conservation practices that help to control runoff and erosion are needed in cleared areas. The unit is poorly suited to cropland because of the slope and the severe hazard of erosion.

This map unit is poorly suited to building site development, sanitary facilities, and recreational development. The slope is the major limitation. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is VIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 9R.

GnB2—Gaston sandy clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Gaston and similar soils on broad ridges in the uplands throughout the county. The most extensive areas are around Triangle and in the northwest-central part of the county, along the South Fork of the Catawba River. Individual areas are irregular in shape and range from 10 to 200 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is dark reddish brown sandy clay loam 8 inches thick. The subsoil is 47 inches thick. It is dark red clay in the upper part, red clay in the next part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is red and yellowish red saprolite that has a texture of loam. In some small areas the soil is slightly eroded and has a surface layer of loam.

Permeability is moderate. The shrink-swell potential is moderate in the subsoil. The depth to bedrock is more than 6 feet. The water table is also below a depth of 6 feet. Reaction is strongly acid to slightly acid. The hazard of further erosion is severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the browner, slowly permeable Winnsboro soils on the lower parts of slopes and along small drainageways. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Gaston soil but have a subsoil that is lighter red or thinner, are slightly eroded, or contain more mica.

Most of the acreage in this unit is used as cropland or pasture. The rest is used as woodland.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, the texture of the surface layer, surface runoff, and the hazard of further erosion are the main management concerns. Maintaining good tilth is difficult because of the surface layer of sandy clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Conservation practices that provide a plant cover help to control erosion and add organic matter to the soil. The unit is moderately suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, northern red oak, southern red oak, white oak, hickory, yellow-poplar, and sweetgum are the most common trees. The most common understory plants are flowering dogwood, sourwood, winged elm, American holly, black cherry, eastern redcedar, eastern redbud, red maple, runningcedar, poison ivy, and honeysuckle. A high content of clay in the surface layer is the main limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is moderately suited to building site development and sanitary facilities, such as septic tank absorption fields and sewage lagoons. A high content of clay in the subsoil, the moderate permeability, and the moderate shrink-swell potential in the subsoil are the main limitations. Because the subsoil shrinks and swells with changes in moisture content, foundations should be designed to resist cracking. The unit is well suited to recreational development. The removal of vegetation at construction sites causes a severe hazard of further erosion. Erosion-control measures are needed.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8C.

GnC2—Gaston sandy clay loam, 8 to 15 percent slopes, eroded. This map unit consists mainly of very deep, well drained, strongly sloping Gaston and similar soils on side slopes in the uplands throughout the county. The most extensive areas are around Triangle and in the northwest-central part of the county, along the South Fork of the Catawba River. Individual areas are oblong and irregular in width. They range from 5 to 100 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is dark reddish brown sandy clay loam 8 inches thick. The subsoil is 47 inches thick. It is dark red clay in the upper part, red clay in the next part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is red and yellowish red saprolite that has a texture of loam. In some small areas the soil is slightly eroded and has a surface layer of loam.

Permeability is moderate. The shrink-swell potential is moderate in the subsoil. The depth to bedrock is more than 6 feet. The water table is below a depth of 6 feet. Reaction is strongly acid to slightly acid. The hazard of further erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along drainageways and Zion and Winnsboro soils at the end of ridges and on the lower parts of the slopes. Zion and Winnsboro soils have a yellowish brown subsoil. Zion soils have bedrock within a depth of 40 inches. Winnsboro soils have a high shrink-swell potential and are slowly permeable. The dissimilar included soils make up about 5 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Gaston soil but have a subsoil that is lighter red, less clayey, or thinner; are slightly eroded; or contain more mica.

Most of the acreage in this unit is used as cropland or pasture. The rest is used as woodland.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, the texture of the surface layer, surface runoff, and the hazard of further erosion are the main management concerns. Maintaining good tilth is difficult because of the surface layer of sandy clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is moderately suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, southern red oak, northern red oak, white oak, hickory, yellow-poplar, and sweetgum are the most common trees. The most common understory plants are flowering dogwood, sourwood, winged elm, American holly, eastern redcedar, red maple, Christmas fern, and Virginia creeper. A high content of clay in the surface layer is the main limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is moderately suited to most types of building site development, most types of sanitary facilities, and recreational development. It is poorly suited to sewage lagoons because of the slope. A high content of clay in the subsoil, the moderate permeability, the moderate shrink-swell potential in the subsoil, and the slope are the main limitations affecting building site development and sanitary facilities. The slope is the main limitation affecting recreational development. Because the subsoil shrinks and swells with changes in moisture content, foundations should be designed to resist cracking. The removal of vegetation at construction sites causes a very severe hazard of further erosion. Erosion-control measures are needed.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8C.

GrB—Georgeville loam, 2 to 8 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Georgeville and similar soils on broad ridges in the uplands. Most areas are in a belt from southeast of Lincolnton to Pumpkin Center. Individual areas are irregular in shape and range from 4 to 100 acres in size.

Typically, the surface layer is strong brown loam 6 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 43 inches thick. It is yellowish red clay loam in the upper part, red clay in the next part, and red silty clay loam in the lower part. The underlying material to a depth of 62 inches is red saprolite that has mottles in shades of yellow, red, and white and has a texture of silt loam. In some small areas the soil is moderately eroded and has a surface layer of clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along intermittent drainageways and in depressions. Also included are soils that are less than 60 inches deep over bedrock.

The dissimilar included soils make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Georgeville soil but contain less silt, have a subsoil that is less clayey or yellowish brown, are moderately eroded, or have a surface layer of gravelly loam.

Most of the acreage in this unit is used as woodland. The rest is mainly used as cropland or pasture. A few areas are used for urban development.

This map unit is well suited to woodland. Chestnut oak, loblolly pine, shortleaf pine, yellow-poplar, northern red oak, white oak, hickory, and southern red oak are the most common trees. The most common understory plants are flowering dogwood, black cherry, sourwood, sassafras, mountain laurel, running cedar, and common greenbrier. No major limitations affect woodland management.

This map unit is well suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the major management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is well suited to building site development and most types of recreational development. It is moderately suited to sanitary facilities, such as septic tank absorption fields and sewage lagoons. A high content of clay in the subsoil and the moderate permeability are the main limitations affecting building site development and sanitary facilities. Small stones are the main limitation affecting recreational development. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

GrC—Georgeville loam, 8 to 15 percent slopes. This map unit consists mainly of very deep, well drained, strongly sloping Georgeville and similar soils on side slopes in the uplands. Most areas are in a belt from southeast of Lincolnton to Pumpkin Center. Individual areas are oblong and irregular in width. They range from 4 to 60 acres in size.

Typically, the surface layer is strong brown loam 6 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 43 inches thick. It is yellowish red clay loam in the upper part, red clay in the next part, and red silty clay loam in the lower part. The underlying material to a depth of 62 inches is red saprolite that has mottles in shades of yellow, red, and white and has a texture of silt loam. In some small areas the soil is moderately eroded and has a surface layer of clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along drainageways. Also included are areas of soils that are less than 60 inches deep over bedrock. The dissimilar included soils make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Georgeville soil but contain less silt, have a subsoil that is less clayey or yellowish brown, are moderately eroded, or have a surface layer of gravelly loam.

Most of the acreage in this unit is used as woodland. The rest is mainly used as cropland or pasture. A few areas are used for urban development.

This map unit is well suited to woodland. Chestnut oak, loblolly pine, shortleaf pine, yellow-poplar, northern red oak, white oak, hickory, and southern red oak are the most common trees. The most common understory plants are flowering dogwood, black cherry, sourwood, sassafras, mountain laurel, running cedar, and common greenbrier. No major limitations affect woodland management.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the major limitations. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to building site development, most types of sanitary facilities, and most types of recreational development. It is poorly suited to sewage lagoons because of the slope and to paths and trails because of the hazard of erosion. A high content of clay in the subsoil, the moderate permeability, and the slope are the main limitations affecting building site development and sanitary facilities, such as septic tank absorption fields. The slope and small stones are the main limitations affecting recreational development. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

GrD—Georgeville loam, 15 to 25 percent slopes. This map unit consist of very deep, well drained, moderately steep Georgeville and similar soils on side slopes in the uplands. Most areas are in a belt from southeast of Lincolnton to Pumpkin Center. Individual areas are oblong and irregular in width. They range from 4 to 40 acres in size.

Typically, the surface layer is strong brown loam 6 inches thick. The subsurface layer is brown loam 3 inches thick. The subsoil is 43 inches thick. It is yellowish red clay loam in the upper part, red clay in the next part, and red silty clay loam in the lower part. The underlying material to a depth of 62 inches is red saprolite that has mottles in shades of yellow, red, and white and has a texture of silt loam. In some small areas the soil is moderately eroded and has a surface layer of clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are Georgeville soils that have a surface layer of gravelly loam and some boulders. They usually are on the upper and steepest parts of the slopes. Also included are small areas of soils that have bedrock within a depth of 3 feet. The dissimilar included soils make up about 5 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Georgeville soil but contain less silt, have a subsoil that is less clayey or yellowish brown, are moderately eroded, or have a surface layer of gravelly loam.

Most of the acreage in this unit is used as woodland. The rest is mainly used as pasture.

This map unit is moderately suited to woodland. Chestnut oak, loblolly pine, shortleaf pine, yellow-poplar, northern red oak, white oak, hickory, and southern red oak are the most common trees. The most common understory plants are flowering dogwood, American holly, sourwood, eastern hophornbeam, mountain laurel, and common greenbrier. The slope, the hazard of erosion, and an equipment limitation are the main management concerns.

This map unit is poorly suited to cropland. It is moderately suited to pasture. Tall fescue and ladino clover are the main forage crops. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed.

This map unit is poorly suited to building site development, sanitary facilities, and recreational development because of the slope. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is VIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8R.

GvB2—Georgeville clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Georgeville and similar soils on broad ridges in the uplands. Most areas are in a belt from southeast of Lincolnton to Pumpkin Center. Individual areas are irregular in shape and range from 4 to 100 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is yellowish red clay loam 5 inches thick. The subsoil is 41 inches thick. It is red clay loam in the upper part, red clay in the next part, and red silty clay loam in the lower part. The underlying material to a depth of 62 inches is red saprolite that has mottles in shades of yellow, red, and white and has a texture of silt loam. In some small areas the soil is slightly eroded and has a surface layer of loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of further erosion is severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along intermittent drainageways and in depressions. Also included are areas of soils that are less than 60 inches deep over bedrock. The dissimilar included soils make up about 5 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Georgeville soil but are less silty; have a subsoil that is thinner, yellowish brown, or less clayey; or are slightly eroded.

Most of the acreage in this unit is used as cropland or pasture. The rest is mainly used as woodland. A few areas are used for urban development.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of further erosion are the major limitations. Maintaining good tilth is difficult because of the surface layer of clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is moderately suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Chestnut oak, loblolly pine, northern red oak, white oak, hickory, red maple, and post oak are the most common trees. The most common understory plants are flowering dogwood, black cherry, sourwood, sassafras, mountain laurel, running cedar, and common greenbrier. A high content of clay in the surface layer is the main limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is well suited to building site development and most types of recreational development. It is moderately suited to sanitary facilities, such as septic tank absorption fields and sewage lagoons. A high content of clay in the subsoil and the moderate permeability are the main limitations affecting building site development and sanitary facilities. Small stones are the main limitation affecting recreational development. The removal of vegetation at construction sites causes a severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6C.

GvC2—Georgeville clay loam, 8 to 15 percent slopes, eroded. This map unit consists mainly of very deep, well drained, strongly sloping Georgeville and similar soils on side slopes in the uplands. Most areas are in a belt from southeast of Lincolnton to Pumpkin Center. Individual areas are oblong and irregular in width. They range from 4 to 60 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is yellowish red clay loam 5 inches thick. The subsoil is 41 inches thick. It is red clay loam in the upper part, red clay in the next part, and red silty clay loam in the lower part. The underlying material to a depth of 62 inches is red saprolite that has mottles in shades of yellow, red, and white and has a texture of silt loam. In some small areas the soil is slightly eroded and has a surface layer of loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 60 inches. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of further erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along drainageways. Also included are areas of soils that are less than 60 inches deep over bedrock. The dissimilar included soils make up about 10 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Georgeville soil but are less silty; have a subsoil that is thinner, yellowish brown, or less clayey; or are slightly eroded.

Most of the acreage in this unit is used as cropland or pasture. The rest is mainly used as woodland. A few areas are used for urban development.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of further erosion are the major limitations. Maintaining good tilth is difficult because of the surface layer of clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is moderately suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Chestnut oak, loblolly pine, northern red oak, white oak, hickory, red maple, and post oak are the most common trees. The most common understory plants are flowering dogwood, black cherry, sourwood, sassafras, mountain laurel, running cedar, and common greenbrier. A high content of clay in the surface layer is the main limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is moderately suited to building site development, most types of sanitary facilities, and most types of recreational development. It is poorly suited to sewage lagoons because of the slope and to paths and trails because of the hazard of erosion. A high content of clay in the subsoil, the moderate permeability, and the slope are the main limitations affecting building site development and sanitary facilities, such as septic tank absorption fields. The slope and small stones are the main limitations affecting recreational development. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6C.

HeB—Helena sandy loam, 1 to 6 percent slopes. This map unit consists mainly of very deep, moderately well drained, nearly level to gently sloping Helena and similar soils on smooth ridges between drainageways, on toe slopes, and along drainageways in the uplands. It is in scattered areas throughout the county. Some of the larger areas are north of Boger City and north of Crouse. Individual areas are irregular in shape and range from 5 to 40 acres in size.

Typically, the surface layer is brown sandy loam 6 inches thick. The subsurface layer is light yellowish brown sandy loam 4 inches thick. The subsoil is 34 inches thick. In sequence downward, it is brownish yellow sandy clay loam, strong brown and yellowish brown sandy clay that has light gray and pale brown mottles, and yellowish brown sandy clay loam that has light gray and red mottles. The underlying material to a depth of 62 inches is strong brown saprolite that has mottles in shades of red, yellow, and gray and has a texture of sandy loam.

Permeability is slow. The shrink-swell potential is high in the subsoil. The seasonal high water table is 1.5 to 2.5 feet below the surface. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the well drained, more permeable Appling and Rion soils on small knolls and ridgetops and the poorly drained Worsham soils in small depressions and drainageways. Rion soils have a subsoil that is less clayey than that of the Helena soil. The dissimilar included soils make up about 10 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Helena soil but are less acidic.

Most of the acreage in this unit is used as pasture or cropland. The rest is mainly used as woodland.

This map unit is moderately suited to crops, such as corn, soybeans, and small grain. Wetness and the hazard of erosion are the main management concerns. A drainage system is needed in some areas. Open ditches are the most common drainage system. Tile is generally not used because of the slow permeability. Tilling when the soil is wet destroys soil structure and forms large clods, resulting in ponding and a poor seedbed. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, yellow-poplar, sweetgum, southern red oak, northern red oak, black oak, post oak, white oak, and hickory are the most common trees. The most common understory plants are flowering dogwood, eastern redcedar, American holly, red maple, hawthorn, sassafras, common greenbrier, blackberry, and poison ivy. The wetness is the main limitation affecting woodland management. Logging when the soil is wet causes compaction, deep ruts, poor surface drainage, and lower productivity.

This map unit is poorly suited to building site development and most types of sanitary facilities, such as septic tank absorption files. It is moderately suited to sewage lagoons because of the slope. A high content of clay in the subsoil, the slow permeability, the high shrink-swell potential in the subsoil, and the wetness are the major limitations affecting building site development. Because the subsoil shrinks and swells with changes in moisture content, foundations should be designed to resist cracking. The wetness and the slow permeability are the major limitations affecting sanitary facilities. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed. The unit is moderately suited to recreational development. The wetness and the slow permeability are the main limitations.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

MaD—Madison sandy loam, 15 to 25 percent slopes. This map unit consists mainly of very deep, well drained, moderately steep Madison and similar soils on side slopes in the uplands. It is in scattered areas throughout the county. Some of the larger areas are located northeast of Lincolnton and northeast of Kidville. Individual areas are oblong and irregular in width. They range from 5 to 50 acres in size.

Typically, the surface layer is yellowish brown sandy loam 7 inches thick. The subsoil is 25 inches thick. It is red clay in the upper part and yellowish red clay loam in the lower part. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam. The soil has common or many flakes of mica in the upper part and many in the lower part. In some small areas the soil is moderately eroded and has a surface layer of sandy clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are severely eroded soils. Gullies are common along drainageways in some areas. The dissimilar included soils make up about 5 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Madison soil but contain less mica, have a subsoil that is yellowish brown or less clayey, or are moderately eroded.

Most of the acreage in this unit is used as woodland. The rest is mainly used as pasture.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, southern red oak, northern red oak, hickory, yellow-poplar, and sweetgum are the most common trees. The most common understory plants are flowering dogwood, American holly, eastern redcedar, sourwood, American hornbeam, and mountain laurel. The slope, the hazard of erosion, and an equipment limitation are the main management concerns.

This map unit is poorly suited to cropland. It is moderately suited to pasture. Tall fescue and ladino clover are the main forage crops. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed.

This map unit is poorly suited to building site development, sanitary facilities, and most types of recreational development because of the slope. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is VIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8R.

MdB2—Madison sandy clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Madison and similar soils on broad ridges in the uplands throughout the county. Some of the larger areas are northeast of Lincolnton and northeast of Kidville. Individual areas are irregular in shape and range from 10 to 80 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is yellowish red sandy clay loam 5 inches thick. The subsoil is 29 inches thick. In sequence downward, it is red clay, red clay loam that has reddish yellow mottles, and yellowish red sandy clay loam that has reddish yellow mottles. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam. The soil has common or many flakes of mica in the upper part and many in the lower part. In some small areas the soil is slightly eroded and has a surface layer of sandy loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of further erosion is severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils around drainageways. Also, gullies and severely eroded soils are common along drainageways in some areas. The dissimilar included soils make up about 5 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Madison soil but contain less mica; have a subsoil that is yellowish brown, thicker, or less clayey; or are slightly eroded.

Most of the acreage in this unit is used as cropland or pasture. The rest is used as woodland.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, the texture of the surface layer, surface runoff, and the hazard of further erosion are the main management concerns. Maintaining good tilth is difficult because of the surface layer of sandy clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is moderately suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately well suited to woodland. Loblolly pine, shortleaf pine, southern red oak, northern red oak, white oak, hickory, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, eastern redcedar, winged elm, red maple, running cedar, and poison ivy. A high content of clay in the surface layer is the main limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is well suited to building site development and most types of recreational development. It is moderately suited to sanitary facilities, such as septic tank absorption fields and sewage lagoons. A high content of clay in the subsoil, the moderate permeability, and the slope are the main limitations. The removal of vegetation at construction sites causes a severe hazard of further erosion. Erosion-control measures are needed.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7C.

MdC2—Madison sandy clay loam, 8 to 15 percent slopes, eroded. This map unit consists mainly of very deep, well drained, strongly sloping Madison and similar soils on side slopes in the uplands. It is in scattered areas throughout the county. Some of the larger areas are northeast of Lincolnton and northeast of Kidville. Individual areas are oblong and irregular in width. They range from 5 to 70 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is yellowish red sandy clay loam 5 inches thick. The subsoil is 29 inches thick. In sequence downward, it is red clay, red clay loam that has reddish yellow mottles, and yellowish red sandy clay loam that has reddish yellow mottles. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam. The soil has common or many flakes of mica in the upper part and many in the lower part. In some small areas the soil is slightly eroded and has a surface layer of sandy loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of further erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils around drainageways. Also, gullies and severely eroded soils are common along drainageways in some areas (fig. 9). The dissimilar included soils make up about 5 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Madison soil but contain less mica, have a subsoil that is yellowish brown or less clayey, or are slightly eroded.

Most of the acreage in this unit is used as woodland.

Figure 9.—Gullies in an area of Madison sandy clay loam, 8 to 15 percent slopes, eroded.

The rest is mainly used as cropland or pasture.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, southern red oak, northern red oak, white oak, hickory, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, red maple, sourwood, American holly, eastern redcedar, running cedar, honeysuckle, and brackenfern. A high content of clay in the surface layer is the main limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, the texture of the surface layer, surface runoff, and the hazard of further erosion are the main management concerns. Maintaining good tilth is difficult because of the surface layer of sandy clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Because of the slope the hazard of further erosion is very severe if cultivated crops are grown. Conservation practices that help to control erosion and surface runoff and add organic matter to the soil are needed. The unit is moderately suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to building site development, most types of sanitary facilities, and recreational development. It is poorly suited to sewage lagoons because of the slope. A high content of clay in the subsoil, the moderate permeability, and the slope are the main limitations affecting building site development and sanitary facilities, such as septic tank absorption fields. The slope is the main limitation affecting recreational development. The removal of vegetation at construction sites causes a very severe hazard of further erosion. Erosion-control measures are needed.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7C.

MsB—Masada sandy loam, 2 to 8 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Masada and similar soils on high stream terraces, mostly along the South Fork of the Catawba River and Clark Creek. Some small areas are along other major creeks. Individual areas are irregular in shape and range from 4 to 40 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 8 inches thick. The subsoil is 47 inches thick. In sequence downward, it is brown sandy clay loam, yellowish red and strong brown sandy clay, and yellowish brown clay loam that has reddish yellow and red mottles. The underlying material to a depth of 62 inches is strong brown sandy clay loam that has mottles in shades of red, brown, and yellow.

Permeability is moderate. The shrink-swell potential is moderate in the subsoil. The depth to bedrock is more than 6 feet. The water table is also below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, less clayey Altavista soils in small depressions and along drainageways and the frequently flooded Chewacla soils along small flood plains. Also included are a few low areas of soils that are subject to rare flooding. The dissimilar included soils make up about 5 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Masada soil but are moderately eroded or have a subsoil that is dark red or less clayey.

This map unit is not very extensive in Lincoln County. Most of the acreage is used as cropland or pasture. The rest is used as woodland.

This map unit is well suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is well suited to woodland. Loblolly pine, shortleaf pine, southern red oak, white oak, hickory, sweetgum, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, red maple, poison ivy, and honeysuckle. No major limitations affect woodland management.

This map unit is moderately suited to building site development and sanitary facilities. A high content of clay in the subsoil and the shrink-swell potential are the main limitations affecting building site development. Because the subsoil shrinks and swells with changes in moisture content, foundations should be designed to resist cracking. The moderate permeability, the high content of clay in the subsoil, and seepage are the main limitations affecting sanitary facilities, such as septic tank absorption fields and sewage lagoons. The hazard of flooding should be determined before the use and management of specific sites are planned. The unit is well suited to recreational development. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

MsC—Masada sandy loam, 8 to 15 percent slopes. This map unit consists mainly of very deep, well drained, strongly sloping Masada and similar soils on side slopes of high stream terraces, mostly along the South Fork of the Catawba River and Clark Creek. Some small areas are along other major creeks. Individual areas are oblong and irregular in width. They range from 4 to 20 acres in size.

Typically, the surface layer is dark yellowish brown sandy loam 8 inches thick. The subsoil is 47 inches thick. In sequence downward, it is brown sandy clay loam, yellowish red and strong brown sandy clay, and yellowish brown clay loam that has reddish yellow and red mottles. The underlying material to a depth of 62 inches is strong brown sandy clay loam that has mottles in shades of red, brown, and yellow.

Permeability is moderate. The shrink-swell potential also is moderate. The depth to bedrock is more than 6 feet. The water table is also below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is severe in bare, unprotected areas.

Included in this unit in mapping are some areas of soils that are similar to the Masada soil but are moderately eroded or have a subsoil that is dark red or less clayey.

This map unit is not very extensive in Lincoln County. Most of the acreage is used as woodland. The rest is used as cropland or pasture.

This map unit is well suited to woodland. Loblolly pine, shortleaf pine, southern red oak, white oak, hickory, sweetgum, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, red maple, poison ivy, and honeysuckle. No major limitations affect woodland management.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to building site development, most types of sanitary facilities, and most types of recreational development. It is poorly suited to sewage lagoons because of the slope. A high content of clay in the subsoil, the shrink-swell potential, and the slope are the main limitations affecting building site development. Because the subsoil shrinks and swells with changes in moisture content, foundations should be designed to resist cracking. The moderate permeability, the high content of clay in the subsoil, and the slope are the main limitations affecting sanitary facilities, such as septic tank absorption fields. The slope is the main limitation affecting recreational development. The removal of vegetation at construction sites causes a severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

PaB—Pacolet sandy loam, 2 to 8 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Pacolet and similar soils on narrow ridges in the uplands. It is located throughout the county. Some of the larger areas are northeast of Lincolnton. Individual areas are irregular in shape and range from 10 to 200 acres in size.

Typically, the surface layer is brown sandy loam 6 inches thick. The subsurface layer is yellowish red sandy loam 3 inches thick. The subsoil is 26 inches thick. It is red clay loam in the upper part, red clay in the next part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is red saprolite that has a texture of loam. In some small areas the soil is moderately eroded and has a surface layer of sandy clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained Helena soils along drainageways. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Pacolet soil but have a subsoil that is thicker, yellowish brown, or less clayey; are moderately eroded; or contain more mica.

Most of the acreage in this unit is used as woodland. The rest is mainly used as cropland or pasture.

This map unit is well suited to woodland. Loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, hickory, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, eastern redcedar, red maple, and running cedar. No major limitations affect woodland management.

This map unit is well suited to cultivated crops, such as corn, soybeans, and small grain. The slope, the texture of the surface layer, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is well suited to building site development and most types of recreational development. It is moderately suited to sanitary facilities, such as septic tank absorption fields and sewage lagoons. A high content of clay in the subsoil and the moderate permeability are the main limitations. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

PaC—Pacolet sandy loam, 8 to 15 percent slopes. This map unit consists mainly of very deep, well drained, strongly sloping Pacolet and similar soils on side slopes in the uplands. It is in scattered areas throughout the county. The most extensive areas are in the northwestern part of the county. Individual areas are oblong and irregular in width. They range from 4 to 40 acres in size.

Typically, the surface layer is brown sandy loam 6 inches thick. The subsurface layer is yellowish red sandy loam 3 inches thick. The subsoil is 26 inches thick. It is red clay loam in the upper part, red clay in the next part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is red saprolite that has a texture of loam. In some small areas the soil is moderately eroded and has a surface layer of sandy clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along drainageways. They make up about 5 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Pacolet soil but have a subsoil that is thicker, yellowish brown, or less clayey; are moderately eroded; or contain more mica.

Most of the acreage in this unit is used as woodland. The rest is mainly used as cropland or pasture.

This map unit is well suited to woodland. Loblolly pine, shortleaf pine, Virginia pine, northern red oak, white oak, southern red oak, yellow-poplar, and hickory are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, black locust, sumac, eastern redcedar, and red maple. No major limitations affect woodland management.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to building site development, most types of sanitary facilities, and most types of recreational development. It is poorly suited to sewage lagoons because of the slope. A high content of clay in the subsoil, the moderate permeability, and the slope are the main limitations affecting building site development. The moderate permeability is a moderate limitation affecting sanitary facilities, such as septic tank absorption fields. The slope is the main limitation affecting recreational development. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

PaD—Pacolet sandy loam, 15 to 25 percent slopes. This map unit consists mainly of very deep, well drained, moderately steep Pacolet and similar soils on side slopes in the uplands. It is in scattered areas throughout the county. Individual areas are oblong and irregular in width. They range from 5 to 50 acres in size.

Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil is 27 inches thick. It is red clay loam in the upper part, red clay in the next part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam. In some small areas the soil is moderately eroded and has a surface layer of sandy clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of soils that are similar to the Pacolet soil but have a surface layer of gravelly sandy loam, contain more mica, have a subsoil that is yellowish brown or less clayey, or are moderately eroded.

Most of the acreage in this unit is used as woodland. The rest is used as pasture.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, white oak, southern red oak, northern red oak, and hickory are the most common trees. The most common understory plants are flowering dogwood, American holly, eastern redcedar, sourwood, and mountain laurel. The slope, the hazard of erosion, and an equipment limitation are the main management concerns.

This map unit is poorly suited to cropland. It is moderately suited to pasture. Tall fescue and ladino clover are the main forage crops. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed.

This map unit is poorly suited to building site development, sanitary facilities, and most types of recreational development because of the slope. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is VIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8R.

PaE—Pacolet sandy loam, 25 to 45 percent slopes. This map unit consists mainly of very deep, well drained, steep Pacolet and similar soils on side slopes in the uplands. It is in scattered areas throughout the county. Individual areas are oblong and irregular in width. They range from 5 to 15 acres in size.

Typically, the surface layer is brown sandy loam 5 inches thick. The subsoil is 27 inches thick. It is red clay loam in the upper part, red clay in the next part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam. In some small areas the soil is moderately eroded and has a surface layer of sandy clay loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of soils that are similar to the Pacolet soil but have a surface layer of gravelly sandy loam; contain more mica; have a subsoil that is thicker, yellowish brown, or less clayey; or are moderately eroded.

This map unit is not very extensive in Lincoln County. Most of the acreage is used as woodland. The rest is used as pasture.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, hickory, yellow-poplar, and white oak are the most common trees. The most common understory plants are flowering dogwood, American holly, eastern redcedar, and mountain laurel. The slope, the hazard of erosion, and an equipment limitation are the main management concerns.

This map unit is generally not used as cropland. It is poorly suited to pasture. Tall fescue and ladino clover are the main forage crops. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed.

This map unit is poorly suited to building site development, sanitary facilities, and recreational development because of the slope. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is VIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8R.

PeB2—Pacolet sandy clay loam, 2 to 8 percent slopes, eroded. This map unit consists mainly of very deep, well drained, gently sloping Pacolet and similar soils on narrow ridges in the uplands. It is in scattered areas throughout the county. The most extensive areas are northeast of Lincolnton. Individual areas are oblong and irregular in width. They range from 4 to 40 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is reddish brown sandy clay loam 7 inches thick. The subsoil is 28 inches thick. In sequence downward, it is red clay loam, red clay that has yellowish red mottles, and red clay loam that has mottles in shades of red and white. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam or sandy loam. In some small areas the soil is slightly eroded and has a surface layer of sandy loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of further erosion is severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along drainageways. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Pacolet soil but have a gravelly surface layer, have a subsoil that is yellower or less clayey, have a higher content of mica, or are slightly eroded.

Most of the acreage in this unit is used as cropland or pasture. The rest is used as woodland.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Maintaining good tilth is difficult because of the surface layer of sandy clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is moderately suited to pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, northern red oak, white oak, southern red oak, yellow-poplar, and hickory are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, black locust, sumac, eastern redcedar, and red maple. A high content of clay in the surface layer is the main limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is well suited to building site development and most types of recreational development. It is moderately suited to sanitary facilities, such as septic tank absorption fields and sewage lagoons. A high content of clay in the subsoil, the moderate permeability, and the slope are the main limitations. The removal of vegetation at construction sites causes a severe hazard of further erosion. Erosion-control measures are needed.

The capability subclass is IIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6C.

PeC2—Pacolet sandy clay loam, 8 to 15 percent slopes, eroded. This map unit consists mainly of very deep, well drained, strongly sloping Pacolet and similar soils on side slopes in the uplands. It is in scattered areas throughout the county. The most extensive areas are in the northwestern part of the county. Individual areas are oblong and irregular in width. They range from 4 to 40 acres in size.

This map unit is moderately eroded. In most places the present surface layer is a mixture of the original surface layer and subsoil material. Typically, it is reddish brown sandy clay loam 7 inches thick. The subsoil is 28 inches thick. In sequence downward, it is red clay loam, red clay that has yellowish red mottles, and red clay loam that has mottles in shades of red and white. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam or sandy loam. In some small areas the soil is slightly eroded and has a surface layer of sandy loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of further erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along drainageways. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Pacolet soil but have a gravelly surface layer, have a subsoil that is yellower or less clayey, have a higher content of mica, or are slightly eroded.

Most of the acreage in this unit is used as cropland or pasture. The rest is used as woodland.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of further erosion are the main management concerns. Maintaining good tilth is difficult because of the surface layer of sandy clay loam. This layer commonly crusts as it dries after a hard rain and becomes cloddy if worked when wet. The crust and clods make seedbed preparation difficult and may affect germination and cause poor or uneven crop growth. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is moderately suited to pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, northern red oak, white oak, southern red oak, yellow-poplar, and hickory are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, black cherry, black locust, sumac, eastern redcedar, and red maple. A high content of clay in the surface layer is the main limitation affecting woodland management. It limits the use of equipment and causes seedling mortality.

This map unit is moderately suited to building site development, most types of sanitary facilities, and recreational development. It is poorly suited to sewage lagoons because of the slope. A high content of clay in the subsoil, the moderate permeability, and the slope are the main limitations affecting building site development and sanitary facilities, such as septic tank absorption fields. The removal of vegetation at construction sites causes a very severe hazard of further erosion. Erosion-control measures are needed.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6C.

PmB—Pacolet-Madison-Urban land complex, 2 to 8 percent slopes. This map unit consists mainly of very deep, well drained, gently sloping Pacolet and Madison soils and Urban land. It is on narrow ridges in the uplands. The soils and Urban land that make up this unit occur as areas so small and intermingled that mapping them separately was not feasible at the scale selected. Most of the acreage is in and around Lincolnton and Boger City. The unit is about 25 to 35 percent Pacolet soil, 25 to 35 percent Madison soil, and 25 to 35 percent Urban land. Individual areas of this unit are irregular in shape and range from 10 to 200 acres in size.

Typically, the surface layer of the Pacolet soil is reddish brown sandy clay loam 7 inches thick. The subsoil is 28 inches thick. In sequence downward, it is red clay loam, red clay that has yellowish red mottles, and red clay loam that has mottles in shades of red and white. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam or sandy loam. In some small areas the soil is slightly eroded and has a surface layer of sandy loam.

Permeability is moderate in the Pacolet soil. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of erosion is severe in bare, unprotected areas.

Typically, the surface layer of the Madison soil is yellowish red sandy clay loam 5 inches thick. The subsoil is 29 inches thick. In sequence downward, it is red clay, red clay loam that has reddish yellow mottles, and yellowish red sandy clay loam that has reddish yellow mottles. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam. The soil has common or many flakes of mica in the upper part and many in the lower part. In some small areas the soil is slightly eroded and has a surface layer of sandy loam.

Permeability is moderate in the Madison soil. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is severe in bare, unprotected areas.

Urban land consists of areas where the soil has been covered with buildings, streets, driveways, parking lots, or other impervious surfaces.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along intermittent drainageways. Also included are cut and fill areas where the natural soils have been altered or covered and the slope has been modified. These areas are commonly adjacent to the Urban land. The dissimilar inclusions make up about 10 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Pacolet and Madison soils but have a subsoil that is thicker, yellower, or less clayey.

The Pacolet and Madison soils are well suited to building site development and most types of recreational development. They are moderately suited to sanitary facilities. A high content of clay in the subsoil and the moderate permeability are the main limitations affecting sanitary facilities. The removal of vegetation at construction sites causes a severe hazard of erosion. Erosion-control measures are needed.

Onsite investigation is needed before the use and management of specific sites are planned.

This map unit has not been assigned a capability subclass or a woodland ordination symbol.

PmC—Pacolet-Madison-Urban land complex, 8 to 15 percent slopes. This map unit consists mainly of very deep, well drained Pacolet and Madison soils and Urban land. It is on strongly sloping side slopes in the uplands. The soils and Urban land that make up this unit occur as areas so small and intermingled that mapping them separately was not feasible at the scale selected. Most of the acreage is in and around Lincolnton and Boger City. The unit is about 25 to 35 percent Pacolet soil, 25 to 30 percent Madison soil, and 25 to 50 percent Urban land. Individual areas of this unit are oblong and irregular in width. They range from 4 to 20 acres in size.

Typically, the surface layer of the Pacolet soil is reddish brown sandy clay loam 7 inches thick. The subsoil is 28 inches thick. In sequence downward, it is red clay loam, red clay that has yellowish red mottles, and red clay loam that has mottles in shades of red and white. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam or sandy loam. In some small areas the soil is slightly eroded and has a surface layer of sandy loam.

Permeability is moderate in the Pacolet soil. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Typically, the surface layer of the Madison soil is yellowish red sandy clay loam 5 inches thick. The subsoil is 29 inches thick. In sequence downward, it is red clay, red clay loam that has reddish yellow mottles, and yellowish red sandy clay loam that has reddish yellow mottles. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of loam. The soil has common or many flakes of mica in the upper part and many in the lower part. In some small areas the soil is slightly eroded and has a surface layer of sandy loam.

Permeability is moderate in the Madison soil. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Urban land consists of areas where the soil has been covered with buildings, streets, driveways, parking lots, or other impervious surfaces.

Included in this unit in mapping are small areas of dissimilar soils. These are the moderately well drained, slowly permeable Helena soils along intermittent drainageways. Also included are cut and fill areas where the natural soils have been altered or covered and the slope has been modified. These areas are commonly adjacent to the Urban land. The dissimilar inclusions make up about 10 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Pacolet and Madison soils but have a subsoil that is thicker, yellower, or less clayey.

The Pacolet and Madison soils are moderately suited to building site development, most types of sanitary facilities, and most types of recreational development. A high content of clay in the subsoil, moderately permeability, and the slope are the main limitations. The unit is poorly suited to sewage lagoons because of the slope. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

Onsite investigation is needed before the use and management of specific sites are planned.

This map unit has not been assigned a capability subclass or a woodland ordination symbol.

Pt—Pits, quarries. This map unit consists of open excavations from which the soil has been removed, exposing either rock or other material that supports few or no plants. The underlying material has been quarried for construction aggregate or for such minerals as mica and lithium (fig. 10). Individual areas are irregular in shape and are as much as 300 feet deep. Areas less than 4 acres in size are shown on the soil maps with a special symbol. Some areas intermittently contain water.

Onsite investigation is needed before the use and management of specific areas are planned.

This map unit has not been assigned a capability subclass or a woodland ordination symbol.

RnB—Rion sandy loam, 2 to 8 percent slopes. This map unit consists mainly of deep, well drained, gently sloping Rion and similar soils on narrow ridges in the uplands. It is in scattered areas throughout the county. Some of the larger areas are north of Lincolnton and Boger City. Individual areas are irregular in shape and range from 4 to 40 acres in size.

Typically, the surface layer is yellowish brown sandy loam 5 inches thick. The subsoil is 27 inches thick. It is brownish yellow sandy clay loam in the upper part and brownish yellow sandy loam in the lower part. The underlying material to a depth of 62 inches is light yellowish brown and pale brown saprolite. It has mottles in shades of yellow, brown, and gray. It has a texture of sandy loam and has lenses of loamy sand.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the clayey, moderately well drained, slowly permeable Helena soils along intermittent drainageways and in depressions. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Rion soil but have a subsoil that is red or clayey, are moderately eroded, or contain more mica.

Most of the acreage in this unit is used as cropland or pasture. The rest is mainly used as woodland or for urban development.

This soil is well suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture (fig. 11). Tall fescue and ladino clover are the main forage crops.

This map unit is well suited to woodland. Loblolly pine, shortleaf pine, post oak, southern red oak, northern red oak, white oak, hickory, sweetgum, and

Figure 10.—A quarry where lithium and construction aggregates are mined.

yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, sourwood, blackberry, eastern redcedar, running cedar, and red maple. No major limitations affect woodland management.

This map unit is well suited to building site development and most types of recreational development. It is moderately suited to most types of sanitary facilities, such as septic tank absorption fields, because of the moderate permeability. It is poorly suited to sewage lagoons because of seepage. No major limitations affect building site development or recreational development. The instability of cutbanks is a limitation in shallow excavations. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

RnC—Rion sandy loam, 8 to 15 percent slopes. This map unit consists mainly of deep, well drained, strongly sloping Rion and similar soils on side slopes in the uplands. It is in scattered areas throughout the county. Some of the larger areas are north of Lincolnton and Boger City. Individual areas are oblong and irregular in width. They range from 4 to 40 acres in size.

Typically, the surface layer is yellowish brown sandy loam 5 inches thick. The subsoil is 27 inches thick. It is brownish yellow sandy clay loam in the upper part and brownish yellow sandy loam in the lower part. The underlying material to a depth of 62 inches is light yellowish brown and pale brown saprolite. It has mottles in shades of yellow, brown, and gray. It has a texture of sandy loam and has lenses of loamy sand.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is very strongly acid to slightly acid. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are the clayey, moderately well drained, slowly permeable Helena soils along intermittent drainageways and in depressions. They make up about 5 to 10 percent of the unit.

Also included are small areas of soils that are similar to the Rion soil but have a subsoil that is red or clayey, are moderately eroded, or contain more mica.

Most of the acreage in this unit is used as woodland. The rest is used as cropland or pasture.

This map unit is well suited to woodland. Loblolly pine, shortleaf pine, northern red oak, post oak, southern red oak, white oak, yellow-poplar, sweetgum, and hickory are the most common trees. The most common understory plants are flowering dogwood, sourwood, American holly, eastern redcedar, red maple,

Figure 11.—An area of Rion sandy loam, 2 to 8 percent slopes, used as hayland.

running cedar, and poison ivy. No major limitations affect woodland management.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to building site development and recreational development. The slope is the main limitation. The instability of cutbanks is a limitation in shallow excavations. The unit is moderately suited to most types of sanitary facilities, such as septic tank absorption fields, because of the slope and the moderate permeability. It is poorly suited to sewage lagoons because of the slope and seepage. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8A.

RvA—Riverview loam, 0 to 2 percent slopes, occasionally flooded. This map unit consists mainly of very deep, well drained, nearly level Riverview and similar soils on flood plains along creeks and rivers throughout the county. Some of the larger areas are along the South Fork of the Catawba River and Clark Creek. Individual areas are long and irregular in width. They range from 5 to 75 acres in size.

Typically, the surface layer is dark yellowish brown loam 8 inches thick. The subsoil is 39 inches thick. It is brown and strong brown loam in the upper part and strong brown sandy loam in the lower part. The underlying material to a depth of 60 inches is strong brown sandy loam.

Permeability is moderate. The shrink-swell potential is low in the subsoil. The seasonal high water table is 3 to 5 feet below the surface. This soil is occasionally flooded for brief periods during winter and spring. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid to moderately acid in the subsoil.

Included in this unit in mapping are small areas of dissimilar soils. These are the somewhat poorly drained Chewacla soils in the slightly lower areas, usually away from the stream channel, and the excessively drained, sandy Buncombe soils adjacent to the stream channel. Also included are a few areas of well drained, loamy soils that have bedrock at a depth of 3 to 4 feet along the narrower flood plains. The dissimilar included soils make up about 10 to 15 percent of the unit.

Most of the acreage in this unit is used as cropland or pasture. The rest is used as woodland.

This map unit is well suited to cultivated crops, such as corn, soybeans, and small grain. These crops, however, may be damaged by the occasional flooding. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops. Proper rotation and timely deferment of grazing during wet periods help to reduce compaction and maintain tilth.

This map unit well suited to woodland. Yellow-poplar, American sycamore, water oak, willow oak, sweetgum, eastern cottonwood, loblolly pine, and black walnut are the most common trees. The most common understory plants are flowering dogwood, boxelder, sourwood, American holly, green ash, red mulberry, and poison ivy. Wetness and the flooding are moderate limitations affecting woodland management. They limit the use of equipment and cause seedling mortality.

This map unit is poorly suited to building site development and sanitary facilities because of the wetness and the flooding. Because of the flooding, it is moderately suited to most types of recreational development and poorly suited to camp areas.

The capability subclass is IIw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 9W.

SeB—Sedgefield fine sandy loam, 1 to 4 percent slopes. This map unit consists mainly of very deep, moderately well drained, nearly level to gently sloping Sedgefield and similar soils on smooth ridges, on toe slopes, and along drainageways in the uplands. Some of the larger areas are south of Lincolnton and west of Triangle. Individual areas are irregular in shape and range from 5 to 40 acres in size.

Typically, the surface layer is dark grayish brown fine sandy loam 6 inches thick. The subsurface layer is yellowish brown fine sandy loam 4 inches thick. The subsoil is 28 inches thick. In sequence downward, it is yellowish brown clay that has mottles in shades of brown and red, light olive brown clay that has light gray mottles, and yellowish brown clay and clay loam having mottles in shades of gray and brown. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of sandy loam.

Permeability is slow. The shrink-swell potential is high in the subsoil. The seasonal high water table is 1.0 to 1.5 feet below the surface. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the upper horizons and moderately acid to moderately alkaline in the lower horizons. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit in mapping are small areas of

dissimilar soils. These are the well drained Winnsboro soils on small knolls and ridgetops and the poorly drained Worsham soils in depressions and along drainageways. The dissimilar included soils make up about 10 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Sedgefield soil but have a gravelly surface layer or are more acidic.

This map unit is not very extensive in Lincoln County. Most of the acreage is used as cropland or pasture. The rest is mainly used as woodland.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. Wetness and the hazard of erosion are the main management concerns. A drainage system is needed in some areas. Open ditches are the most common drainage system. Tile is generally not used because of the slow permeability. Tilling when the soil is wet destroys soil structure and forms large clods, resulting in ponding and a poor seedbed. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, yellow-poplar, sweetgum, southern red oak, northern red oak, black oak, white oak, and hickory are the most common trees. The most common understory plants are flowering dogwood, eastern redcedar, American holly, red maple, hawthorn, sassafras, common greenbrier, blackberry, and poison ivy. Wetness is the main limitation affecting woodland management. It moderately limits the use of equipment. Logging when the soil is wet causes compaction, deep ruts, poor surface drainage, and lower productivity.

This map unit is poorly suited to building site development and sanitary facilities. A high content of clay in the subsoil, the slow permeability, the high shrink-swell potential, and the wetness are the major limitations affecting building site development. Because the subsoil shrinks and swells with changes in moisture content, foundations should be designed to resist cracking. The wetness and the slow permeability are the major limitations affecting sanitary facilities, such as septic tank absorption fields. The unit is moderately suited to most types of recreational development. It is, however, poorly suited to camp areas and playgrounds. The wetness and the slow permeability are the main limitations affecting recreational development. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 8w.

Ud—Udorthents, loamy. This map unit consists of borrow areas, landfills, and cut and fill areas. In areas of this unit all of the original soil has been altered by cutting, filling, and shaping. Slope varies highly. Individual areas are rectangular in shape and range from 5 to 200 acres in size.

Borrow areas consist of areas from which all of the original soil has been excavated to saprolite or bedrock for use as fill material in construction. The cuts are as much as 25 feet deep. The base slope in these cuts is generally level or gently sloping. The side slopes are very steep to nearly vertical. The more recently excavated areas are bare and subject to accelerated erosion. The older areas are eroded, but many of them have stabilized under pine or other vegetation. Borrow areas range from 4 to more than 50 acres in size. Borrow areas less than 4 acres in size are shown on the soil maps with a special symbol.

Landfills are excavated areas where deeply graded trenches have been backfilled with alternate layers of solid refuse and soil material. The trenches are as much as 30 feet deep. After a final cover is added, the areas are nearly level to gently sloping. Most areas are seeded to grass or planted to trees. Areas of landfill are unsuitable for most building purposes because of subsidence and the danger of methane gas from the decomposition of refuse.

Cut and fill areas consist of areas from which the soil has been removed and placed in an adjacent area. These areas are subject to accelerated erosion. Erosion-control measures are needed. Areas of flood plains that have been filled in from adjacent hillsides and used for farming and areas where soil has been removed from construction sites and deposited nearby are examples of cut and fill areas.

Onsite investigation is needed before the use and management of specific areas are planned.

This map unit has not been assigned a capability subclass or a woodland ordination symbol.

Ur—Urban land. This map unit consist of areas where more than 85 percent of the surface area is covered with asphalt, concrete, buildings, or other impervious cover. Most areas are in or near the business districts of Lincolnton and Boger City. Individual areas are irregular in shape and range from 5 to 300 acres in size.

Areas of Urban land have been greatly altered by cutting, filling, grading, and shaping. The original landscape, topography, and commonly the drainage pattern, have been changed. The soils between the urban facilities are used for lawns, playgrounds, cemeteries, parks, or drainageways.

The major problem in this unit is excessive runoff of water from roofs, streets, and parking lots. This runoff increases the hazard of flooding in low areas. Onsite investigation is needed before the use and management of specific areas are planned.

This map unit has not been assigned a capability subclass or a woodland ordination symbol.

WnB—Winnsboro fine sandy loam, 2 to 8 percent slopes. This map unit consists mainly of deep, well drained, gently sloping Winnsboro and similar soils on broad ridges in the uplands. It is in scattered areas throughout the county. Some of the larger areas are west of Triangle. Individual areas are irregular in shape and range from 4 to 60 acres in size.

Typically, the surface layer is dark brown fine sandy loam 8 inches thick. The subsoil is 29 inches thick. In the upper part it is yellowish brown sandy clay loam. In the lower part it is yellowish brown clay that has brownish yellow mottles. The underlying material to a depth of 60 inches is light yellowish brown or multicolored saprolite that has a texture of sandy loam or loam. The soil has few or common manganese concretions and black streaks throughout.

Permeability is slow. The shrink-swell potential is high in the subsoil. The water table is below a depth of 6 feet. The depth to bedrock is more than 5 feet. Reaction is strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the subsoil. The hazard of erosion is moderate in bare, unprotected areas.

Included in this unit is mapping are small areas of dissimilar soils. These are the red, more permeable Gaston soils on small knolls and ridgetops, the moderately well drained Sedgefield soils in depressions and along drainageways, and Zion and Mocksville soils on side slopes. Zion soils have weathered bedrock at a depth of 20 to 40 inches. Mocksville soils have a subsoil that is less clayey than that of the Winnsboro soil. The dissimilar included soils make up about 10 to 15 percent of the unit.

Also included are small areas of soils that are similar to the Winnsboro soil but are moderately eroded and have a surface layer of clay loam.

Most of the acreage in this unit is used as woodland. The rest is mainly used as cropland or pasture. A few small areas are used for urban development.

This map unit is well suited to woodland. Loblolly pine, Virginia pine, shortleaf pine, red maple, southern red oak, white oak, post oak, northern red oak, sweetgum, and yellow-poplar are the most common trees. The most common understory plants are flowering dogwood, eastern redcedar, American holly, sourwood, running cedar, and poison ivy. No major limitations affect woodland management.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. The unit is well suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is poorly suited to building site development and some types of sanitary facilities. It is moderately suited to sewage lagoons because of the slope. A high content of clay in the subsoil, the slow permeability, and the high shrink-swell potential are the major limitations affecting building site development and sanitary facilities, such as septic tank absorption fields. Because the subsoil shrinks and swells with changes in moisture content, foundations should be designed to resist cracking. The unit is moderately suited to recreational development. The slow permeability and the slope are the main limitations affecting most types of recreational development. The removal of vegetation at construction sites causes a moderate hazard of erosion. Erosion-control measures are needed.

The capability subclass is IIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 7A.

WoA—Worsham fine sandy loam, 0 to 2 percent slopes. This map unit consists mainly of deep, poorly drained, nearly level Worsham and similar soils on uplands around intermittent drainageways, at the head of drainageways, and in depressions. This map unit is in scattered areas throughout the county. Individual areas are oblong and range from 4 to 20 acres in size.

Typically, the surface layer is dark brown fine sandy loam 7 inches thick. The subsoil is 48 inches thick. In sequence downward, it is grayish brown sandy clay loam, gray sandy clay and clay having brownish yellow mottles, and light gray sandy clay loam that has brownish yellow mottles. The underlying material to a depth of 62 inches is light gray saprolite that has mottles in shades of gray and brown and has a texture of sandy clay loam.

Permeability is very slow. The shrink-swell potential is moderate in the subsoil. The seasonal high water table is within a depth of 1 foot, mostly during winter and spring. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the surface layer and very strongly acid or strongly acid in the subsoil.

Included in this unit in mapping are small areas of

dissimilar soils. These are the moderately well drained Helena and Sedgefield soils on small knolls. Also included are some small intermingled areas of poorly drained soils that have a subsoil that is less clayey than that of the Worsham soil and some areas that have more than 20 inches of overburden. The dissimilar inclusions make up about 10 to 15 percent of the unit.

Most of the acreage in this unit is used as woodland. The rest is mainly used as pasture.

This map unit is poorly suited to woodland. Sweetgum, loblolly pine, Virginia pine, willow oak, blackgum, and yellow-poplar are the most common trees. The most common understory plants are red mulberry, willow, common greenbrier, sedge, arrowhead, alder, and poison ivy. Wetness is the main limitation affecting woodland management. It severely limits the use of equipment and causes seedling mortality. Logging when the soil is wet causes compaction, deep ruts, poor surface drainage, and lower productivity.

This map unit is poorly suited to cultivated crops, such as corn, soybeans, and small grain. The wetness is the main limitation. Open ditches are the most common drainage system. Tilling when the soil is wet destroys soil structure and causes compaction, resulting in ponding and a poor seedbed. The unit is moderately suited to hay and pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is poorly suited to building site development, sanitary facilities, and recreational development. The wetness and the slow permeability are the major limitations.

The capability subclass is IVw. Based on yellow-poplar as the indicator species, the woodland ordination symbol is 6W.

ZmE—Zion-Mocksville complex, 25 to 45 percent slopes. This map unit consists mainly of Zion and Mocksville soils on steep side slopes in the uplands. The most extensive areas are west of Triangle. These soils occur as areas so intricately mixed or so small that mapping them separately was not practical at the scale selected. The unit is about 40 to 50 percent moderately deep, well drained Zion soil and 40 to 45 percent very deep, well drained Mocksville soil. Individual areas of this unit are oblong and irregular in width. They range from 5 to 15 acres in size.

Typically, the surface layer of the Zion soil is brown fine sandy loam 4 inches thick. The subsurface layer is yellowish brown fine sandy loam 4 inches thick. The subsoil is 15 inches thick. It is yellowish brown clay in the upper part and yellowish brown clay loam in the lower part. The underlying material to a depth of 28 inches is yellowish brown saprolite that has a texture of fine sandy loam. The soil has few or common manganese concretions and black streaks throughout. Multicolored, weathered bedrock that is difficult to dig with a spade is below the saprolite. Hard bedrock is at a depth of 35 inches.

Permeability is slow in the Zion soil. The shrink-swell potential is high in the subsoil. The depth to bedrock ranges from 20 to 40 inches. The water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid in the surface layer and strongly acid to neutral in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Typically, the surface layer of the Mocksville soil is dark yellowish brown fine sandy loam 4 inches thick. The subsoil is 23 inches thick. In the upper part it is yellowish brown sandy clay loam. In the lower part it is yellowish brown sandy loam that has mottles in shades of brown and yellow. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of sandy loam. The soil has few to many dark minerals.

Permeability is moderate in the Mocksville soil. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is strongly acid to neutral in the surface layer and moderately acid to neutral in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small intermingled areas of dissimilar soils. These are the red Madison soils. They are more acidic than the Zion and Mocksville soils and have a high content of mica. They make up about 5 to 10 percent of the unit.

This map unit is not very extensive in Lincoln County. It is used as woodland.

This map unit is moderately suited to woodland. Loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, southern red oak, northern red oak, post oak, white oak, and hickory are the most common trees. The most common understory plants are flowering dogwood, American holly, eastern redcedar, sourwood, and mountain laurel. The slope, the hazard of erosion, and an equipment limitation are the major management concerns.

This map unit is poorly suited to cropland, pasture, building site development, sanitary facilities, and recreational development because of the slope.

The capability subclass is VIIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6R in areas of the Zion soil and 8R in areas of the Mocksville soil.

ZwC—Zion-Winnsboro-Mocksville complex, 8 to 15 percent slopes. This map unit consists mainly of Zion, Winnsboro, and Mocksville soils on strongly sloping side slopes in the uplands. It is in scattered areas throughout the county. The most extensive areas are west of Triangle. These soils occur as areas so intricately mixed or so small that mapping them separately was not practical at the scale selected. The unit is about 35 percent moderately deep, well drained Zion soil; 30 percent deep, well drained Winnsboro soil; and 25 percent very deep, well drained Mocksville soil. Individual areas of this unit are oblong and irregular in width. They range from 5 to 40 acres in size.

Typically, the surface layer of the Zion soil is brown fine sandy loam 4 inches thick. The subsurface layer is yellowish brown fine sandy loam 4 inches thick. The subsoil is 15 inches thick. It is yellowish brown clay in the upper part and yellowish brown clay loam in the lower part. The underlying material to a depth of 28 inches is yellowish brown saprolite that has a texture of fine sandy loam. The soil has few or common manganese concretions and black streaks throughout. Multicolored, weathered bedrock that is difficult to dig with a spade is below the saprolite. Hard bedrock is at a depth of 35 inches.

Permeability is slow in the Zion soil. The shrink-swell potential is high in the subsoil. The depth to bedrock ranges from 20 to 40 inches. The water table is below a depth of 6 feet. Reaction is very strongly acid to moderately acid in surface layer and strongly acid to neutral in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Typically, the surface layer of the Winnsboro soil is dark brown fine sandy loam 8 inches thick. The subsoil is 29 inches thick. In the upper part it is yellowish brown sandy clay loam. In the lower part it is yellowish brown clay that has brownish yellow mottles. The underlying material to a depth of 60 inches is brown or multicolored saprolite that has a texture of sandy loam or loam. The soil has few or common manganese concretions and black streaks throughout.

Permeability is slow in the Winnsboro soil. The shrink-swell potential is high in the subsoil. The water table is below a depth of 6 feet. The depth to bedrock is more than 5 feet. Reaction is strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Typically, the surface layer of the Mocksville soil is dark yellowish brown fine sandy loam 4 inches thick. The subsoil is 23 inches thick. In the upper part it is yellowish brown sandy clay loam. In the lower part it is yellowish brown sandy loam that has mottles in shades of brown and yellow. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of sandy loam.

Permeability is moderate in the Mocksville soil. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is strongly acid to neutral in the surface layer and moderately acid to neutral in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are Gaston, Pacolet, and Madison soils. They have a red subsoil and are very deep. Also, Madison soils have a high content of mica. The dissimilar included soils make up about 5 to 10 percent of the unit.

This map unit is not very extensive in Lincoln County. Most of the acreage is used as woodland. The rest is mainly used as cropland or pasture.

This map unit is well suited to woodland. Loblolly pine, Virginia pine, shortleaf pine, white oak, northern red oak, southern red oak, post oak, sweetgum, and yellow-poplar are the most common trees. The most common understory plants are eastern redcedar, American holly, and sourwood. No major limitations affect woodland management. The Zion soil, however, is subject to windthrow because it is moderately deep over bedrock.

This map unit is moderately suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. This map unit is well suited to pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is poorly suited to building site development and sanitary facilities. It is moderately suited to most types of recreational development. The slope is the main limitation affecting recreational development. A high content of clay in the subsoil, the shrink-swell potential, the slow permeability, depth to bedrock, and the slope are the major limitations affecting building site development and sanitary facilities in areas of the Zion soil. A high content of clay in the subsoil, the shrink-swell potential, the slow permeability, and the slope are the major limitations affecting building site development and sanitary facilities in areas of the Winnsboro soil. Because the subsoil shrinks and swells with changes in moisture content, foundations in areas of the Zion and Winnsboro soils should be designed to resist cracking. The slope and the moderate permeability are the main limitations affecting building site development and sanitary facilities in areas of the Mocksville soil. The removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

Because the areas of soils in the unit are so intricately mixed, onsite investigation is needed before the use and management of specific sites are planned.

The capability subclass is IVe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6D in areas of the Zion soil, 7A in areas of the Winnsboro soil, and 8A in areas of the Mocksville soil.

ZwD—Zion-Winnsboro-Mocksville complex, 15 to 25 percent slopes. This map unit consists mainly of Zion, Winnsboro, and Mocksville soils on moderately steep side slopes in the uplands. It is in scattered areas throughout the county. The most extensive areas are west of Triangle. These soils occur as areas so intricately mixed or so small that mapping them separately was not practical at the scale selected. The unit is about 35 percent moderately deep, well drained Zion soil; 30 percent deep, well drained Winnsboro soil; and 25 percent very deep, well drained Mocksville soil. Individual areas of this unit are oblong and irregular in width. They range from 5 to 50 acres in size.

Typically, the surface layer of the Zion soil is brown fine sandy loam 4 inches thick. The subsurface layer is yellowish brown fine sandy loam 4 inches thick. The subsoil is 15 inches thick. It is yellowish brown clay in the upper part and yellowish brown clay loam in the lower part. The underlying material to a depth of 28 inches is yellowish brown saprolite that has a texture of fine sandy loam. The soil has few or common manganese concretions and black streaks throughout. Multicolored, weathered bedrock that is difficult to dig with a spade is below the saprolite. Hard bedrock is at a depth of 35 inches.

Permeability is slow in the Zion soil. The shrink-swell potential is high in the subsoil. The depth to bedrock ranges from 20 to 40 inches. The water table is below a depth of 6 feet. The soil is very strongly acid to moderately acid in the surface layer and strongly acid to neutral in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Typically, the surface layer of the Winnsboro soil is dark brown fine sandy loam 8 inches thick. The subsoil is 29 inches thick. In the upper part it is yellowish brown sandy clay loam. In the lower part it is yellowish brown clay that has brownish yellow mottles. The underlying material to a depth of 60 inches is brown or multicolored saprolite that has a texture of sandy loam or loam. The soil has few or common manganese concretions and black streaks throughout.

Permeability is slow in the Winnsboro soil. The shrink-swell potential is high in the subsoil. The water table is below a depth of 6 feet. The depth to bedrock is more than 5 feet. Reaction is strongly acid to slightly acid in the surface layer and slightly acid to mildly alkaline in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Typically, the surface layer of the Mocksville soil is dark yellowish brown fine sandy loam 4 inches thick. The subsoil is 23 inches thick. In the upper part it is yellowish brown sandy clay loam. In the lower part it is yellowish brown sandy loam that has mottles in shades of brown and yellow. The underlying material to a depth of 62 inches is multicolored saprolite that has a texture of sandy loam.

Permeability is moderate in the Mocksville soil. The shrink-swell potential is low in the subsoil. The depth to bedrock is more than 5 feet. The water table is below a depth of 6 feet. Reaction is strongly acid to neutral in the surface layer and moderately acid to neutral in the subsoil. The hazard of erosion is very severe in bare, unprotected areas.

Included in this unit in mapping are small areas of dissimilar soils. These are Gaston, Pacolet, and Madison soils. They have a red subsoil and are very deep. Also, Madison soils have a high content of mica. The dissimilar included soils make up about 5 to 10 percent of the unit.

This map unit is not very extensive in Lincoln County. Most of the acreage is used as woodland. The rest is mainly used as pasture.

This map unit is moderately suited to woodland. Loblolly pine, Virginia pine, shortleaf pine, white oak, northern red oak, southern red oak, post oak, sweetgum, and yellow-poplar are the most common trees. The most common understory plants are eastern redcedar, American holly, and sourwood. The slope, the hazard of erosion, and an equipment limitation are the main management concerns.

This map unit is poorly suited to cultivated crops, such as corn, soybeans, and small grain. The slope, surface runoff, and the hazard of erosion are the main management concerns. Conservation practices that help to control erosion and add organic matter to the soil are needed. This map unit is moderately suited to pasture. Tall fescue and ladino clover are the main forage crops.

This map unit is poorly suited to building site development, sanitary facilities, and recreational development. The depth to bedrock, the shrink-swell potential, and the slope are the major limitations affecting building site development, sanitary facilities, and recreational development in areas of the Zion soil. A high content of clay in the subsoil, the shrink-swell potential, the slow permeability, and the slope are the major limitations affecting building site development, sanitary facilities, and recreational development in areas of the Winnsboro soil. Because the subsoil shrinks and swells with changes in moisture content, foundations in areas of the Zion and Winnsboro soils should be designed to resist cracking. The slope is the main limitation affecting building site development, sanitary facilities, and recreational development in areas of the Mocksville soil. Removal of vegetation at construction sites causes a very severe hazard of erosion. Erosion-control measures are needed.

Because the areas of soils in the unit are so intricately mixed, onsite investigation is needed before the use and management of specific sites are planned.

The capability subclass is VIe. Based on loblolly pine as the indicator species, the woodland ordination symbol is 6R in areas of the Zion soil, 7R in areas of the Winnsboro soil, and 8R in areas of the Mocksville soil.

Prime Farmland

In this section, prime farmland is defined. The soils in Lincoln County that are considered prime farmland are listed in table 5.

About 90,955 acres, or 47 percent of the county, is prime farmland. The northwest-central part of the county is dominantly prime farmland. Many small areas of prime farmland are scattered throughout the remainder of the county. An additional 12,835 acres, or about 7 percent of the county, is areas of soils that are considered prime farmland where drainage measures or flood control, or both, are applied.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, State, and Federal levels, as well as individuals, must encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to food, feed, forage, fiber, and oilseed crops. Such soils have properties that favor the economic production of sustained high yields of crops. The soils need only to be treated and managed by acceptable farming methods. The moisture supply must be adequate, and the growing season must be sufficiently long. Prime farmland soils produce the highest yields with minimal expenditure of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be used as cropland, pasture, or woodland or for other purposes. They are used for food or fiber or are available for these uses. Urban or built-up land, public land, and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water-control structures. Public land is land not available for farming in National forests, National parks, military reservations, and State parks.

Prime farmland soils usually receive an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not frequently flooded during the growing season. The slope ranges mainly from 0 to 8 percent.

The map units in table 5 are considered prime farmland in Lincoln County. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Some soils that have a high water table and all soils that are frequently flooded during the growing season qualify as prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. If applicable, the need for drainage or flood control measures is indicated in parentheses after the map unit name in table 5. Onsite evaluation is necessary to determine whether or not limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help to prevent construction failures caused by unfavorable soil properties.

Generally, the soils in Lincoln County that are well suited to crops also are well suited to urban uses. The data concerning specific soils in the county can be used in planning future land use patterns. The potential for farming should be considered relative to any soil limitations and the potential for nonfarm development.

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

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

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

Crops and Pasture

Ben Robinson, district conservationist, and Bobby G. Brock, agronomist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Soil Conservation Service or the North Carolina Cooperative Extension Service.

In 1984, approximately 52,000 acres, or 26 percent of Lincoln County, was used as cropland. Of this total, 16,282 acres was used for row crops, mainly corn and soybeans; 6,534 acres for close-growing crops, mainly wheat; 6,734 acres for harvested hay; and 1,000 acres for orchard crops, mainly apples. The rest of the cropland was idle, used for conservation, or used for miscellaneous purposes. Approximately 24,900 acres, or 13 percent of the county, was used for pasture. A small acreage was used for truck crops, such as tomatoes, squash, and sweet corn.

Cropland Management

Erosion is the main management concern affecting sustained, productive farming in the county. Because of the rolling topography of the county, most of the soils in the uplands are sufficiently steep that intense conservation practices are required to maintain productivity. The majority of the cropland in the uplands consists of eroded soils that have lost 25 to 75 percent of the topsoil.

Critical eroding areas, such as gullies and steep banks, are high sediment producing areas in the county. Many of the gullies are along the edge of fields and began as unprotected terrace outlets. Active gullies are throughout the county. Stabilizing these gullies can be very expensive. Many roadside ditches and banks also produce large amounts of sediment.

Erosion is damaging to soils that have a clayey subsoil, such as Cecil and Gaston soils, for several reasons. As subsoil material is incorporated into the surface layer, the available water capacity declines, the need for lime and fertilizer increases, and soil porosity decreases. Cecil and Gaston soils tend to crust, especially in severely eroded areas. This crust limits infiltration and causes rapid surface runoff, increasing the hazard of further erosion.

Many sloping areas have clayey spots where tilling or preparing a good seedbed is difficult because erosion has removed the original, friable surface layer. Such spots are common in areas of the moderately eroded soils, such as Cecil, Gaston, and Madison soils.

A resource management system that provides a protective surface cover, helps to control runoff, and increases the rate of water infiltration reduces the hazard of erosion. A cropping system that maintains a plant cover for extended periods can keep losses due to erosion to amounts that do not reduce the productive capacity of the soil. Including grasses and legumes in the cropping system helps to control erosion in sloping areas, provides nitrogen, and improves tilth.

Since the 1950's, terraces have been the major conservation practice in the county. Many of the terraces have been poorly maintained, including the outlets. This poor maintenance reduces the usefulness of the terraces for controlling erosion. Crop rotations and other conservation measures involving vegetation are needed in many areas to control erosion. No-till farming was first used in the county in 1965. It involves planting a crop in a cover crop, sod, or the residue of a previous crop while minimizing soil disturbance. It is the most important component of a resource management system in the county.

Stripcropping is a viable alternative to installing terraces. It allows farm equipment to be used more efficiently and promotes the inclusion of grasses and legumes in the crop rotation. It can be used with no-till planting to provide excellent erosion control. Alfalfa for hay is commonly used in alternate strips.

No-till farming effectively reduces the hazard of erosion and conserves soil moisture. It provides a substantial plant cover by minimizing tillage and soil disturbance. It increases the infiltration rate of rainfall, helps to control runoff, and helps to control erosion in sloping areas. It is practical and economical and can be adapted to most of the soils in the county. It is more difficult to apply on soils that have a high content of clay in the surface layer.

Diversions reduce the length of a slope and help to control runoff and erosion by intercepting excess surface runoff and safely disposing of the water to a suitable outlet, such as a grassed waterway or a field border. They can best be constructed on slopes of 8 percent or less. Grassed waterways, which are usually planted to tall fescue, provide safe disposal of water from areas where runoff concentrates or from diversions and terraces. Field borders help filter sediment laden runoff around the field. Diversions, grassed waterways, and field borders are practical and highly effective on soils that have a uniform slope. Examples are Appling, Cecil, and Georgeville soils.

Pasture Management

The major plants in areas of pasture and hayland are tall fescue and ladino clover. Other plants that are better adapted to summer weather include perennial grasses, such as hybrid bermudagrasses, common bermudagrass, and switchgrass, and legumes, such as alfalfa and sericea lespedeza. Producers of livestock need to plant a combination of species that are best adapted to the soils. Growing adapted species and using good management techniques, such as proper annual applications of fertilizer, weed control, and rotation grazing, improve pasture and hayland.

The deep, well drained soils, such as Cecil, Gaston, and Georgeville soils, are suited to all of the major grasses and legumes in the county. Fescue, ladino clover, and common bermudagrass produce 5 to 9 animal-unit-months on these soils each year. Hybrid bermudagrass and switchgrass produce 10 animal-unit-months. An animal-unit-month is the amount of feed or forage required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

A well-rounded management program for pasture and hayland includes species, such as bermudagrass, that are adapted to summer and cool-season grasses or grass-legume mixtures. If proper fencing is installed to allow for rotation of grazing stock and an intensive management program for the application of fertilizer is used, pastures can produce sufficient forage for grazing from March through November, and alfalfa, sericea lespedeza, red clover, orchardgrass, and hybrid bermudagrass can be used for hay during the winter (fig. 12). These combinations provide a successful management program for pasture and hayland. Perennials are normally preferred in forage programs because of better erosion-control benefits and lower production costs.

Drainage

About 10 percent of the pasture and cropland in Lincoln County has a drainage problem. A considerable

Figure 12.—An area of alfalfa, which will be harvested as hay and used as winter feed.

part of the cropland in the county is on flood plains, mostly along the South Fork of the Catawba River and along the major creeks. Flooding and wetness are the main management concerns affecting crops and pasture in these areas. Intensive networks of ditches and tiles have been used to make the soils suitable for farming. Wetness is also a problem in some soils on uplands. Seasonal wetness is a limitation in Helena, Sedgefield, and Worsham soils.

Tillage can worsen drainage problems by creating low areas and blocking surface drainage. Installing a tile drainage system is difficult in some areas because of a lack of suitable outlets and a high content of clay in the subsoil. Open ditches are common. The somewhat poorly drained Chewacla soils are on flood plains and are frequently flooded. Crop production is generally not practical on these soils because of the flooding and an equipment limitation. In drained areas that are either protected from flooding or not frequently flooded during the growing season, however, the Chewacla soils can be very productive. Wet spots, seeps, and springs occur in some areas in the county. In such areas tile drainage and ditches are useful for transporting water to a suitable outlet.

The design of both surface and subsurface drainage systems varies with the kind of soil. In most areas of the poorly drained to moderate well drained soils used for intensive row cropping, a combination of surface drainage and tile drainage is needed. Drains must be spaced more closely in the slowly permeable soils than in the more permeable soils.

Management of drainage in conformance with regulations influencing wetlands may require special permits and extra planning. The local office of the Soil Conservation Service should be contacted for identification of hydric soils and potential wetlands.

Information about the design and applicability of systems to control erosion or modify drainage for each type of soil also can be obtained from the local office of the Soil Conservation Service or from the Lincoln Soil and Water Conservation District.

Truck Crops

Many vegetables and small fruits are grown commercially in the county. A small acreage throughout the county is used for apples, melons, strawberries, sweet corn, squash, tomatoes, peppers, and other vegetables and small fruits.

Deep soils that have good drainage and that warm up early in spring are especially well suited to many vegetables, apples, and small fruits. Cecil, Pacolet, and Gaston soils are good examples.

The latest information and suggestions about growing vegetables and fruits can be obtained from the local office of the Cooperative Extension Service or the Soil Conservation Service.

Chemical Weed Control

The use of herbicides for weed control is a common practice on the cropland in Lincoln County. It decreases the need for tillage and is an integral part of modern farming. Selected soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates of both of these properties were determined for the soils in the county. Table 16 shows a general range of organic matter content in the surface layer of the soils. The texture of the surface layer is shown in the USDA texture column in table 15.

In some areas the organic matter content projected for the different soils is outside the range shown in the table. The content can be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation may have a higher content of organic matter in the surface layer than similar soils that have been cultivated for a long time. Conservation tillage can increase the content of organic matter in the surface layer. A lower content of organic matter is common where the surface layer has been partly or completely removed by erosion or land smoothing. Current soil tests should be used for specific organic matter determinations.

Soil Fertility

The soils in Lincoln County generally are low in natural fertility. They are naturally acid, except for a few areas of basic soils. Additions of lime and fertilizer are needed for the production of most kinds of crops.

Liming requirements are a major concern on cropland. The acidity level in the soil affects the availability of many nutrients to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum in the soil and thus counteracts the adverse effects high levels of aluminum have on many crops. Liming adds calcium (from calcitic lime) or calcium and magnesium (from dolomitic lime) to the soil.

A soil test is a guide to what amount and kind of lime should be used. The desired pH levels may differ, depending on the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required, however, for clover, in some rotations of soybeans, or for alfalfa that is established. A reliable soil test is not available for predicting nitrogen requirements. Appropriate rates of nitrogen application are described in the section "Yields per Acre."

Soil tests can indicate the need for phosphorus and potassium fertilizer. They are needed because phosphorus and potassium tend to build up in the soil.

Yields per Acre

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

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

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

A high level of management includes maintaining proper soil reaction and fertility levels as indicated by standard soil tests. The application rate of nitrogen for corn on soils that have a yield potential of 125 to 150 bushels per acre should be 140 to 160 pounds per acre. If the yield potential for corn is 100 bushels per acre or less, a rate of 100 to 120 pounds of nitrogen per acre should be used. The application of nitrogen in excess of that required for potential yields generally is not recommended. The excess nitrogen fertilizer that is not utilized by a crop is an unnecessary expense and causes a hazard of water pollution. If corn or cotton is grown after the harvest of soybeans, nitrogen rates can be reduced by about 20 to 30 pounds per acre. Because nitrogen can be readily leached from sandy soils, applications may be needed on these soils more than once during the growing season.

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

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland *(17)*. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

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

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

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in table 6.

Woodland Management and Productivity

Albert B. Coffey, forester, Soil Conservation Service, helped prepare this section.

Forest managers in Lincoln County are faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand; propagating the more productive species and genetic varieties; providing short

Figure 13.—A stand of loblolly pine in Lincoln County.

rotations and complete fiber utilization; controlling insects, diseases, and weeds; and improving tree growth by applications of fertilizer and the installation of a drainage system. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture. This goal is to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover 91,949 acres, or about 49 percent of the land area of Lincoln County *(16)*. Commercial forest is land that is producing or is capable of producing crops of industrial wood and that has not been withdrawn from timber production. Loblolly pine is the most important timber species in the county because it grows fast, is adapted to the soil and climate, brings the highest average sale value per acre, and is easy to establish and manage (fig. 13).

For purposes of forest inventory, the predominant forest types identified in Lincoln County are described in the following paragraphs *(11, 16)*.

Loblolly-shortleaf pine. This forest type covers 29,975 acres. It is more than 50 percent loblolly pine and shortleaf pine. Commonly included trees are red oak, white oak, gum, hickory, and yellow-poplar.

Oak-pine. This forest type covers 6,510 acres. It is more than 50 percent hardwoods. Pines make up 25 to 50 percent of the stand. Commonly included trees are upland oaks, gum, hickory, and yellow-poplar. If left undisturbed, this forest type and the loblolly-shortleaf pine forest type develop into a forest of predominantly oak and other upland hardwoods. The understory usually consists of hardwood seedlings and saplings, which are more tolerant of shade than pine seedlings and saplings. In shaded understory, hardwoods compete for light and moisture so strongly that few pine seedlings are able to survive. If mature stands of pine are cut, the dense understory of young hardwoods becomes dominant.

Oak-hickory. This forest type covers 48,955 acres. It is more than 50 percent upland oaks and hickory. Commonly included trees are elm, red maple, and yellow-poplar.

Elm-ash-cottonwood. This forest type covers 6,509 acres. Elm, ash, and cottonwood, singly or in combination, comprise a plurality of the stockings in this forest type. Commonly included trees are willow, sycamore, beech, and maple.

One of the first steps in planning intensive woodland management is to determine the potential productivity of the soil for several alternative tree species. The most productive and valued trees are then selected for each soil type. Site and yield information enables a forest manager to estimate future wood supplies. These estimates are the basis of realistic decisions concerning expenses and profits associated with intensive woodland management, land acquisition, or industrial investments.

The potential productivity of woodland depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

Other site factors are also important. The gradient and length of slopes affect water movement and availability. In mountainous areas, elevation and aspect affect the amount of sunlight a site receives and the rate of evaporation. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. The best sites are generally on north- and east-facing slopes in the lower areas, in sheltered coves, and in gently sloping concave areas. The amount of rainfall and length of growing season influence site productivity.

This soil survey can be used by woodland managers planning ways to increase the productivity of forest land. Some soils respond better to applications of fertilizer than others, and some are more susceptible to erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in the survey area suitable for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate,* and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

In each map unit description, important or common woodland plants are listed by their common names *(9)*. Local plants are listed in table 8 by their common and scientific names *(10)*.

Table 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year. The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *T* indicates a soil that has, within the root zone, excessive alkalinity or acidity, sodium salts, or other toxic substances that limit the development of desirable trees. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the profile. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a large amount of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, and F.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation or harvesting activities expose the soil. The risk is *slight* if no particular preventive measures are needed under ordinary conditions; *moderate* if erosion-control measures are needed for particular silvicultural activities; and *severe* if special precautions are needed to control erosion for most silvicultural activities. Ratings of moderate or severe indicate the need for construction of higher standard roads, additional maintenance of roads, additional care in planning harvesting and reforestation activities, or the use of special equipment.

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

Ratings of *seedling mortality* refer to the probability of the death of the naturally occurring or properly planted seedlings of good stock in periods of normal rainfall, as influenced by kinds of soil or topographic features. Seedling mortality is caused primarily by too much water or too little water. The factors used in rating a soil for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, rooting depth, and the aspect of the slope. The mortality rate generally is highest on soils that have a sandy or clayey surface layer. The risk is *slight* if, after site preparation, expected mortality is less than 25 percent; *moderate* if expected mortality is between 25 and 50 percent; and *severe* if expected mortality exceeds 50 percent. Ratings of moderate or severe indicate that it may be necessary to use containerized or larger than usual planting stock or to make special site preparations, such as bedding, furrowing, installing a surface drainage system, and providing artificial shade for seedlings. Reinforcement planting is often needed if the risk is moderate or severe.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. The predominant common trees are listed in table 7 in the order of their observed occurrence. Additional species that commonly occur on the soils may be listed in the detailed soil map unit descriptions. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based on loblolly pine and yellow-poplar *(3, 6)*.

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Site index values shown in table 7 are based on measurements at selected sites in Lincoln County or other counties, or both. Productivity of a site can be improved through management practices, such as bedding, ditching, managing water, applying fertilizer, and planting genetically improved species.

The *volume* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year.

Trees to plant are those that are used for reforestation or, under suitable conditions, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The desired product, topographic position (such as a low, wet area), and personal preference are three factors among many that can influence the choice of trees for use in reforestation. If hardwoods are desired on a forest site, natural reproduction from seeds and sprouts of acceptable species is effective. Special site preparation may be required.

Recreation

In table 9, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic

Figure 14.—A recreational area of Chewacla loam, 0 to 2 percent slopes, frequently flooded.

quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential (fig. 14).

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Jack Mason, wildlife biologist, Division of Wildlife Management, North Carolina Wildlife Resources Commission, and John P. Edwards, biologist, Soil Conservation Service, helped to prepare this section.

Wildlife species are associated with specific plant communities, which are directly related to particular kinds of soil. The soils of Lincoln County produce a wide variety of plants that provide food and cover for many species of wildlife.

Upland game in the county include deer, quail, rabbit, squirrel, and mourning dove. Furbearers include red fox, gray fox, raccoon, muskrat, mink, skunk, and opossum. Several species of waterfowl, such as black duck, mallard, wood duck, green-winged teal, blue heron, green heron, and Canada goose, frequent the tributaries in the county. Fair to moderate populations of nongame wildlife, including numerous songbirds, raptors, woodpeckers, small mammals, amphibians, and reptiles, are in the county. A stocking project for deer was completed by the North Carolina Wildlife Resources Commission in 1983. The potential for a continued increase in the deer population is very high.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depends largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat. The ratings in table 10 are intended to be used as a guide and are not site specific. Onsite investigation is needed for individual management plans.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and millet.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, shrub lespedeza, annual lespedeza, partridge pea, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, ragweed, beggarweed, and pokeberry.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwoods and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are autumn-olive and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, cattail, rushes, and sedges.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

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

Habitat for openland wildlife consists of cropland, pasture, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, raptors, cottontail rabbit, red fox, and other small mammals.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and white-tailed deer.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are muskrat, raccoon, mink, beaver, waterfowl, and many species of songbirds, small mammals, reptiles, and amphibians.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, the shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the "Glossary."

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and shrinking and swelling can cause the movement of footings. The depth to a high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. The depth to bedrock, depth to a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), the shrink-swell potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, depth to a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established. Soil tests are essential to determine liming and fertilizer needs. Help in making soil tests or in deciding what soil additive, if any, should be used can be obtained from the office of the Lincoln County Soil and Water Conservation District or the local office of the North Carolina Cooperative Extension Service.

Sanitary Facilities

Table 12 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, depth to a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope or bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

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

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

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and the shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* have more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a water table at a depth of less than 1 foot. These soils have layers of suitable material, but the material is less than 3 feet thick.

Sand and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is as much as 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as highly weathered granite gneiss or schist, are not considered to be sand and gravel.

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

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

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal high water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and releases a variety of plant nutrients as it decomposes.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the soil maps because of the scale of mapping.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders. The depth to a high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability in the aquifer. The depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock or to other layers that affect the rate of water movement, permeability, depth to a high water table or depth of standing water if the soil is subject to ponding, slope, and susceptibility to flooding. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to help to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. Maintenance of terraces and diversions is adversely affected by a restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. Low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed *(15)*. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

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

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

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

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest. The AASHTO classification for soils tested, with group index numbers in parentheses, is given in table 18.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated content of clay in each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence the shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time. It is the difference between the amount of soil water at field moisture capacity and the amount at wilting point.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

The shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, more than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

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

Flooding, the temporary covering of the surface by flowing water, is caused by overflowing streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as *none, rare, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), and *long* (more than 7 days). Probable dates are expressed in months. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered is local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is, *perched* or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Two numbers in the column showing depth to the water table indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. "More than 6.0" indicates that the water table is below a depth of 6 feet.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors results in a severe hazard of corrosion. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low, moderate,* or *high,* is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion also is expressed as *low, moderate,* or *high.* It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are typical of the series and are described in the section "Soil Series and Their Morphology." The soil samples were tested by the North Carolina Department of Transportation and Highway Safety, Materials and Test Unit, Raleigh, North Carolina.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 422 (ASTM), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 4318 (ASTM); and Moisture density—T 99 (AASHTO), D 698 (ASTM).

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(18)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 19 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

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

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Kanhapludults (*Kan*, meaning low activity clays; plus *hapl*, meaning minimal horizonation; plus *udult*, the suborder of the Ultisols that occurs in humid climates).

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

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

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

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described and is located on the soils maps by a special symbol. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" *(19)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(18)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Altavista Series

The Altavista series consists of moderately well drained, moderately permeable soils on stream terraces. These soils formed in alluvium. Slopes range from 0 to 2 percent. The soils are fine-loamy, mixed, thermic Aquic Hapludults.

Altavista soils are commonly adjacent to Masada, Chewacla, and Riverview soils. The well drained Masada soils have more clay in the subsoil than the Altavista soil and are in the higher areas on the terraces. The somewhat poorly drained Chewacla and well drained Riverview soils are on flood plains.

Typical pedon of Altavista sandy loam, 0 to 2 percent slopes, rarely flooded; about 3.0 miles northwest of Lincolnton, 1.5 miles northeast on Secondary Road 1268 from the intersection of Secondary Roads 1005 and 1268, about 900 feet west of the intersection of Secondary Roads 1268 and 1269:

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

BE—10 to 14 inches; light yellowish brown (10YR 6/4) sandy loam; weak fine subangular blocky structure; friable; common fine roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt1—14 to 23 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; common faint clay films on faces of peds; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt2—23 to 35 inches; yellowish brown (10YR 5/6) sandy clay loam; common medium distinct light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable, slightly sticky; few fine roots; common faint clay films on faces of peds; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt3—35 to 49 inches; yellowish brown (10YR 5/4) sandy clay loam; many medium distinct light brownish gray (10YR 6/2), common medium distinct brownish yellow (10YR 6/8), and few fine prominent yellowish red (5YR 5/8) mottles; weak medium subangular blocky structure; friable, slightly sticky; common faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

BCg—49 to 57 inches; gray (10YR 6/1) sandy clay loam; common medium prominent brownish yellow (10YR 6/6) and faint pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; friable; few fine flakes of mica; strongly acid; gradual wavy boundary.

Cg—57 to 62 inches; gray (10YR 6/1) sandy loam; common medium prominent brownish yellow (10YR 6/6) and many coarse faint pale brown (10YR 6/3) mottles; massive; very friable; few pebbles; few fine flakes of mica; strongly acid.

The thickness of the solum ranges from 35 to 60 inches. The depth to bedrock is more than 10 feet. Few or common flakes of mica are in the B and C horizons in most pedons. Reaction ranges from very strongly acid to slightly acid in the A, Ap, E, and BE horizons and from very strongly acid to moderately acid in the Bt, BC, and C horizons.

The A or Ap horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 to 8. It is sandy loam or loamy sand.

The BE horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. It is sandy loam or loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. It has mottles with chroma of 2 or less in the upper 24 inches. In some pedons it has mottles in shades of brown or red and a few red concretions in the lower part. In some pedons a Btg horizon is below the Bt horizon. It has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 or 2. The Bt and Btg horizons are clay loam or sandy clay loam.

The BCg horizon has the same colors as the Btg horizon. The BC horizon, if it occurs, has the same colors as the Bt horizon. The BCg and BC horizons are sandy loam, loam, or sandy clay loam.

The Cg horizon has the same colors as the BCg horizon. The C horizon, if it occurs, has colors similar to those of the BC horizon. The Cg and C horizons vary in texture but typically are sandy or loamy.

Appling Series

The Appling series consists of well drained, moderately permeable soils on smooth, broad ridges in the uplands. These soils formed in material that weathered from felsic, igneous and metamorphic rock, such as granite and gneiss. Slopes range from 1 to 6 percent. The soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Appling soils are commonly adjacent to Cecil, Pacolet, Rion, and Helena soils. Cecil and Pacolet soils have a red Bt horizon. Rion soils have a thinner and less clayey Bt horizon than the Appling soils. Pacolet and Rion soils are on side slopes, and Cecil soils are on broad ridges. Helena soils are moderately well drained and are along drainageways.

Typical pedon of Appling sandy loam, 1 to 6 percent slopes; about 0.5 mile north of Flay on North Carolina Highway 274, about 50 feet west of the road in a cultivated field:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; common fine and medium roots; moderately acid; clear smooth boundary.

BA—8 to 12 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; common faint clay films on faces of peds; few fine roots; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt1—12 to 19 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; common distinct clay films on faces of peds; few fine roots; few fine pores; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt2—19 to 33 inches; yellowish brown (10YR 5/8) clay; few medium distinct strong brown (7.5YR 5/8) and few fine prominent red (2.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct clay films on faces of peds; few fine pores; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt3—33 to 41 inches; yellowish brown (10YR 5/8) clay loam; many coarse prominent red (2.5YR 4/8) and common medium distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; common faint clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—41 to 47 inches; yellowish red (5YR 5/6) sandy clay loam; many coarse distinct red (2.5YR 4/6), many medium distinct brownish yellow (10YR 6/6), and many fine distinct very pale brown (10YR 7/4) mottles; weak fine subangular blocky structure; friable; few fine flakes of mica; very strongly acid; gradual wavy boundary.

C—47 to 62 inches; multicolored saprolite that has a texture of sandy loam and has seams of clay loam; massive; friable; few fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 6 feet. The soil is very strongly acid to slightly acid in the A, Ap, and E horizons and very strongly acid or strongly acid in the Bt, BC, and C horizons. Few or common flakes of mica are in most pedons.

The A or Ap horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. The E horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 3 to 6. It is sandy loam.

The BA horizon or the BE horizon, if it occurs, has hue of 5YR to 10YR, value of 5 or 6, and chroma of 3 to 8. It is sandy clay loam.

The Bt horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 6 to 8. It is clay, sandy clay, or clay loam. It has few to many mottles in shades of red, yellow, or brown in the middle and lower parts.

The BC horizon has colors similar to those of the Bt horizon. It is sandy clay loam, sandy clay, or clay loam.

The C horizon is brownish or multicolored saprolite that weathered from felsic, igneous and metamorphic rock. It varies in texture but typically is loamy.

Buncombe Series

The Buncombe series consists of rarely flooded, excessively drained, rapidly and very rapidly permeable soils on flood plains. These soils formed in sandy alluvium. Slopes range from 0 to 5 percent. The soils are mixed, thermic Typic Udipsamments.

Buncombe soils are adjacent to Chewacla and Riverview soils. The loamy, somewhat poorly drained Chewacla soils and the loamy, well drained Riverview soils are on the lower parts of the flood plain, usually away from the stream channel.

Typical pedon of Buncombe sand, 0 to 5 percent slopes, rarely flooded; about 5.0 miles northwest of Lincolnton, 1.3 miles west on Secondary Road 1271 from the intersection of Secondary Roads 1005 and 1271, about 2,000 feet west of the road along the South Fork of the Catawba River:

Ap—0 to 10 inches; dark yellowish brown (10YR 4/4) sand; weak fine granular structure; very friable, nonsticky and nonplastic; common fine and medium roots; few fine flakes of mica; slightly acid; abrupt smooth boundary.

C1—10 to 30 inches; yellowish brown (10YR 5/6) sand; single grained; loose; few fine roots; few fine flakes of mica; slightly acid; gradual wavy boundary.

C2—30 to 41 inches; strong brown (7.5YR 5/8) sand; loose; few fine roots; common fine flakes of mica; moderately acid; gradual wavy boundary.

C3—41 to 61 inches; strong brown (7.5YR 4/6) sand; single grained; loose; common fine and medium flakes of mica; moderately acid.

Sandy horizons extend to a depth of 40 inches or more. The depth to bedrock is more than 10 feet. Few to many flakes of mica are in most pedons. Reaction ranges from very strongly acid to slightly acid.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 6.

The C horizon has hue of 5YR to 2.5Y, value of 4 to 8, and chroma of 3 to 8. Colors with a chroma of 2 or less are below a depth of 40 inches in some pedons. The C horizon to a depth of 40 inches is sand or loamy sand. Below a depth of 40 inches, it ranges from sand to loam.

Cecil Series

The Cecil series consists of well drained, moderately permeable soils on broad ridges in the uplands. These soils formed in material that weathered from felsic, igneous and metamorphic rock, such as granite and gneiss. Slopes range from 2 to 8 percent. The soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Cecil soils are commonly adjacent to Appling, Gaston, Madison, and Pacolet soils. Appling soils have a yellower Bt horizon than the Cecil soils, and Pacolet and Madison soils have a thinner subsoil. Gaston soils are dark red in the upper part of the Bt horizon. Madison soils have a high content of mica. Appling soils are on the smoother landscapes. Gaston soils are on the lower landscapes. Madison and Pacolet soils are on narrow ridges and side slopes.

Typical pedon of Cecil sandy clay loam, 2 to 8 percent slopes, eroded; about 2.5 miles west of Cat Square, 1,200 feet northwest on Secondary Road 1111 from the intersection of Secondary Roads 1113 and 1111, about 30 feet west of the road:

Ap—0 to 6 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium granular structure; very friable, slightly sticky and slightly plastic; many fine and common medium roots; slightly acid; clear smooth boundary.

Bt1—6 to 34 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual smooth boundary.

Bt2—34 to 45 inches; red (2.5YR 4/6) clay; few fine prominent reddish yellow (7.5YR 6/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few very fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

BC—45 to 56 inches; red (2.5YR 4/8) clay loam; common medium prominent reddish yellow (7.5YR 6/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few distinct clay films on faces of peds; common fine flakes of mica; few medium pockets of relic rock; strongly acid; gradual wavy boundary.

C—56 to 70 inches; red (2.5YR 4/6), yellowish red (5YR 5/6), and reddish yellow (7.5YR 6/6) saprolite that has a texture of sandy loam; massive; friable; common fine flakes of mica; fine veins of soft, white, quartzlike rock; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 6.5 feet. Reaction is very strongly acid to slightly acid in the A, Ap, and E horizons and very strongly acid or strongly acid in the Bt, BC, and C horizons. Few or common flakes of mica are in most pedons.

In eroded areas the A or Ap horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8 and is sandy clay loam. In uneroded or slightly eroded areas, the A or Ap horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8 and is sandy loam.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8. It is sandy loam or fine sandy loam.

The Bt horizon dominantly has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 to 8. In some pedons where the soil is not mottled, hue is 5YR. Texture is clay or clay loam.

The BC horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8. It is clay loam or sandy clay loam.

The C horizon is reddish or multicolored saprolite that weathered from felsic, igneous and metamorphic rock. It varies in texture but typically is loamy.

Chewacla Series

The Chewacla series consists of frequently flooded, somewhat poorly drained, moderately permeable soils on flood plains. These soils formed in recent alluvium. Slopes are 0 to 2 percent. The soils are fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts.

Chewacla soils are commonly adjacent to Riverview and Buncombe soils. Riverview soils are well drained and are in the slightly higher positions, usually near the stream channel. The excessively drained, sandy Buncombe soils generally are adjacent to the stream channel.

Typical pedon of Chewacla loam, 0 to 2 percent slopes, frequently flooded; about 1.5 miles northwest of Lincolnton, 0.75 mile north on Secondary Road 1005 from the intersection of Secondary Roads 1008 and 1005, about 1,300 feet west of the road along the South Fork of the Catawba River:

A—0 to 6 inches; brown (7.5YR 4/4) loam; weak medium granular structure; friable; common fine and medium roots; few fine flakes of mica; slightly acid; clear wavy boundary.

Bw1—6 to 16 inches; brown (7.5YR 4/4) clay loam; few medium distinct brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; few fine flakes of mica; few fine black streaks; moderately acid; clear smooth boundary.

Bw2—16 to 23 inches; strong brown (7.5YR 4/6) clay loam; common medium prominent gray (10YR 5/1) and few fine distinct reddish yellow (7.5YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; common fine and medium flakes of mica; few fine black streaks; moderately acid; clear smooth boundary.

Bg—23 to 41 inches; gray (10YR 5/1) and light gray (10YR 7/1) clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine flakes of mica; few fine black streaks; moderately acid; gradual wavy boundary.

Cg1—41 to 53 inches; light gray (10YR 6/1) sandy clay loam; common fine and medium prominent yellowish brown (10YR 5/6) and few fine faint brown mottles; massive; friable, slightly sticky and slightly plastic; common fine flakes of mica; few medium black streaks; moderately acid; gradual wavy boundary.

Cg2—53 to 60 inches; gray (10YR 5/1) sandy clay loam; massive; friable, slightly sticky and slightly plastic; common fine flakes of mica; few quartz pebbles; moderately acid.

The thickness of the solum ranges from 20 to 65 inches. The depth to bedrock is more than 5 feet. Few or common flakes of mica are throughout the soil. The soil ranges from very strongly acid to slightly acid.

The Ap or A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 4. Where value is 3, the horizon is less than 7 inches thick.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. It has mottles with chroma of 2 or less within 24 inches of the surface. It is loam, clay loam, sandy clay loam, fine sandy loam, or sandy loam.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. It has the same textures as the Bw horizon.

The Cg horizon has colors similar to those of the Bg horizon. If it is within a depth of 40 inches, it is loamy alluvium. If it is below a depth of 40 inches, it varies in texture.

Gaston Series

The Gaston series consists of well drained, moderately permeable soils on broad ridges and side slopes in the uplands. These soils formed in material that weathered from intermediate and mafic rock, such as gabbro, diorite, and hornblende gneiss. Slopes range from 2 to 25 percent. The soils are clayey, mixed, thermic Humic Hapludults.

Gaston soils are commonly adjacent to Cecil, Madison, and Winnsboro soils. Cecil and Madison soils have kaolinitic mineralogy. Also, Madison soils have a thinner subsoil than the Gaston soils and have a high content of mica. Cecil soils are on ridgetops. Madison soils are on narrow ridges and side slopes. Winnsboro soils are less acid than the Gaston soil, have a thinner subsoil, and are on the lower parts of the slope.

Typical pedon of Gaston sandy clay loam, 2 to 8 percent slopes, eroded; about 2.0 miles northwest of Lincolnton on Secondary Road 1008, about 2,000 feet northwest of the intersection of Secondary Roads 1008 and 1219, about 75 feet east of Secondary Road 1008, in a cultivated field:

Ap—0 to 8 inches; dark reddish brown (5YR 3/4) sandy clay loam; moderate medium granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

Bt1—8 to 18 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common fine and few medium roots; common distinct clay films on faces of peds; few black streaks; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bt2—18 to 46 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common distinct clay films on faces of peds; few medium flakes of mica; few black streaks; moderately acid; clear wavy boundary.

BC—46 to 55 inches; red (2.5YR 4/6) clay loam; few medium prominent reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; firm, slightly sticky and plastic; common fine flakes of mica; few pockets of weathered black minerals; moderately acid; clear wavy boundary.

C—55 to 62 inches; red (2.5YR 4/6) and yellowish red (5YR 5/6) saprolite that has a texture of sandy clay loam and pockets of clay loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; massive; common black specks and streaks; common fine flakes of mica; moderately acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 6 feet. The soil is strongly acid to slightly acid. Most pedons have few or common flakes of mica in the Bt horizon and few to many flakes of mica in the BC and C horizons.

In eroded areas the A or Ap has hue of 2.5YR or 5YR, value of 3, and chroma of 3 to 6 and is sandy clay loam. In uneroded areas the A horizon has hue of 5YR or 7.5YR, has value of less than 4, has chroma of 3 to 6, is at least 6 inches thick, and is loam.

The Bt horizon has hue of 10R or 2.5YR, value of 3 or 4, and chroma of 4 to 8. In most pedons it has dark streaks or stains. It is clay or clay loam.

The BC horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 6 to 8. It is clay loam, sandy clay loam, or loam.

The C horizon is reddish or multicolored saprolite that weathered from intermediate, igneous and metamorphic rock. It varies in texture but typically is loamy.

Georgeville Series

The Georgeville series consists of well drained, moderately permeable soils on broad ridges and side slopes in the uplands. These soils formed in material that weathered from sericite schist and phyllite. Slopes range from 2 to 25 percent. The soils are clayey, kaolinitic, thermic Typic Hapludults.

Georgeville soils are commonly adjacent to Cecil, Gaston, and Pacolet soils. The adjacent soils have less silt than the Georgeville soils and are in areas where felsic and intermediate felsic rock or mafic rock are predominant. Also, Gaston soils are dark red in the upper part of the Bt horizon and Pacolet soils have a thinner subsoil than the Georgeville soil.

Typical pedon of Georgeville loam, 2 to 8 percent slopes; about 2.75 miles southeast of Lincolnton, 0.7 mile southwest on Secondary Road 1641 from the intersection of Secondary Roads 1001 and 1641, about 100 feet northwest of the road:

A—0 to 6 inches; strong brown (7.5YR 4/6) loam; weak fine granular structure; slightly sticky and slightly plastic; common or many fine to coarse roots; moderately acid; clear smooth boundary.

E—6 to 9 inches; brown (10YR 4/3) loam; weak fine granular structure; friable, slightly sticky and slightly plastic; common fine to coarse roots; strongly acid; clear smooth boundary.

Bt1—9 to 18 inches; yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; few fine and medium roots; strongly acid; clear smooth boundary.

Bt2—18 to 43 inches; red (2.5YR 5/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common discontinuous distinct clay films on face of peds; few fine roots; strongly acid; gradual smooth boundary.

BC—43 to 52 inches; red (2.5YR 4/6) silty clay loam; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few distinct clay films on faces of peds; few fine roots; strongly acid; gradual wavy boundary.

C—52 to 62 inches; red (2.5YR 4/8) saprolite that has a texture of silt loam; common coarse prominent white (10YR 8/1), common coarse prominent yellow (10YR 7/6), and common coarse distinct red (10R 5/6) mottles; friable; common soft fragments of schist; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The content of coarse fragments ranges from 0 to 10 percent, by volume, in the A and Bt horizons. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the A, Ap, and E horizons and very strongly acid or strongly acid in the Bt, BC, and C horizons.

In uneroded or slightly eroded areas, the Ap or A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 8 and is loam. In eroded areas the A or Ap horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8 and is clay loam.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 6. It is loam or very fine sandy loam.

The Bt horizon dominantly has hue of 2.5YR or 10R, value of 4 or 5, and chroma of 6 to 8. In many pedons, however, it has hue of 5YR in the upper part. It is clay loam or clay.

The BC horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. In some pedons it is mottled in shades of yellow or brown. It is loam, silt loam, clay loam, or silty clay loam.

The C horizon is reddish or multicolored saprolite that weathered from sericite schist and phyllite. It typically has a texture of silt loam, very fine sandy loam, or fine sandy loam.

Helena Series

The Helena series consists of moderately well drained, slowly permeable soils in the uplands on smooth ridges between drainageways, on toe slopes, and along the drainageways. These soils formed in material that weathered from felsic, igneous and metamorphic rock, such as granite and granite gneiss. Slopes range from 1 to 6 percent. The soils are clayey, mixed, thermic Aquic Hapludults.

Helena soils are commonly adjacent to Appling, Rion, and Worsham soils. Appling and Rion soils are well drained and are on ridges and side slopes. Also, Appling soils have kaolinitic mineralogy and Rion soils are less clayey than the Helena soils. Worsham soils are poorly drained and are in the lower areas.

Typical pedon of Helena sandy loam, 1 to 6 percent slopes; about 1 mile northwest of Roseland on

Secondary Road 123, about 300 yards northeast on Secondary Road 1228 from the intersection of Secondary Roads 1232 and 1228, about 800 feet northwest of the road:

Ap—0 to 6 inches; brown (10YR 5/3) sandy loam; weak medium granular structure; very friable; common fine and medium roots; moderately acid; abrupt smooth boundary.

E—6 to 10 inches; light yellowish brown (2.5Y 6/4) sandy loam; weak medium granular structure; very friable; few fine roots; few fine and medium pebbles; moderately acid; clear wavy boundary.

BE—10 to 14 inches; brownish yellow (10YR 6/6) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; few faint clay films on faces of peds; few fine and medium pebbles; strongly acid; clear wavy boundary.

Bt1—14 to 19 inches; strong brown (7.5YR 5/8) sandy clay; moderate medium angular blocky structure; firm, sticky and plastic; few fine roots; common faint clay films on faces of peds; few fine flakes of mica; strongly acid; clear wavy boundary.

Bt2—19 to 35 inches; yellowish brown (10YR 5/8) sandy clay; common medium prominent light gray (10YR 7/1) and pale brown (10YR 6/3) mottles; weak medium angular blocky structure; firm, sticky and plastic; common faint clay films on faces of peds; few flakes of mica; very strongly acid; gradual wavy boundary.

BC—35 to 44 inches; yellowish brown (10YR 5/8) sandy clay loam; many coarse prominent light gray (10YR 7/1) and few fine distinct red (2.5YR 4/6) mottles; weak fine subangular blocky structure; firm, slightly sticky and slightly plastic; few faint clay films on faces of peds; common flakes of mica; common pockets of sandy clay; few fine and medium quartz pebbles; strongly acid; clear wavy boundary.

C—44 to 62 inches; strong brown (7.5YR 5/6) saprolite that has a texture of sandy loam; common medium distinct yellowish red (5YR 4/6) and brownish yellow (10YR 6/8) and common coarse prominent gray (10YR 6/1) mottles; massive; friable; few coarse veins of white and gray clay; common flakes of mica; strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the A, Ap, and E horizons and very strongly acid or strongly acid in the Bt, BC, and C horizons.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 4. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4. It is sandy loam or loamy sand.

The BE horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. It is sandy clay loam or clay loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. It has mottles with chroma of 2 or less in the upper 24 inches. In some pedons a gray Btg horizon is below the Bt horizon. The Bt and Btg horizons are sandy clay, clay, or clay loam.

The BC horizon has colors similar to those of the Bt horizon and includes shades of gray, light gray, and white. It is clay loam, sandy clay loam, or sandy loam.

The C horizon is brownish or multicolored saprolite that weathered from felsic, igneous and metamorphic rock. It varies in texture but typically is sandy loam, fine sandy loam, loam, or sandy clay loam.

Madison Series

The Madison series consists of well drained, moderately permeable soils on narrow ridges and side slopes in the uplands. These soils formed in material that weathered from felsic, micaceous, metamorphic rock, such as mica schist and mica gneiss. Slopes range from 2 to 25 percent. The soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Madison soils are commonly adjacent to Pacolet and Rion soils. The adjacent soils are in the same landscape positions as the Madison soils. They have less mica than the Madison soils. Also, Rion soils are less clayey.

Typical pedon of Madison sandy clay loam, 2 to 8 percent slopes, eroded; about 2.0 miles northeast of Lincolnton, 0.6 mile east on Secondary Road 1283 from the intersection of U.S. Highway 321 and Secondary Road 1283, about 700 feet west of the end of Secondary Road 1283:

Ap—0 to 5 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium granular structure; very friable; common fine and medium roots; common fine flakes of mica; slightly acid; clear smooth boundary.

Bt1—5 to 17 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common fine and medium roots; common fine pores; common faint clay films on faces of peds; common fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—17 to 26 inches; red (2.5YR 4/8) clay loam; few medium prominent reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few fine and medium roots; common fine pores; common faint clay films on faces of peds; many fine flakes of mica; strongly acid; gradual wavy boundary.

BC—26 to 34 inches; yellowish red (5YR 5/8) sandy clay loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable; many fine flakes of mica that have a greasy consistence; pockets of saprolite that crushes easily to loam; strongly acid; gradual wavy boundary.

C1—34 to 51 inches; mottled red (2.5YR 5/8) and yellowish red (5YR 5/8) saprolite that has a texture of loam; massive; friable; many fine flakes of mica that have a greasy consistence; very strongly acid; gradual wavy boundary.

C2—51 to 62 inches; mottled red (2.5YR 5/8), yellowish red (5YR 5/8), reddish yellow (7.5YR 6/8), reddish brown (5YR 5/4), and pale brown (10YR 6/3) saprolite that has a texture of loam; massive; friable; many fine flakes of mica that have a greasy consistence; few medium fragments of schist; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 5 feet. The upper horizons have few to many flakes of mica, and the lower horizons have many. Reaction is very strongly acid to slightly acid in the A, Ap, and E horizons and very strongly acid or strongly acid in the Bt, BC, and C horizons.

In eroded areas the A or Ap horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8 and is sandy clay loam. In uneroded or slightly eroded areas, the A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 8 and is sandy loam.

The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is sandy loam or fine sandy loam.

The Bt horizon has hue of 10R to 5YR, value of 4 to 6, and chroma of 6 to 8. It is clay, sandy clay, or clay loam.

The BC horizon has colors similar to those of the Bt horizon. It is clay loam, sandy clay loam, or loam.

The C horizon is reddish or multicolored saprolite that weathered from felsic, micaceous, metamorphic rock. It varies in texture but typically is sandy loam, loam, or sandy clay loam.

Masada Series

The Masada series consists of well drained, moderately permeable soils on high stream terraces. These soils formed in old alluvium. Slopes range from 2 to 15 percent. The soils are clayey, mixed, thermic Typic Hapludults.

Masada soils are commonly adjacent to Altavista, Riverview, and Chewacla soils. The moderately well drained Altavista soils have a less clayey subsoil than the Masada soils, are in a lower landscape position, and are subject to rare flooding. The well drained Riverview soils and the somewhat poorly drained Chewacla soils are on flood plains.

Typical pedon of Masada sandy loam, 2 to 8 percent slopes; about 3.0 miles northwest of Lincolnton, 1.5 miles northwest on Secondary Road 1268 from the intersection of Secondary Roads 1005 and 1268, about 1,200 feet southwest of the road:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; many fine roots; strongly acid; clear smooth boundary.

BA—8 to 15 inches; brown (7.5YR 5/4) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine roots; strongly acid; clear wavy boundary.

Bt1—15 to 28 inches; yellowish red (5YR 4/6) sandy clay; weak medium subangular blocky structure; firm, sticky and plastic; common fine roots; common faint clay films on faces of peds; very strongly acid; clear wavy boundary.

Bt2—28 to 45 inches; strong brown (7.5YR 5/6) sandy clay; weak medium subangular blocky structure; firm, sticky and plastic; few fine roots; common faint clay films on faces of peds; very strongly acid; clear wavy boundary.

BC—45 to 55 inches; yellowish brown (10YR 5/8) clay loam; common medium distinct reddish yellow (7.5YR 6/8) and few medium prominent red (2.5YR 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few faint clay films on faces of peds; very strongly acid; gradual wavy boundary.

C—55 to 62 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct light red (2.5YR 6/8), brown (7.5YR 5/4), and brownish yellow (10YR 6/8) mottles; massive; friable; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. The depth to bedrock is more than 6 feet. Reaction is very strongly acid to slightly acid in the A and Ap horizons and very strongly acid or strongly acid in the Bt, BC, and C horizons.

The Ap or A horizon has hue of 7.5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8.

The BA horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 8, and chroma of 3 to 8. It is sandy clay loam.

The Bt horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It has hue of 2.5YR only in the lower part. It is clay loam, sandy clay, or clay.

The BC horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 4 to 8. It commonly has high-chroma mottles. It is clay loam, sandy clay loam, or clay.

The C horizon is brownish or multicolored sandy loam, sandy clay loam, or clay loam.

Mocksville Series

The Mocksville series consists of well drained, moderately permeable soils on gently sloping to steep side slopes in the uplands. These soils formed in material that weathered from intermediate and mafic, igneous and metamorphic rock, such as diorite, gabbro, and hornblende gneiss. Slopes range from 8 to 45 percent. The soils are fine-loamy, mixed, thermic Typic Hapludalfs.

Mocksville soils are intermixed with areas of Winnsboro and Zion soils and commonly are adjacent to Gaston soils. Winnsboro and Zion soils have a clayey Bt horizon. Also, Zion soils have bedrock at a depth of 20 to 40 inches. Gaston soils have a dark red, clayey Bt horizon and are near ridgetops.

Typical pedon of Mocksville fine sandy loam, in an area of Zion-Winnsboro-Mocksville complex, 8 to 15 percent slopes; about 2.0 miles southwest of Triangle, 0.9 mile south on Secondary Road 1386 from the intersection of Secondary Roads 1380 and 1386, about 200 feet west of the road:

A—0 to 4 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; few fine grains of dark minerals; moderately acid; clear wavy boundary.

Bt—4 to 21 inches; yellowish brown (10YR 5/4) sandy clay loam; weak medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; common fine grains of dark minerals; slightly acid; gradual wavy boundary.

BC—21 to 27 inches; yellowish brown (10YR 5/4) sandy loam; common medium distinct strong brown (7.5YR 5/8) and common fine prominent yellow (10YR 7/8) mottles; weak fine subangular blocky structure; common medium pockets of saprolite; common fine flakes of mica; common fine grains of dark minerals; few fine roots; slightly acid; gradual wavy boundary.

C—27 to 62 inches; mottled light yellowish brown (10YR 6/4), brown (10YR 5/3), and strong brown (7.5YR 5/8) saprolite that has a texture of sandy loam; massive; very friable; common fine flakes of mica; common fine grains of dark minerals; neutral.

The thickness of the solum ranges from 18 to 40 inches. The depth to bedrock is more than 5 feet. Few or common flakes of mica are throughout the soil. The content of dark minerals ranges from few to many. Reaction ranges from strongly acid to neutral in the A horizon, from moderately acid to neutral in the B horizons, and from slightly acid to mildly alkaline in the C horizon.

The A horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. The E horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8. It is fine sandy loam, sandy loam, or loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. It is clay loam, sandy clay loam, or loam.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon. It is sandy loam, fine sandy loam, or loam.

The C horizon is brownish, mottled, or multicolored saprolite that weathered from intermediate or mafic, igneous and metamorphic rock. It has a texture of sandy loam, fine sandy loam, loam, loamy fine sand, or loamy sand.

Pacolet Series

The Pacolet series consists of well drained, moderately permeable soils on narrow ridges and side slopes in the uplands. These soils formed in material that weathered from felsic, igneous and metamorphic rock, such as granite and gneiss. Slopes range from 2 to 45 percent. The soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Pacolet soils are commonly adjacent to Cecil, Madison, and Rion soils. Cecil soils are on broad ridges and have a thicker subsoil than the Pacolet soils. Madison soils have a high content of mica. Rion soils have a yellower and less clayey Bt horizon than the Pacolet soils. Madison and Rion soils are in the same landscape positions as the Pacolet soils.

Typical pedon of Pacolet sandy clay loam, 8 to 15 percent slopes, eroded; about 2.0 miles north of Hulls Crossroads, 1,300 feet northwest of the intersection of Secondary Roads 1113 and 1111:

Ap—0 to 7 inches; reddish brown (5YR 4/4) sandy clay loam; moderate medium granular structure; friable, slightly sticky and slightly plastic; many fine and medium roots; slightly acid; clear wavy boundary.

Bt1—7 to 11 inches; red (2.5YR 4/6) clay loam; moderate medium blocky structure; firm, sticky and plastic; few faint clay films on faces of peds; common fine and medium roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

Bt2—11 to 26 inches; red (2.5YR 4/6) clay; few fine distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common faint clay films on faces of peds; common fine and medium roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

BC—26 to 35 inches; red (2.5YR 4/6) clay loam; many medium distinct yellowish red (5YR 5/8) and few fine prominent pinkish white (5YR 8/2) mottles; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine and medium roots; few fine flakes of mica; common medium fragments of weathered feldspar; strongly acid; gradual wavy boundary.

C1—35 to 40 inches; red (2.5YR 4/6) saprolite that has a texture of loam; many medium prominent pinkish white (5YR 8/2) and common medium distinct yellowish red (5YR 5/8) mottles; massive; friable, slightly sticky and slightly plastic; few medium roots; common fine flakes of mica; many medium fragments of weathered feldspar; very strongly acid; gradual wavy boundary.

C2—40 to 62 inches; mottled red (2.5YR 4/6), yellowish red (5YR 5/8), pinkish white (5YR 8/2), and black (5YR 2.5/1) saprolite that has a texture of sandy loam; massive; friable; few medium roots; common fine flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the A, Ap, and E horizons and very strongly acid to moderately acid in the Bt, BC, and C horizons. Few or common flakes of mica are in most pedons.

In eroded areas the A or Ap horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 to 8 and is sandy clay loam. In uneroded or slightly eroded areas, the A or Ap horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 1 to 4 and is sandy loam.

The E horizon, if it occurs, has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8. It is sandy loam or fine sandy loam.

The Bt horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 to 8. It is clay loam, sandy clay, or clay.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon, or it is mottled in shades of red, yellow, or brown. It is clay loam, sandy clay loam, loam, or sandy loam.

The C horizon is reddish or multicolored saprolite that weathered from felsic, igneous and metamorphic rock. It has a texture of sandy loam, fine sandy loam, or loam.

Rion Series

The Rion series consists of well drained, moderately permeable soils on narrow ridges and side slopes in the uplands. These soils formed in residuum that weathered from felsic, igneous and metamorphic rock, such as gneiss and granite. Slopes range from 2 to 15 percent. The soils are fine-loamy, mixed, thermic Typic Hapludults.

Rion soils are commonly adjacent to Appling, Helena, Madison, and Pacolet soils. Appling, Madison, and Pacolet soils have a clayey Bt horizon. Also, Appling soils have a thicker subsoil than the Rion soil and Madison soils have a high content of mica. Appling soils are on the broader ridges. The moderately well drained Helena soils are along drainageways. Madison and Pacolet soils are in the same landscape positions as the Rion soils.

Typical pedon of Rion sandy loam, 2 to 8 percent slopes; about 1.5 miles northeast of Lincolnton, 2,700 feet northwest of the intersection of Secondary Roads 1282 and 1333:

Ap—0 to 5 inches; yellowish brown (10YR 5/4) sandy loam; weak medium granular structure; very friable; common fine and medium roots; common fine and medium flakes of mica; strongly acid; abrupt smooth boundary.

Bt1—5 to 12 inches; brownish yellow (10YR 6/6) sandy clay loam; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine and medium roots; common fine and medium flakes of mica; very strongly acid; clear smooth boundary.

Bt2—12 to 24 inches; brownish yellow (10YR 6/6) sandy clay loam with lenses of sandy loam; weak medium subangular blocky structure; friable; few medium roots; common fine and medium flakes of mica; very strongly acid; clear smooth boundary.

BC—24 to 32 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; very friable; common fine and medium flakes of mica; very strongly acid; gradual smooth boundary.

C—32 to 62 inches; light yellowish brown (10YR 6/4) and very pale brown (10YR 7/3) saprolite that has a texture of sandy loam and lenses of loamy sand; common medium distinct yellow (10YR 7/8), common medium faint pale brown (10YR 6/3), and few fine distinct very dark gray (10YR 3/1) mottles; massive; very friable; common fine and medium flakes of mica; very strongly acid.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the A, Ap, and E horizons and very strongly acid to moderately acid in the Bt, BC, and C horizons. Few or common flakes of mica are in most pedons.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. The E horizon, if it occurs, has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. It is sandy loam or loamy sand.

The Bt horizon has hue of 2.5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. It is sandy clay loam, sandy loam, or clay loam. The number of mottles in shades of red, yellow, and brown ranges from none to common. Also, in some pedons this horizon has mottles in shades of gray in the lower part.

The BC horizon has colors similar to those of the Bt horizon. It is sandy clay loam or sandy loam. The number of mottles in shades of red, yellow, brown, gray, and white ranges from none to many.

The C horizon is brownish or multicolored saprolite that weathered from felsic, igneous and metamorphic rock. It typically has a texture of sandy loam or loamy sand.

Riverview Series

The Riverview series consists of occasionally flooded, well drained, moderately permeable soils on flood plains. These soils formed in recent alluvium. Slopes range from 0 to 2 percent. The soils are fine-loamy, mixed, thermic Fluventic Dystrochrepts.

Riverview soils are adjacent to Chewacla and Buncombe soils. Chewacla soils are somewhat poorly drained and are in the lower parts of the flood plains. The excessively drained, sandy Buncombe soils generally are adjacent to the stream channel.

Typical pedon of Riverview loam, 0 to 2 percent slopes, occasionally flooded; about 1.5 miles northwest of Lincolnton, 0.6 mile north of the intersection of Secondary Roads 1008 and 1005, about 1,600 feet west of the road along the South Fork of the Catawba River:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; friable; common fine and medium roots; common fine flakes of mica; slightly acid; clear smooth boundary.

Bw1—8 to 22 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; moderately acid; gradual wavy boundary.

Bw2—22 to 40 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; friable; few fine roots; common fine flakes of mica; moderately acid; gradual wavy boundary.

BC—40 to 47 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; moderately acid; gradual wavy boundary.

C—47 to 60 inches; strong brown (7.5YR 5/6) sandy loam; massive; very friable, nonsticky and nonplastic; few fine flakes of mica; strongly acid.

The thickness of the solum ranges from 24 to 60 inches. The depth to bedrock is more than 5 feet. Few or common flakes of mica are throughout the soil. Reaction ranges from very strongly acid to slightly acid in the A or Ap horizon and from very strongly acid to moderately acid in the Bw, BC, and C horizons.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Where value is 3 and chroma is 2, the horizon is less than 7 inches thick.

The Bw horizon dominantly has hue of 7.5YR, value of 4 or 5, and chroma of 3 to 6 or hue of 10YR, value of 3 to 5, and chroma of 4 to 8. In some pedons, however, part of the horizon has hue of 5YR, value of 4 or 5, and chroma of 3 or 4. The number of mottles having chroma of 2 or less in the Bw horizon ranges from none to common at a depth of 24 inches or more. The Bw horizon is sandy clay loam, loam, silt loam, or silty clay loam.

The BC horizon has colors similar to those of the Bw horizon. It is sandy clay loam, loam, sandy loam, or fine sandy loam.

In some pedons a buried A or B horizon or both is below a depth of 25 inches. The buried horizons have colors and textures similar to those of the A and B horizons.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 4 to 8. In some pedons it has few or common gray mottles. It is fine sandy loam, sandy loam, loamy fine sand, loamy sand, or sand.

Sedgefield Series

The Sedgefield series consists of moderately well drained, slowly permeable soils in the uplands on smooth ridges, on toe slopes, and along drainageways. These soils formed in material that weathered from intermediate and mafic rock, such as gabbro, diorite, and hornblende gneiss. Slopes range from 1 to 4 percent. The soils are fine, mixed, thermic Aquultic Hapludalfs.

Sedgefield soils are commonly adjacent to Gaston and Winnsboro soils. The well drained Gaston soils have a dark red subsoil, are more permeable than the Sedgefield soils, and are on knolls and ridgetops. Winnsboro soils are well drained, have weathered bedrock at a depth of 40 to 70 inches, and are in the higher landscape positions.

Typical pedon of Sedgefield fine sandy loam, 1 to 4 percent slopes; about 4.0 miles south of Lincolnton on

Secondary Road 1252, about 0.5 mile west on Secondary Road 1617 from the intersection of Secondary Roads 1252 and 1617, about 2,400 feet north of the road in a pasture:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and medium roots; common fine and medium rounded iron-manganese concretions; slightly acid; clear smooth boundary.

E—6 to 10 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and medium roots; common fine and medium rounded iron-manganese concretions; slightly acid; clear smooth boundary.

Bt1—10 to 18 inches; yellowish brown (10YR 5/6) clay; few fine distinct grayish brown (10YR 5/2) and light yellowish brown (10YR 6/4) and few fine prominent yellowish red (5YR 5/6) mottles; moderate medium angular blocky structure parting to moderate medium prismatic; very firm, very sticky and very plastic; few fine roots between peds; many prominent clay films on faces of peds; common fine rounded iron-manganese concretions; slightly acid; gradual smooth boundary.

Bt2—18 to 28 inches; light olive brown (2.5Y 5/4) clay; few fine prominent light gray (10YR 7/1) mottles; moderate medium angular blocky structure parting to moderate medium prismatic; very firm, very sticky and very plastic; few fine roots between peds; many prominent clay films on faces of peds; common fine rounded iron-manganese concretions; neutral; gradual smooth boundary.

Bt3—28 to 33 inches; yellowish brown (10YR 5/4) clay; few medium distinct light gray (10YR 7/1) mottles; moderate medium angular blocky structure; very firm, very sticky and very plastic; few fine roots between peds; many distinct clay films on faces of peds; common fine flakes of mica; common streaks of relic rock; neutral; gradual smooth boundary.

BC—33 to 38 inches; yellowish brown (10YR 5/4) clay loam; common medium distinct grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; firm, sticky and plastic; few fine roots between peds; few patchy distinct clay films on vertical faces of peds; common coarse pockets of green and brown saprolite that has a texture of sandy loam; moderately alkaline; clear wavy boundary.

C—38 to 62 inches; multicolored saprolite that has a texture of sandy loam; massive; friable; common green and black minerals; moderately alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to bedrock is more than 5 feet. The A horizon and the upper part of the Bt horizon are very strongly acid to slightly acid. The lower part of the Bt horizon and the BC and C horizons are moderately acid to moderately alkaline.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 1 to 3. The E horizon, if it occurs, has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 3 or 4. It is fine sandy loam, sandy loam, or loam.

The Bt horizon has hue of 7.5YR to 5Y, value of 5 or 6, and chroma of 3 to 8. It has mottles with chroma of 2 or less in the upper 10 inches. In some pedons a gray Btg horizon is below the Bt horizon. The Bt and Btg horizons are clay, sandy clay, or clay loam.

The BC horizon has colors similar to those of the Bt horizon and includes shades of gray, light gray, and white. It is clay loam, sandy clay loam, or sandy loam.

The C horizon is multicolored saprolite that weathered from mixed felsic and mafic, igneous and metamorphic rock. It varies in texture but typically is loamy.

Udorthents

Udorthents consist of areas where the natural soil has been altered by excavation or covered by earthy fill material. These areas are well drained or moderately well drained. The excavated areas mainly are borrow pits from which the soil has been removed and used as foundation material for roads or buildings. In most excavated areas, the exposed substratum is loam, sandy loam, or sandy clay loam. The fill areas are sites where at least 20 inches of loamy, earthy fill material covers the natural soil, borrow pits, landfills, natural drainageways, or low areas. Slopes range from nearly level to steep, and some areas are undulating.

A typical pedon is not given for these soils because of their variability. The fill areas are more than 20 inches deep and as thick as 30 feet in places. Landfills have layers of material other than soil covered by loamy soil material.

Udorthents have colors in shades of red, brown, yellow, and gray. Texture is variable but typically is loamy. Reaction ranges from extremely acid to slightly acid.

Winnsboro Series

The Winnsboro series consists of well drained, slowly permeable soils on broad ridges in the uplands. These soils formed in material that weathered from intermediate and mafic, igneous and metamorphic rock, such as diabase, hornblende gneiss, diorite, and gabbro. Slopes range from 2 to 25 percent. The soils are fine, mixed, thermic Typic Hapludalfs.

Winnsboro soils are commonly adjacent to Gaston, Zion, and Mocksville soils. Gaston soils have a dark red subsoil, are more permeable than the Winnsboro soils, and are on knolls and ridgetops. Zion soils have weathered bedrock at a depth of 20 to 40 inches. Mocksville soils have a fine-loamy Bt horizon. Zion and Mocksville soils are on side slopes.

Typical pedon of Winnsboro fine sandy loam, 2 to 8 percent slopes; about 3.0 miles north of Lowesville, 0.6 mile north on North Carolina Highway 16 from the intersection of North Carolina Highways 73 and 16, about 1,000 feet west on Secondary Road 1393 from the intersection of North Carolina Highway 16 and Secondary Road 1393, about 300 feet south of the road:

Ap—0 to 8 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine and medium manganese concretions; moderately acid; clear wavy boundary.

BA—8 to 11 inches; yellowish brown (10YR 5/4) sandy clay loam; few fine faint brownish yellow mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few fine manganese concretions; moderately acid; abrupt smooth boundary.

Bt1—11 to 25 inches; yellowish brown (10YR 5/6) clay; moderate medium angular blocky structure; very firm, sticky and plastic; many distinct clay films on faces of peds; few fine roots; common fine manganese concretions and streaks; slightly acid; gradual wavy boundary.

Bt2—25 to 32 inches; yellowish brown (10YR 5/4 and 5/6) clay; few medium distinct brownish yellow (10YR 6/6) mottles; moderate medium angular blocky structure; very firm, sticky and plastic; common distinct clay films on faces of peds; few fine root channels; common fine manganese concretions and streaks; neutral; gradual wavy boundary.

Bt/C—32 to 37 inches; yellowish brown (10YR 5/4) clay (Bt); weak medium angular blocky structure; firm, sticky and plastic; few distinct clay films on faces of peds; few fine roots; common streaks of black; few fine manganese concretions; common medium pockets of saprolite (C) that has a texture of loam; neutral; gradual wavy boundary.

C1—37 to 46 inches; light yellowish brown (2.5Y 6/4) saprolite that has a texture of sandy loam; common mottles in shades of brown and yellow; massive; friable; common streaks of black; few fine black concretions; mildly alkaline; gradual irregular boundary.

C2—46 to 60 inches; multicolored saprolite that has a texture of loam; massive; friable; mildly alkaline.

The thickness of the solum ranges from 20 to 40 inches. The depth to hard bedrock is more than 5 feet. Reaction is strongly acid to slightly acid in the A, Ap, and E horizons and slightly acid to mildly alkaline in the Bt, BC, and C horizons. Few or common manganese concretions are in most pedons.

The Ap or A horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. The E horizon, if it occurs, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. It is fine sandy loam, sandy loam, or loam.

The BA horizon, if it occurs, has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is sandy clay loam or clay loam.

The Bt horizon and the Bt part of the Bt/C horizon have hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. They are clay or clay loam.

The BC horizon, if it occurs, is mottled in shades of brown, yellow, olive, or black. It is clay loam, loam, or sandy clay loam.

The C horizon and C part of the Bt/C horizon are multicolored saprolite that weathered from intermediate and mafic rock. They typically have a texture of loam, sandy loam, or sandy clay loam.

The Winnsboro soils in Lincoln County are a taxadjunct to the series because they have as much as 81 percent clay in the Bt horizon. This difference, however, does not affect the overall use, management, and interpretations of the soils.

Worsham Series

The Worsham series consists of poorly drained, very slowly permeable soils on uplands around intermittent drainageways, at the head of drainageways, and in depressions. These soils formed in a mixture of colluvium and local alluvium or residuum derived from felsic, igneous and metamorphic rock, such as granite and gneiss. Slopes range from 0 to 2 percent. The soils are clayey, mixed, thermic Typic Ochraquults.

Worsham soils are commonly adjacent to Helena soils, which are moderately well drained and in the slightly higher areas.

Typical pedon of Worsham fine sandy loam, 0 to 2 percent slopes; about 2.5 miles northwest of Hulls Crossroads on Secondary Road 1114, about 0.4 mile north on Secondary Road 1114 from the intersection of Secondary Roads 1114 and 1115, about 1,000 feet west of the road in a wooded drainage area:

Ap—0 to 7 inches; dark brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; few fine flakes of mica; strongly acid; abrupt smooth boundary.
BEg—7 to 11 inches; grayish brown (10YR 5/2) sandy clay loam; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; few fine flakes of mica; strongly acid; clear smooth boundary.
Btg1—11 to 15 inches; gray (10YR 5/1) sandy clay; common medium prominent brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; few distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.
Btg2—15 to 35 inches; gray (10YR 5/1) clay; common medium prominent brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure; very firm, sticky and plastic; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.
BCg—35 to 55 inches; light gray (10YR 6/1) sandy clay loam; common medium distinct brownish yellow (10YR 6/8) mottles; weak coarse subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; common fine flakes of mica; strongly acid; gradual wavy boundary.
Cg—55 to 62 inches; light gray (10YR 6/1) sandy clay loam with pockets of loamy sand; common medium distinct dark gray (10YR 4/1) and few fine prominent yellowish brown (10YR 5/8) mottles; massive; firm in place; common fine flakes of mica; strongly acid.

The thickness of the solum ranges from 40 to 80 inches. The depth to bedrock is more than 5 feet. Reaction is very strongly acid to slightly acid in the A, Ap, and E horizons and very strongly acid or strongly acid in the Btg, BCg, and Cg horizons. Few or common flakes of mica are in most pedons.

The Ap or A horizon has hue of 10YR or 2.5Y or is neutral in hue. It has value of 2 to 4 and chroma of 0 to 3.

The BEg horizon, if it occurs, has hue of 10YR to 5Y or is neutral in hue. It has value of 4 to 6 and chroma of 0 to 2. It is sandy clay loam or sandy loam.

The Btg horizon has hue of 10YR to 5Y or is neutral in hue. It has value of 5 or 6 and chroma of 0 to 2. It is clay, sandy clay, or clay loam.

The BCg horizon has colors similar to those of the Btg horizon. It is sandy clay loam or clay loam.

The Cg horizon has colors similar to those of BCg horizon and is colluvium and alluvium or saprolite that weathered from felsic, igneous and metamorphic rock. It is sandy clay loam, clay loam, or sandy loam.

Zion Series

The Zion series consists of well drained, moderately deep, slowly permeable soils on strongly sloping to steep side slopes in the uplands. These soils formed in material that weathered from intermediate and mafic, igneous and metamorphic rock, such as diabase, hornblende gneiss, diorite, and gabbro. Slopes range from 8 to 45 percent. The soils are fine, mixed, thermic Ultic Hapludalfs.

Zion soils are intermixed with areas of Winnsboro and Mocksville soils and commonly are adjacent to Gaston soils. Winnsboro, Mocksville, and Gaston soils have bedrock below a depth of 60 inches. Mocksville soils have a fine-loamy Bt horizon. Gaston soils have a dark red subsoil, are more permeable than the Zion soils, and are on ridgetops.

Typical pedon of Zion fine sandy loam, in an area of Zion-Winnsboro-Mocksville complex, 15 to 25 percent slopes; about 2.8 miles northwest of Lowesville, 1,200 feet north on Secondary Road 1383 from the intersection of Secondary Roads 1511 and 1383, about 1,800 feet south on a private road, 70 feet north of the road:

A—0 to 4 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; many fine and common medium roots; common fine black concretions; strongly acid; clear smooth boundary.
E—4 to 8 inches; yellowish brown (10YR 5/6) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine and medium black concretions; strongly acid; clear smooth boundary.
Bt—8 to 18 inches; yellowish brown (10YR 5/6) clay; moderate medium angular blocky structure; firm, sticky and plastic; few fine roots; few prominent clay skins on vertical faces of peds; few fine black concretions; few medium pockets of saprolite; moderately acid; gradual wavy boundary.
BC—18 to 23 inches; yellowish brown (10YR 5/6) clay loam; weak medium subangular blocky structure; firm, sticky and plastic; few distinct clay films on faces of peds; few fine roots; common streaks of black material; common coarse pockets of saprolite that has a texture of fine sandy loam; moderately acid; gradual wavy boundary.
C—23 to 28 inches; yellowish brown (10YR 5/6) saprolite that has a texture of fine sandy loam; massive; friable; common streaks of black, white, and brownish yellow minerals; neutral; gradual wavy boundary.
Cr—28 to 35 inches; multicolored, weathered, mafic rock; partially consolidated, but can be dug with

difficulty with a spade; few pockets of clay loam filling seams; common hard rock fragments; diffuse broken boundary.

R—35 inches; hard, mafic rock.

The thickness of the solum ranges from 20 to 38 inches. The depth to bedrock ranges from 20 to 40 inches. Reaction is very strongly acid to moderately acid in the A and E horizons and in the upper part of the Bt horizon. It is strongly acid to neutral in the lower part of the Bt horizon and in the C horizon. The soils have few or common manganese concretions and black streaks throughout.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3. The E horizon, if it occurs, has hue of 10YR, value of 4 to 6, and chroma of 3 to 6. It is fine sandy loam, sandy loam, or loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. It is clay or clay loam.

The BC horizon, if it occurs, has colors similar to those of the Bt horizon. It is clay loam, sandy clay loam, or loam.

The C horizon is brownish or multicolored saprolite that weathered from intermediate and mafic, igneous and metamorphic rock. It varies in texture but typically is loamy.

The Cr horizon is multicolored, weathered, intermediate and mafic, igneous and metamorphic rock that can be dug with difficulty with hand tools.

Formation of the Soils

This section describes the five major factors of soil formation and the effects of these factors on the soils in Lincoln County. It also gives information about the general geology of the county and the relationship between parent material and geology.

Factors of Soil Formation

Soils are formed by processes of the environment acting upon geologic agents, such as metamorphic, igneous, and sedimentary rock and fluvial stream sediments. The characteristics of a soil are determined by the combined influence of parent material, climate, organisms, relief, and time. These five factors are responsible for the profile development and chemical properties that differentiate soils *(5)*.

Parent Material and General Geology

Parent material is the unconsolidated mass from which a soil forms. The character of this mass affects the kind of profile that develops and the degree of this development. In Lincoln County parent material is a major factor determining what kind of soil forms, and it can be correlated to some degree to geologic formations. The general soil map can serve as an approximate guide to the geology of the county.

Generally, the soils of the Cecil-Pacolet general soil map unit formed in material weathered from felsic, igneous and metamorphic rock, such as granite, gneiss, biotite gneiss, biotite-muscovite schist, augen gneiss, and pegmatite. The soils of the Gaston-Pacolet-Cecil general soil map unit formed in intermingled areas of material weathered from intermediate, mafic, and felsic, igneous and metamorphic rock, such as diorite, gabbro, hornblende, gneiss, and granite. The soils of the Pacolet-Madison-Rion general soil map unit formed in material weathered from felsic, igneous and metamorphic rock, such as mica gneiss, mica schists, Cherryville granite, biotite-muscovite schists, and coarse grained rocks of granitic composition. The soils of the Chewacla-Riverview general soil map unit formed in recent alluvium. The soils of the Georgeville general soil map unit formed in material weathered from phyllite or sericite schist.

Parent material is largely responsible for the chemical and mineralogical composition of soils and for the major differences among the soils in the county. Major differences in parent material, such as texture, can be observed in the field. Less distinct differences, such as mineralogical composition, can be determined only by careful laboratory analysis.

Climate

Climate affects the physical, chemical, and biological relationships in soil, primarily through the effects of precipitation and temperature. The rate of rock weathering and of organic matter decomposition are highly influenced by precipitation and temperature. The amount of leaching in a soil is related to the amount of rainfall and its movement through the soil. The kind and growth of organisms and the speed of chemical and physical reactions in a soil are influenced by temperature.

Lincoln County has a warm, humid climate. It occupies a moderate plateau that ranges in elevation from 650 to 1,480 feet above sea level. Because mountains to the west of the county have a modifying effect, changes in temperature and precipitation are gradual. The climate favors rapid chemical processes, resulting in decomposition of organic matter and weathering of rock. The mild temperatures and abundant rainfall cause intense leaching and oxidizing.

The effects of climate have noticeably influenced the formation of the soils in the county. The mild temperatures throughout the year and the abundant rainfall have resulted in depletion of organic matter and considerable leaching of soluble bases. Because variations in climate are small across the county, climate has probably not caused major local differences among the soils. The most important effect of climate on soil formation in the county is the alteration of parent material caused by changes in temperature and amount of precipitation and by influences on plant and animal life.

Organisms

Plants and animals influence the formation and differentiation of soil horizons. The type and number of organisms in and on a soil are determined in part by climate and in part by the nature of the soil material, relief, and the age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic material.

Under normal conditions plants largely determine the kinds and amounts of organic matter in a soil and the way in which the organic matter is added. Plants are also important to changes of base status and to the leaching process of a soil through the nutrient cycle.

Animals convert complex compounds into simpler forms, add organic matter to soil, and modify certain chemical and physical properties of soil. In Lincoln County most of the organic material accumulates on the surface. It is acted upon by micro-organisms, fungi, earthworms, and other forms of life and by direct chemical reaction. It is mixed with the uppermost mineral part of the soil by the activities of earthworms and other small invertebrates. Rodents have had little effect on the formation of soils in the county.

In areas of native forest in the county, not enough bases are brought to the surface by plants to counteract the effects of leaching. Generally, the soils of the county formed under hardwood forest. Trees took up elements from the subsoil and added organic matter to the surface by depositing leaves, roots, twigs, and eventually branches and trunks. The organic material on the surface was acted upon by organisms and underwent chemical reactions.

Organic material decomposes rapidly in the county because of the moderate temperature, the abundant moisture supply, and the character of the organic material. It decays so rapidly that little of it accumulates in the soil.

Relief

Relief causes differences in free drainage, surface runoff, soil temperature, and the extent of geologic erosion. In Lincoln County relief is largely determined by the kind of underlying bedrock, the geology of the area, and the amount of dissection of the landscape by streams.

Relief affects the percolation of water through the soil profile. The movement of water through the profile is important to soil development because it aids chemical reactions and is necessary for leaching.

Relief affects the depth of soils. Slopes in the county range from 0 to 45 percent. On uplands the soils that have slopes of less than 10 percent generally have deeper, better defined profiles than the steeper soils. Examples are the well developed Appling, Cecil, and Gaston soils. On most soils that have slopes of 15 percent or more, geologic erosion removes soil material almost as quickly as it forms. As a result, most of the strongly sloping to steep soils have a thinner solum than the less sloping soils. Examples are Pacolet and Zion soils, which are neither as deep nor as well developed as the less sloping soils.

Relief affects drainage. A high water table, for example, is usually related to nearly level relief. Helena and Worsham soils on uplands are not as well drained as the steeper soils because they are nearly level and thus the internal movement of water is slow.

Soils at the lower elevations generally are less sloping than those at the higher elevations and receive runoff from the adjacent higher areas. This water tends to accumulate in the nearly level to depressional areas. Examples are the somewhat poorly drained Chewacla soils on flood plains and the poorly drained Worsham soils in depressions on uplands.

Time

The length of time that soil material has been exposed to soil forming processes is responsible for some differences among soils. The length of time required for a well defined soil profile to form depends on the other factors of soil formation. Less time is required for the development of a soil profile in coarse textured material than in similar but fine textured material. Less time is required for profile development in a warm, humid area where the plant cover is dense than in a cold, dry area where the plant cover is sparse.

The age of soils varies considerably, and the length of time that a soil has been developing is generally reflected in the profile. Old soils generally have better defined horizons than young soils. In Lincoln County the effects of time as a soil forming factor are more apparent in the older soils, such as Cecil and Appling soils, than in the younger soils. These older soils have more distinct horizons than such younger soils as Chewacla and Riverview soils, which formed in alluvium. The Chewacla and Riverview soils on flood plains have not been in place long enough to have strongly developed horizons.

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Glossary

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Atterberg limits. Atterberg limits are measured for soil materials passing the No. 40 sieve. They include the liquid limit (LL), which is the moisture content at which the soil passes from a plastic to a liquid state, and the plasticity index (PI), which is the water content corresponding to an arbitrary limit between the plastic and semisolid states of consistency of a soil.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

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.

Clayey. A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

CMAI (cumulative mean annual increment). The age or rotation at which growing stock of a forest produces the greatest annual growth (for that time period). It is the age at which periodic annual growth and mean annual growth are equal.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Crop residue management. Use of that portion of the plant or crop left in the field after harvest for protection or improvement of the soil.

Dbh (diameter at breast height). The diameter of a tree at 4.5 feet above the ground level on the uphill side.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delineation. The process of drawing or plotting features on a map with lines and symbols.

Depth class. Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	more than 60 inches

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

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

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Engineering index test data. Laboratory test and mechanical analysis of selected soils in the county.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion classes. Classes based on estimates of past erosion. The classes are as follows:

Class 1.—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most of the area, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

Class 2.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.

Class 4.—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

Erosion hazard. Terms describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in tons per acre (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per acre	none
Less than 1 ton per acre	slight
1 to 5 tons per acre	moderate
5 to 10 tons per acre	severe
More than 10 tons per acre	very severe

Evapotranspiration. The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period of time.

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

Felsic rock. A general term for light colored igneous rock and some metamorphic crystalline rock.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flooding. The temporary covering of the surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (the chance of flooding is nearly 0 to 5 percent in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year). *Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month).

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forest type. A classification of forest land based on the species forming the majority of live-tree stocking.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gneiss. A coarse grained metamorphic rock in which bands rich in granular minerals alternate with bands in which schistose minerals predominate. It is commonly formed by the metamorphism of granite.

Granite. A coarse grained igneous rock dominated by light colored minerals, consisting of about 50 percent orthoclase and 25 percent quartz with the balance being plagioclase feldspars and ferromagnesian silicates. Granites and granodiorites comprise 95 percent of all intrusive rocks.

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

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

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

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Igneous rock. Rock formed by solidification of molten rock, generally crystalline in nature.

Intermediate rock. Igneous or metamorphic crystalline rock that is intermediate in composition between mafic and felsic rock.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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

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

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

Loamy. A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam, sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

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

Mafic rock. A dark rock composed predominantly of magnesium silicates. It contains little quartz, feldspar, or muscovite mica.

Mean annual increment. The average yearly volume of a stand of trees from the year of origin to the age under consideration.

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

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

Micas. A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

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

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

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Overstory. The portion of the trees in a forest stand forming the upper crown cover.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piedmont. The physiographic region of central North Carolina characterized by rolling landscapes formed from the weathering of residual rock material.

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range in moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	below 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

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

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Road cut. A sloping surface made by mechanical means during road construction. It is generally on the uphill section of a road.

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

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Runoff class (surface). Refers to the rate at which water flows away from the soil over the surface without infiltrating. Six classes of rate of runoff are recognized:

Ponded.—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level and nearly level soils in depressions. The water depth may fluctuate greatly.

Very slow.—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very open and porous.

Slow.—Surface water flows away so slowly that free water stands on the surface for moderate periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

Medium.—Surface water flows away so rapidly that free water stands on the surface for only short periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level or gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

Rapid.—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly moderately steep or steep and have moderate or slow rates of absorption.

Very rapid.—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandy. A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Schist. A metamorphic rock dominated by fibrous or platy minerals. It has schistose cleavage and is a product of regional metamorphism.

Seasonal high water table. The highest level of a saturated zone (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

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

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

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

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey area slope classes are as follows:

Nearly level	0 to 2 percent
Gently sloping	2 to 8 percent

Strongly sloping	8 to 15 percent
Moderately steep	15 to 25 percent
Steep	25 to 45 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil compaction. An alteration of soil structure that ultimately can affect the biological and chemical properties of the soil. Soil compaction decreases the extent of voids and increases bulk density.

Soil map unit. A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. They are generally designed to reflect significant differences in use and management.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Soil strength. Load supporting capacity of a soil at specific moisture and density conditions.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

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

Suitability ratings. Ratings for the degree of suitability of soils for pasture, crops, woodland, and engineering uses. The ratings and the general criteria used for their selection are as follows:
Well suited.—The intended use may be initiated and maintained by using only the standard materials and methods typically required for that use. Good results can be expected.
Moderately suited.—The limitations affecting the intended use make special planning, design, or maintenance necessary.
Poorly suited.—The intended use is difficult or costly to initiate and maintain because of certain soil properties, such as steep slopes, a high hazard of erosion, a high water table, low fertility, and a hazard of flooding. Major soil reclamation, special design, or intensive management practices are needed.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

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

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

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

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine." The textural classes are defined as follows:

Sands (coarse sand, sand, fine sand, and very fine sand).—Soil material in which the content of sand is 85 or more percent and the percentage of silt plus 1.5 times the percentage of clay does not exceed 15.

Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus 1.5 times the percentage of clay is not less than 15; at the lower limit, the content of sand is 70 to 85 percent, and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more or soil material in which the content of clay is less than 7 percent, the content of silt is less than 50 percent, and the content of sand is 43 and 52 percent.

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

Silt loam.—Soil material that contains 50 or more percent silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

Silt.—Soil material that contains 80 or more percent silt and less than 12 percent clay.

Sandy clay loam.—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 or more percent sand.

Clay loam.—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

Silty clay loam.—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

Sandy clay.—Soil material that contains 35 or more percent clay and 45 or more percent sand.

Silty clay.—Soil material that contains 40 or more percent clay and 40 or more percent silt.

Clay.—Soil material that contains 40 or more percent clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topography. The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Underlying material. Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

Understory. The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Water table (apparent). A thick zone of free water in the soil. The apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table (perched). A saturated zone of water in the soil standing above an unsaturated zone.

Water table (seasonal high). The highest level of a saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Wetness. A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Yield (forest land). The volume of wood fiber from harvested trees taken from a certain unit of area. Yield is usually measured in board feet or cubic feet per acre.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1952-84 at Lincolnton, North Carolina)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	49.3	27.7	38.5	73	4	22	3.80	2.00	5.13	7	2.7
February----	53.0	29.9	41.5	74	8	21	4.15	2.09	5.78	7	2.5
March-------	61.4	37.4	49.4	82	17	123	4.84	3.04	6.43	9	1.3
April-------	71.4	46.2	58.8	90	27	271	3.64	1.85	5.39	6	.0
May---------	78.9	55.6	67.3	92	36	536	4.59	2.53	6.39	7	.0
June--------	85.1	62.7	73.9	96	48	717	4.24	2.43	5.76	7	.0
July--------	88.0	66.3	77.2	99	55	843	4.20	1.98	6.41	7	.0
August------	87.3	65.5	76.4	98	53	818	4.06	1.74	6.22	7	.0
September---	82.1	59.3	70.7	95	42	621	3.88	1.59	5.66	5	.0
October-----	72.4	47.2	59.8	87	28	313	3.35	1.37	5.25	5	.0
November----	62.4	37.6	50.0	81	17	72	2.93	1.40	3.76	5	.0
December----	52.7	31.0	41.9	72	9	43	3.89	1.77	5.82	6	.6
Yearly:											
Average---	70.3	47.2	58.8	---	---	---	---	---	---	---	---
Extreme---	---	---	---	99	2	---	---	---	---	---	---
Total-----	---	---	---	---	---	4,400	47.57	42.01	53.44	78	7.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1952-84 at Lincolnton, North Carolina)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Mar. 30	Apr. 9	Apr. 22
2 years in 10 later than--	Mar. 22	Apr. 3	Apr. 17
5 years in 10 later than--	Mar. 6	Mar. 22	Apr. 7
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 7	Oct. 24	Oct. 14
2 years in 10 earlier than--	Nov. 12	Oct. 29	Oct. 19
5 years in 10 earlier than--	Nov. 22	Nov. 8	Oct. 30

TABLE 3.--GROWING SEASON

(Recorded in the period 1952-84 at Lincolnton, North Carolina)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	231	208	187
8 years in 10	241	216	193
5 years in 10	260	231	205
2 years in 10	279	247	218
1 year in 10	291	256	224

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

Map symbol	Soil name	Acres	Percent
AaA	Altavista sandy loam, 0 to 2 percent slopes, rarely flooded	348	0.2
ApB	Appling sandy loam, 1 to 6 percent slopes	941	0.5
BnB	Buncombe sand, 0 to 5 percent slopes, rarely flooded	241	0.1
CcB	Cecil sandy loam, 2 to 8 percent slopes	4,584	2.3
CeB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded	56,191	28.6
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded	10,348	5.3
GaD	Gaston loam, 15 to 25 percent slopes	1,933	1.0
GnB2	Gaston sandy clay loam, 2 to 8 percent slopes, eroded	10,790	5.5
GnC2	Gaston sandy clay loam, 8 to 15 percent slopes, eroded	5,366	2.7
GrB	Georgeville loam, 2 to 8 percent slopes	2,252	1.1
GrC	Georgeville loam, 8 to 15 percent slopes	1,796	0.9
GrD	Georgeville loam, 15 to 25 percent slopes	1,313	0.7
GvB2	Georgeville clay loam, 2 to 8 percent slopes, eroded	1,841	1.0
GvC2	Georgeville clay loam, 8 to 15 percent slopes, eroded	1,022	0.5
HeB	Helena sandy loam, 1 to 6 percent slopes	1,310	0.7
MaD	Madison sandy loam, 15 to 25 percent slopes	1,216	0.6
MdB2	Madison sandy clay loam, 2 to 8 percent slopes, eroded	2,183	1.1
MdC2	Madison sandy clay loam, 8 to 15 percent slopes, eroded	1,387	0.7
MsB	Masada sandy loam, 2 to 8 percent slopes	475	0.2
MsC	Masada sandy loam, 8 to 15 percent slopes	115	0.1
PaB	Pacolet sandy loam, 2 to 8 percent slopes	1,958	1.0
PaC	Pacolet sandy loam, 8 to 15 percent slopes	7,504	3.8
PaD	Pacolet sandy loam, 15 to 25 percent slopes	16,103	8.2
PaE	Pacolet sandy loam, 25 to 45 percent slopes	1,801	0.9
PeB2	Pacolet sandy clay loam, 2 to 8 percent slopes, eroded	6,261	3.2
PeC2	Pacolet sandy clay loam, 8 to 15 percent slopes, eroded	37,616	19.2
PmB	Pacolet-Madison-Urban land complex, 2 to 8 percent slopes	3,035	1.6
PmC	Pacolet-Madison-Urban land complex, 8 to 15 percent slopes	463	0.2
Pt	Pits, quarries	130	0.1
RnB	Rion sandy loam, 2 to 8 percent slopes	1,194	0.6
RnC	Rion sandy loam, 8 to 15 percent slopes	763	0.4
RvA	Riverview loam, 0 to 2 percent slopes, occasionally flooded	2,487	1.3
SeB	Sedgefield fine sandy loam, 1 to 4 percent slopes	205	0.1
Ud	Udorthents, loamy	324	0.2
Ur	Urban land	620	0.3
WnB	Winnsboro fine sandy loam, 2 to 8 percent slopes	462	0.2
WoA	Worsham fine sandy loam, 0 to 2 percent slopes	1,497	0.8
ZmE	Zion-Mocksville complex, 25 to 45 percent slopes	87	*
ZwC	Zion-Winnsboro-Mocksville complex, 8 to 15 percent slopes	428	0.2
ZwD	Zion-Winnsboro-Mocksville complex, 15 to 25 percent slopes	452	0.2
	Water	7,220	3.7
	Total	196,262	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
AaA	Altavista sandy loam, 0 to 2 percent slopes, rarely flooded
ApB	Appling sandy loam, 1 to 6 percent slopes
CcB	Cecil sandy loam, 2 to 8 percent slopes
CeB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded
ChA	Chewacla loam, 0 to 2 percent slopes, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
GnB2	Gaston sandy clay loam, 2 to 8 percent slopes, eroded
GrB	Georgeville loam, 2 to 8 percent slopes
GvB2	Georgeville clay loam, 2 to 8 percent slopes, eroded
HeB	Helena sandy loam, 1 to 6 percent slopes
MdB2	Madison sandy clay loam, 2 to 8 percent slopes, eroded
MsB	Masada sandy loam, 2 to 8 percent slopes
PaB	Pacolet sandy loam, 2 to 8 percent slopes
PeB2	Pacolet sandy clay loam, 2 to 8 percent slopes, eroded
RnB	Rion sandy loam, 2 to 8 percent slopes
RvA	Riverview loam, 0 to 2 percent slopes, occasionally flooded (where protected from flooding or not frequently flooded during the growing season)
SeB	Sedgefield fine sandy loam, 1 to 4 percent slopes
WnB	Winnsboro fine sandy loam, 2 to 8 percent slopes

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Wheat	Corn silage	Oats	Pasture	Grass-legume hay
		Bu	Bu	Bu	Tons	Bu	AUM*	Tons
AaA------------- Altavista	IIw	125	40	55	20	75	6.3	3.7
ApB------------- Appling	IIe	95	35	50	16	70	6.8	4.0
BnB------------- Buncombe	IIIs	40	15	20	9	35	3.4	2.0
CcB------------- Cecil	IIe	95	35	50	16	70	6.8	4.0
CeB2------------ Cecil	IIIe	80	30	45	14	65	6.0	3.5
ChA------------- Chewacla	IVw	80	30	30	15.5	40	5.1	3.0
GaD------------- Gaston	VIe	---	---	---	---	---	4.3	---
GnB2------------ Gaston	IIIe	90	35	50	15.5	70	6.8	4.0
GnC2------------ Gaston	IVe	80	25	40	14	60	6.0	3.5
GrB------------- Georgeville	IIe	95	35	50	16	70	6.8	4.0
GrC------------- Georgeville	IVe	80	25	40	14	60	6.0	3.5
GrD------------- Georgeville	VIe	---	---	---	---	---	4.3	---
GvB2------------ Georgeville	IIIe	80	30	45	15.5	65	6.0	3.5
GvC2------------ Georgeville	IVe	65	20	35	12	55	5.1	3.0
HeB------------- Helena	IIe	80	30	45	14	65	6.0	3.5
MaD------------- Madison	VIe	---	---	---	---	---	4.3	---
MdB2------------ Madison	IIIe	70	25	40	13	60	5.1	3.0
MdC2------------ Madison	IVe	55	20	30	11	45	4.5	2.7
MsB------------- Masada	IIe	115	40	50	19	70	6.8	4.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Soybeans	Wheat	Corn silage	Oats	Pasture	Grass-legume hay
		Bu	Bu	Bu	Tons	Bu	AUM*	Tons
MsC------------- Masada	IIIe	95	35	40	16	60	6.0	3.5
PaB------------- Pacolet	IIe	80	30	45	14	65	6.0	3.5
PaC------------- Pacolet	IVe	65	25	35	12	55	5.1	3.0
PaD------------- Pacolet	VIe	---	---	---	---	---	4.3	---
PaE------------- Pacolet	VIIe	---	---	---	---	---	---	---
PeB2------------ Pacolet	IIIe	70	25	40	13	60	5.1	3.0
PeC2------------ Pacolet	IVe	55	20	30	11	45	4.6	2.7
PmB**. Pacolet-Madison-Urban land								
PmC**. Pacolet-Madison-Urban land								
RnB------------- Rion	IIe	85	35	50	14.8	70	6.8	4.0
RnC------------- Rion	IVe	70	25	40	13	60	6.0	3.5
RvA------------- Riverview	IIw	130	40	55	21	80	7.7	4.5
SeB------------- Sedgefield	IIe	85	35	50	14.8	70	6.8	4.0
WnB------------- Winnsboro	IIe	85	35	50	14.8	70	6.8	4.0
WoA------------- Worsham	IVw	70	25	30	13	45	5.1	3.0
ZmE------------- Zion-Mocksville	VIIe	---	---	---	---	---	---	---
ZwC------------- Zion-Winnsboro-Mocksville	IVe	60	20	30	11.7	45	5.1	3.0
ZwD------------- Zion-Winnsboro-Mocksville	VIe	---	---	---	---	---	---	---

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

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

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

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

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
AaA---------------- Altavista	9A	Slight	Slight	Slight	Loblolly pine--------	91	133	Loblolly pine.
					White oak------------	77	59	
					Shortleaf pine-------	---	---	
					Sweetgum-------------	---	---	
					Red maple------------	---	---	
					Yellow-poplar--------	---	---	
					Southern red oak-----	---	---	
					Hickory--------------	---	---	
ApB---------------- Appling	8A	Slight	Slight	Slight	Loblolly pine--------	84	118	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	65	99	
					White oak------------	64	47	
					Yellow-poplar--------	81	73	
					Sweetgum-------------	---	---	
					Southern red oak-----	---	---	
					Hickory--------------	---	---	
BnB---------------- Buncombe	8S	Slight	Moderate	Moderate	Yellow-poplar--------	100	107	Loblolly pine, yellow-poplar.
					American sycamore----	---	---	
					Sweetgum-------------	---	---	
					Loblolly pine--------	90	131	
					Northern red oak-----	---	---	
					Southern red oak-----	---	---	
					Elm------------------	---	---	
					Eastern cottonwood---	---	---	
CcB---------------- Cecil	8A	Slight	Slight	Slight	Loblolly pine--------	83	116	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	67	---	
					White oak------------	79	61	
					Northern red oak-----	81	63	
					Southern red oak-----	79	61	
					Yellow-poplar--------	92	93	
					Hickory--------------	---	---	
CeB2--------------- Cecil	7C	Slight	Moderate	Moderate	Loblolly pine--------	72	96	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	63	95	
					White oak------------	64	47	
					Northern red oak-----	---	---	
					Southern red oak-----	---	---	
					Hickory--------------	---	---	
					Yellow-poplar--------	---	---	
ChA---------------- Chewacla	7W	Slight	Moderate	Slight	Yellow-poplar--------	95	98	Yellow-poplar, loblolly pine, sweetgum.
					Loblolly pine--------	95	142	
					Sweetgum-------------	---	---	
					Water oak------------	---	---	
					Eastern cottonwood---	---	---	
					Green ash------------	---	---	
					Willow oak-----------	---	---	
					American sycamore----	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
GaD---------------- Gaston	9R	Moderate	Moderate	Slight	Loblolly pine-------- Shortleaf pine------- Virginia pine-------- Yellow-poplar-------- White oak------------ Southern red oak----- Sweetgum------------- Hickory-------------- Northern red oak-----	88 --- --- --- --- --- --- --- ---	127 --- --- --- --- --- --- --- ---	Loblolly pine.
GnB2, GnC2--------- Gaston	8C	Slight	Moderate	Moderate	Loblolly pine-------- Shortleaf pine------- Yellow-poplar-------- White oak------------ Southern red oak----- Sweetgum------------- Northern red oak----- Hickory--------------	85 --- --- --- --- --- --- ---	120 --- --- --- --- --- --- ---	Loblolly pine.
GrB, GrC----------- Georgeville	8A	Slight	Slight	Slight	Loblolly pine-------- Shortleaf pine------- White oak------------ Southern red oak----- Chestnut oak--------- Yellow-poplar-------- Northern red oak----- Hickory--------------	81 66 --- 67 --- --- --- ---	112 101 --- 49 --- --- --- ---	Loblolly pine.
GrD---------------- Georgeville	8R	Moderate	Moderate	Slight	Loblolly pine-------- Shortleaf pine------- White oak------------ Southern red oak----- Chestnut oak--------- Yellow-poplar-------- Northern red oak----- Hickory--------------	81 66 --- --- --- --- --- ---	112 101 --- --- --- --- --- ---	Loblolly pine.
GvB2, GvC2--------- Georgeville	6C	Slight	Moderate	Moderate	Loblolly pine-------- Chestnut oak--------- Northern red oak----- White oak------------ Hickory-------------- Red maple------------ Post oak-------------	70 --- --- --- --- --- ---	93 --- --- --- --- --- ---	Loblolly pine.
HeB---------------- Helena	8A	Slight	Slight	Slight	Loblolly pine-------- Shortleaf pine------- White oak------------ Yellow-poplar-------- Sweetgum------------- Northern red oak----- Southern red oak----- Black oak------------ Hickory-------------- Post oak-------------	84 66 --- --- --- --- --- --- --- ---	118 101 --- --- --- --- --- --- --- ---	Loblolly pine, yellow-poplar.

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
MaD-----------------	8R	Moderate	Moderate	Slight	Loblolly pine--------	80	110	Loblolly pine,
Madison					Shortleaf pine-------	64	97	shortleaf pine.
					Southern red oak-----	75	57	
					Yellow-poplar--------	96	100	
					Northern red oak-----	75	57	
					Hickory--------------	---	---	
					Sweetgum-------------	---	---	
MdB2, MdC2----------	7C	Slight	Moderate	Moderate	Loblolly pine--------	72	96	Loblolly pine,
Madison					Shortleaf pine-------	62	92	shortleaf pine.
					Northern red oak-----	66	48	
					White oak------------	---	---	
					Southern red oak-----	---	---	
					Hickory--------------	---	---	
					Yellow-poplar--------	---	---	
MsB, MsC------------	8A	Slight	Slight	Slight	Loblolly pine--------	80	110	Loblolly pine.
Masada					Southern red oak-----	70	52	
					Shortleaf pine-------	76	110	
					Yellow-poplar--------	80	71	
					White oak------------	---	---	
					Hickory--------------	---	---	
					Sweetgum-------------	---	---	
PaB, PaC------------	8A	Slight	Slight	Slight	Loblolly pine--------	78	107	Loblolly pine,
Pacolet					Shortleaf pine-------	70	110	shortleaf pine.
					Yellow-poplar--------	90	90	
					Virginia pine--------	---	---	
					Northern red oak-----	---	---	
					Hickory--------------	---	---	
					White oak------------	---	---	
					Southern red oak-----	---	---	
PaD, PaE------------	8R	Moderate	Moderate	Slight	Loblolly pine--------	78	107	Loblolly pine.
Pacolet					Shortleaf pine-------	70	110	
					Yellow-poplar--------	90	90	
					Virginia pine--------	---	---	
					Northern red oak-----	---	---	
					Hickory--------------	---	---	
					White oak------------	---	---	
					Southern red oak-----	---	---	
PeB2, PeC2----------	6C	Slight	Moderate	Moderate	Loblolly pine--------	70	93	Loblolly pine,
Pacolet					Shortleaf pine-------	60	88	shortleaf pine.
					Yellow-poplar--------	80	71	
					Southern red oak-----	---	---	
					Northern red oak-----	---	---	
					White oak------------	---	---	
					Hickory--------------	---	---	
RnB, RnC------------	8A	Slight	Slight	Slight	Loblolly pine--------	80	110	Loblolly pine.
Rion					Post oak-------------	65	48	
					Shortleaf pine-------	70	110	
					Southern red oak-----	80	62	
					Sweetgum-------------	80	79	
					White oak------------	70	52	
					Yellow-poplar--------	90	90	
					Northern red oak-----	---	---	
					Hickory--------------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
RvA: Riverview	9W	Slight	Moderate	Moderate	Yellow-poplar	100	124	Loblolly pine, sweetgum, yellow-poplar.
					Loblolly pine	110	154	
					Sweetgum	100	138	
					American sycamore	---	---	
					Water oak	---	---	
					Willow oak	---	---	
					Eastern cottonwood	---	---	
					Black walnut	---	---	
SeB: Sedgefield	8W	Slight	Moderate	Slight	Loblolly pine	80	8	Loblolly pine, shortleaf pine.
					Shortleaf pine	---	---	
					Southern red oak	---	---	
					Northern red oak	---	---	
					Sweetgum	---	---	
					Yellow-poplar	---	---	
					White oak	---	---	
					Black oak	---	---	
					Hickory	---	---	
WnB: Winnsboro	7A	Slight	Slight	Slight	Loblolly pine	73	98	Loblolly pine.
					Shortleaf pine	63	95	
					Virginia pine	63	96	
					Post oak	55	38	
					Red maple	---	---	
					Southern red oak	84	66	
					Sweetgum	78	75	
					White oak	69	51	
					Yellow-poplar	88	86	
					Northern red oak	---	---	
WoA: Worsham	6W	Slight	Severe	Severe	Yellow-poplar	91	92	Loblolly pine, yellow-poplar.
					Loblolly pine	88	127	
					Southern red oak	80	62	
					Virginia pine	80	122	
					Sweet gum	---	---	
					Willow oak	---	---	
					Blackgum	---	---	
ZmE**:								
Zion	6R	Severe	Severe	Slight	Loblolly pine	70	93	Loblolly pine.
					Shortleaf pine	60	88	
					Virginia pine	60	91	
					Yellow-poplar	---	---	
					Northern red oak	70	52	
					Southern red oak	---	---	
					Post oak	---	---	
					White oak	---	---	
					Hickory	---	---	
Mocksville	8R	Severe	Severe	Slight	Loblolly pine	82	114	Loblolly pine, shortleaf pine.
					Virginia pine	80	122	
					Shortleaf pine	78	126	
					Northern red oak	83	664	
					Hickory	---	---	
					White oak	---	---	
					Yellow-poplar	---	---	
					Southern red oak	---	---	
					Post oak	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
ZwC**:								
Zion	6D	Slight	Slight	Slight	Loblolly pine	70	93	Loblolly pine.
					Northern red oak	70	52	
					Shortleaf pine	60	88	
					Virginia pine	60	91	
					Yellow-poplar	---	---	
					White oak	---	---	
					Southern red oak	---	---	
					Post oak	---	---	
					Sweetgum	---	---	
Winnsboro	7A	Slight	Slight	Slight	Loblolly pine	73	98	Loblolly pine.
					Shortleaf pine	63	95	
					Virginia pine	63	96	
					Post oak	55	38	
					Southern red oak	84	66	
					Sweetgum	78	75	
					White oak	69	51	
					Yellow-poplar	88	86	
					Northern red oak	---	---	
Mocksville	8A	Slight	Slight	Slight	Loblolly pine	82	114	Loblolly pine, shortleaf pine.
					Virginia pine	80	122	
					Shortleaf pine	78	126	
					Northern red oak	83	65	
					White oak	---	---	
					Sweetgum	---	---	
					Blackgum	---	---	
					Post oak	---	---	
					Southern red oak	---	---	
					Yellow-poplar	---	---	
ZwD**:								
Zion	6R	Moderate	Moderate	Slight	Loblolly pine	70	93	Loblolly pine.
					Virginia pine	60	91	
					Shortleaf pine	60	88	
					White oak	---	---	
					Northern red oak	70	52	
					Southern red oak	---	---	
					Post oak	---	---	
					Sweetgum	---	---	
					Yellow-poplar	---	---	
Winnsboro	7R	Moderate	Moderate	Slight	Loblolly pine	73	98	Loblolly pine.
					Shortleaf pine	63	95	
					Virginia pine	63	96	
					Post oak	55	38	
					Southern red oak	84	66	
					Sweetgum	78	75	
					White oak	69	51	
					Yellow-poplar	88	86	
					Northern red oak	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Volume*	Trees to plant
ZwD**:								
Mocksville	8R	Moderate	Moderate	Slight	Loblolly pine	82	114	Loblolly pine, shortleaf pine.
					Virginia pine	80	122	
					Shortleaf pine	78	126	
					Northern red oak	83	65	
					White oak	---	---	
					Sweetgum	---	---	
					Blackgum	---	---	
					Post oak	---	---	
					Southern red oak	---	---	
					Yellow-poplar	---	---	

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

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

TABLE 8.--COMMON AND SCIENTIFIC NAMES OF WOODLAND PLANTS

Common Name	Scientific Name
Alder	Alnus
American holly	Ilex opaca
American sycamore	Platanus occidentalis
Arrowhead	Sagittaria
Blackberry	Rubus
Black cherry	Prunus serotina
Blackgum	Nyssa sylvatica
Blackjack oak	Quercus marilandica
Black locust	Robinia pseudoacacia
Black oak	Quercus velutina
Black walnut	Juglans nigra
Brackenfern	Pteridium aquilinum
Chestnut oak	Quercus prinus
Christmas fern	Polystichum acrostichoides
Common greenbrier	Smilax rotundifolia
Eastern cottonwood	Populus deltoides
Eastern redcedar	Juniperus Virginiana
Elm	Ulmus
Flowering dogwood	Cornus florida
Green ash	Fraxinus pennsylvanica
Hickory	Carya
Honeysuckle	Lonicera
Loblolly pine	Pinus taeda
Mountain laurel	Kalmia latifolia
Muscadine grape	Vitis rotundifolia
Northern red oak	Quercus rubra
Poison ivy	Toxicodendron radicans
Post oak	Quercus stellata
Red maple	Acer rubrum
Red mulberry	Morus rubra
Running cedar	Lycopodium clavatum
Sassafras	Sassafras albidum

TABLE 8.--COMMON AND SCIENTIFIC NAMES OF WOODLAND PLANTS--Continued

Common Name	Scientific Name
Sedge	Carex
Shortleaf pine	Pinus echinata
Sourwood	Oxydendrum arboreum
Southern red oak	Quercus falcata
Sumac	Rhus
Sweetgum	Liquidambar styraciflua
Virginia creeper	Parthenocissus quinquefolia
Virginia pine	Pinus virginiana
Water oak	Quercus nigra
White oak	Quercus alba
Willow	Salix
Willow oak	Quercus phellos
Winged elm	Ulmus alata
Yellow-poplar	Liriodendron tulipifera

TABLE 9.--RECREATIONAL DEVELOPMENT

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

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AaA------------------- Altavista	Severe: flooding.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
ApB------------------- Appling	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
BnB------------------- Buncombe	Severe: flooding, too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: droughty.
CcB, CeB2------------- Cecil	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
ChA------------------- Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
GaD------------------- Gaston	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
GnB2------------------ Gaston	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
GnC2------------------ Gaston	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
GrB------------------- Georgeville	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
GrC------------------- Georgeville	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
GrD------------------- Georgeville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
GvB2------------------ Georgeville	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
GvC2------------------ Georgeville	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
HeB------------------- Helena	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
MaD------------------- Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
MdB2------------------ Madison	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
MdC2------------------ Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
MsB: Masada	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
MsC: Masada	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
PaB: Pacolet	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
PaC: Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
PaD: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PaE: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PeB2: Pacolet	Slight	Slight	Moderate: slope.	Slight	Slight.
PeC2: Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
PmB*:					
Pacolet	Slight	Slight	Moderate: slope.	Slight	Slight.
Madison	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
Urban land.					
PmC*:					
Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
Urban land.					
Pt*. Pits					
RnB: Rion	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
RnC: Rion	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
RvA: Riverview	Severe: flooding.	Slight	Moderate: flooding.	Slight	Moderate: flooding.
SeB: Sedgefield	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ud*. Udorthents					
Ur*. Urban land					
WnB Winnsboro	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
WoA Worsham	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.
ZmE*:					
Zion	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mocksville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ZwC*:					
Zion	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: droughty, slope, depth to rock.
Winnsboro	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
Mocksville	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
ZwD*:					
Zion	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Winnsboro	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
Mocksville	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

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

TABLE 10.--WILDLIFE HABITAT

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

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hardwood trees	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
AaA----------------- Altavista	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
ApB----------------- Appling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
BnB----------------- Buncombe	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
CcB----------------- Cecil	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CeB2---------------- Cecil	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ChA----------------- Chewacla	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
GaD----------------- Gaston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GnB2---------------- Gaston	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
GnC2---------------- Gaston	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
GrB----------------- Georgeville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GrC----------------- Georgeville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GrD----------------- Georgeville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
GvB2---------------- Georgeville	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
GvC2---------------- Georgeville	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
HeB----------------- Helena	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaD----------------- Madison	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
MdB2---------------- Madison	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
MdC2---------------- Madison	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
MsB----------------- Masada	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MsC----------------- Masada	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
PaB----------------- Pacolet	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
PaC----------------- Pacolet	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
PaD----------------- Pacolet	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
PaE----------------- Pacolet	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
PeB2---------------- Pacolet	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
PeC2---------------- Pacolet	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
PmB*:										
Pacolet-----------	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Madison-----------	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Urban land.										
PmC*:										
Pacolet-----------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Madison-----------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
Pt*. Pits										
RnB----------------- Rion	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
RnC----------------- Rion	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
RvA----------------- Riverview	Good	Good	Good	Good	---	Poor	Poor	Good	Good	Poor.
SeB----------------- Sedgefield	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ud*. Udorthents										
Ur*. Urban land										

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
WnB: Winnsboro	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WoA: Worsham	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
ZmE*:										
Zion	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Mocksville	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
ZwC*:										
Zion	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Winnsboro	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Mocksville	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ZwD*:										
Zion	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Winnsboro	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Mocksville	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

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

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AaA---------------Altavista	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding, low strength.	Moderate: wetness.
ApB---------------Appling	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
BnB---------------Buncombe	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.	Severe: droughty.
CcB, CeB2---------Cecil	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
ChA---------------Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
GaD---------------Gaston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
GnB2--------------Gaston	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
GnC2--------------Gaston	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
GrB---------------Georgeville	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
GrC---------------Georgeville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
GrD---------------Georgeville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
GvB2--------------Georgeville	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.
GvC2--------------Georgeville	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
HeB---------------Helena	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
MaD---------------Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
MdB2--------------Madison	Moderate: too clayey.	Slight---------	Slight---------	Moderate: slope.	Moderate: low strength.	Slight.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
MdC2: Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
MsB: Masada	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
MsC: Masada	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
PaB: Pacolet	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
PaC: Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PaD, PaE: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
PeB2: Pacolet	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
PeC2: Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PmB*:						
Pacolet	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Madison	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						
PmC*:						
Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
Urban land.						
Pt*. Pits						
RnB: Rion	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Moderate: droughty.
RnC: Rion	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
RvA: Riverview	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
SeB---------------- Sedgefield	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
Ud*. Udorthents						
Ur*. Urban land						
WnB---------------- Winnsboro	Moderate: too clayey.	Severe: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: shrink-swell.	Slight.
WoA---------------- Worsham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness.
ZmE*:						
Zion--------------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Mocksville--------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ZwC*:						
Zion--------------	Severe: depth to rock.	Severe: shrink-swell.	Severe: depth to rock, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: droughty, slope, depth to rock.
Winnsboro---------	Moderate: slope, too clayey.	Severe: shrink-swell.	Moderate: slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope.
Mocksville--------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.
ZwD*:						
Zion--------------	Severe: depth to rock, slope.	Severe: shrink-swell, slope.	Severe: depth to rock, slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength, slope.	Severe: slope.
Winnsboro---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope, shrink-swell, low strength.	Severe: slope.
Mocksville--------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

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

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "poor," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AaA: Altavista	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: wetness, too clayey.
ApB: Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
BnB: Buncombe	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
CcB, CeB2: Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
ChA: Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
GaD: Gaston	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
GnB2: Gaston	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
GnC2: Gaston	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
GrB: Georgeville	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
GrC: Georgeville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
GrD: Georgeville	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
GvB2: Georgeville	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
GvC2: Georgeville	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
HeB: Helena	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MaD: Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
MdB2: Madison	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
MdC2: Madison	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey.
MsB: Masada	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
MsC: Masada	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
PaB: Pacolet	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
PaC: Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
PaD, PaE: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PeB2: Pacolet	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
PeC2: Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
PmB*:					
Pacolet	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
Madison	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
Urban land.					
PmC*:					
Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
Madison	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey.
Urban land.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Pt*. Pits					
RnB----------------- Rion	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too clayey.
RnC----------------- Rion	Moderate: slope, percs slowly.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too clayey, slope.
RvA----------------- Riverview	Severe: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Fair: wetness.
SeB----------------- Sedgefield	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Ud*. Udorthents					
Ur*. Urban land					
WnB----------------- Winnsboro	Severe: percs slowly.	Moderate: slope.	Slight-----------	Slight-----------	Poor: small stones.
WoA----------------- Worsham	Severe: percs slowly, wetness.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
ZmE*:					
Zion---------------	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Mocksville---------	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
ZwC*:					
Zion---------------	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
Winnsboro----------	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Poor: small stones.
Mocksville---------	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: too sandy, slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ZwD*:					
Zion	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
Winnsboro	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope, small stones.
Mocksville	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.

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

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
AaA------------------ Altavista	Fair: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
ApB------------------ Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
BnB------------------ Buncombe	Good-----------------	Probable-------------	Improbable: too sandy.	Poor: too sandy.
CcB, CeB2------------ Cecil	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
ChA------------------ Chewacla	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
GaD------------------ Gaston	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
GnB2, GnC2----------- Gaston	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GrB, GrC------------- Georgeville	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GrD------------------ Georgeville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
GvB2, GvC2----------- Georgeville	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HeB------------------ Helena	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MaD------------------ Madison	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
MdB2, MdC2----------- Madison	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MsB, MsC------------- Masada	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey, small stones.
PaB, PaC------------- Pacolet	Good-----------------	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
PaD------------------ Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
PaE Pacolet	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
PeB2, PeC2 Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
PmB*, PmC*:				
Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Madison	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
Pt*. Pits				
RnB Rion	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
RnC Rion	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
RvA Riverview	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
SeB Sedgefield	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Ud*. Udorthents				
Ur*. Urban land				
WnB Winnsboro	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
WoA Worsham	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
ZmE*:				
Zion	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Mocksville	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
ZwC*:				
Zion	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Winnsboro	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Mocksville	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy, small stones, slope.
ZwD*:				
Zion	Poor: depth to rock, shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Winnsboro	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
Mocksville	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

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

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the "Glossary." See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AaA: Altavista	Moderate: seepage.	Severe: piping, wetness.	Moderate: deep to water, slow refill.	Favorable	Wetness, soil blowing.	Favorable.
ApB: Appling	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Soil blowing	Favorable.
BnB: Buncombe	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty, rooting depth.
CcB: Cecil	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable	Soil blowing.
CeB2: Cecil	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
ChA: Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Moderate: slow refill.	Flooding	Wetness	Wetness.
GaD: Gaston	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
GnB2: Gaston	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
GnC2: Gaston	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
GrB: Georgeville	Moderate: slope, seepage.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
GrC, GrD: Georgeville	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
GvB2: Georgeville	Moderate: slope, seepage.	Severe: hard to pack.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
GvC2: Georgeville	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
HeB: Helena	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Wetness, soil blowing, percs slowly.	Percs slowly.
MaD: Madison	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
MdB2 Madison	Moderate: seepage, slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
MdC2 Madison	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
MsB Masada	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Soil blowing	Rooting depth.
MsC Masada	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, rooting depth.
PaB Pacolet	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing	Favorable.
PaC, PaD, PaE Pacolet	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing, slope.	Slope.
PeB2 Pacolet	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
PeC2 Pacolet	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
PmB*:						
Pacolet	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Favorable.
Madison	Moderate: seepage, slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
Urban land.						
PmC*:						
Pacolet	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope.
Madison	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
Urban land.						
Pt*. Pits						
RnB Rion	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing	Favorable.
RnC Rion	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing, slope.	Slope.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
RvA: Riverview	Severe: seepage.	Severe: piping.	Severe: cutbanks cave.	Deep to water	Favorable	Favorable.
SeB: Sedgefield	Moderate: seepage.	Severe: hard to pack.	Severe: no water.	Percs slowly	Wetness, soil blowing, percs slowly.	Wetness, percs slowly.
Ud*. Udorthents						
Ur*. Urban land						
WnB: Winnsboro	Moderate: slope.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing	Percs slowly.
WoA: Worsham	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Wetness, percs slowly.	Wetness, percs slowly.
ZmE*:						
Zion	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty.
Mocksville	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope.
ZwC*, ZwD*:						
Zion	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty.
Winnsboro	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, percs slowly.
Mocksville	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope.

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

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
AaA-------------- Altavista	0-14	Sandy loam-------	ML, CL-ML, SM, SM-SC	A-4	0	95-100	90-100	65-99	35-60	<23	NP-7
	14-57	Clay loam, sandy clay loam, loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-7	0	95-100	95-100	60-99	45-75	20-45	5-28
	57-62	Variable---------	---	---	---	---	---	---	---	---	---
ApB-------------- Appling	0-8	Sandy loam-------	SM	A-2	0-5	86-100	80-100	55-91	15-35	<27	NP-5
	8-41	Sandy clay, clay loam, clay.	MH, ML, CL	A-7	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	41-47	Sandy clay, clay loam, sandy clay loam.	SC, CL	A-4, A-6, A-7	0-5	95-100	85-100	70-90	40-75	25-45	8-22
	47-62	Variable---------	---	---	---	---	---	---	---	---	---
BnB-------------- Buncombe	0-10	Sand-------------	SM, SP-SM	A-2, A-3	0	98-100	98-100	90-97	7-32	---	NP
	10-61	Loamy sand, sand	SM, SP-SM	A-2, A-3	0	98-100	98-100	98-100	7-32	---	NP
CcB-------------- Cecil	0-7	Sandy loam-------	SM, SM-SC	A-2, A-4	0-5	84-100	80-100	67-90	26-42	<30	NP-7
	7-59	Clay, clay loam	MH, ML	A-7, A-5	0-5	97-100	92-100	72-99	55-95	41-80	9-37
	59-70	Variable---------	---	---	---	---	---	---	---	---	---
CeB2------------- Cecil	0-6	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0-5	75-100	75-100	68-95	38-81	21-35	3-16
	6-56	Clay, clay loam	MH, ML	A-7, A-5	0-5	97-100	92-100	72-99	55-95	41-80	9-37
	56-70	Variable---------	---	---	---	---	---	---	---	---	---
ChA-------------- Chewacla	0-6	Loam-------------	ML, CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	70-100	55-90	25-49	4-20
	6-41	Silt loam, silty clay loam, clay loam.	ML, CL	A-4, A-6, A-7	0	96-100	95-100	80-100	51-98	30-49	4-22
	41-60	Variable---------	---	---	---	---	---	---	---	---	---
GaD-------------- Gaston	0-6	Loam-------------	SM, ML, CL-ML	A-2, A-4	0-5	90-100	84-100	80-95	30-75	25-40	NP-7
	6-44	Clay, clay loam	CL, CH, ML, MH	A-7	0-5	95-100	90-100	80-99	65-90	40-82	12-57
	44-52	Clay loam, sandy clay loam, loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	84-100	75-98	36-75	25-50	7-23
	52-62	Variable---------	---	---	---	---	---	---	---	---	---
GnB2, GnC2------- Gaston	0-8	Sandy clay loam	CL, SC, SM, ML	A-4, A-6, A-7-6	0-5	90-100	84-100	75-95	36-75	30-50	5-20
	8-46	Clay, clay loam	CL, CH, ML, MH	A-7	0-5	95-100	90-100	80-99	65-90	40-82	12-57
	46-55	Clay loam, sandy clay loam, loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	84-100	75-98	36-75	25-50	7-23
	55-62	Variable---------	---	---	---	---	---	---	---	---	---
GrB, GrC--------- Georgeville	0-9	Loam-------------	ML	A-4, A-6	0-2	90-100	80-100	65-100	55-95	<40	NP-11
	9-18	Silty clay loam, clay loam.	CL, ML	A-6, A-7, A-4	0-1	90-100	90-100	85-100	70-98	30-49	8-20
	18-52	Clay, silty clay, silty clay loam.	MH, ML	A-7	0-1	95-100	95-100	90-100	75-98	41-79	15-40
	52-62	Silty clay loam, loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0-5	90-100	90-100	65-100	51-95	<30	NP-12

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
GrD-------------- Georgeville	0-9	Loam------------	ML	A-4, A-6	0-2	90-100	80-100	65-100	55-95	<40	NP-11
	9-13	Silty clay loam, clay loam.	CL, ML	A-6, A-7, A-4	0-1	90-100	90-100	85-100	70-98	30-49	8-20
	13-47	Clay, silty clay, silty clay loam.	MH, ML	A-7	0-1	95-100	95-100	90-100	75-98	41-79	15-40
	47-62	Silty clay loam, loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0-5	90-100	90-100	65-100	51-95	<30	NP-12
GvB2, GvC2------- Georgeville	0-5	Clay loam--------	CL, ML	A-6, A-7	0-2	90-100	90-100	85-100	65-98	30-49	11-20
	5-15	Silty clay loam, clay loam.	CL, ML	A-6, A-7, A-4	0-1	90-100	90-100	85-100	70-98	30-49	8-20
	15-46	Clay, silty clay, silty clay loam.	MH, ML	A-7	0-1	95-100	95-100	90-100	75-98	41-79	15-40
	46-62	Silty clay loam, loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0-5	90-100	90-100	65-100	51-95	<30	NP-12
HeB-------------- Helena	0-10	Sandy loam-------	SM, SM-SC, SC	A-2, A-4	0-5	95-100	90-100	51-90	26-46	<30	NP-9
	10-14	Sandy clay loam, clay loam.	CL, SC	A-6, A-7	0-5	95-100	95-100	70-90	38-70	30-49	15-26
	14-35	Clay loam, sandy clay, clay.	CH	A-7	0-5	95-100	95-100	73-97	56-86	50-85	24-50
	35-44	Sandy clay loam, clay loam.	CL, SC	A-6, A-7	0-5	90-100	85-100	70-95	38-70	30-49	15-26
	44-62	Variable---------	---	---	---	---	---	---	---	---	---
MaD-------------- Madison	0-7	Sandy loam-------	SM, ML	A-2, A-4	0-3	85-100	80-100	60-90	26-55	<35	NP-8
	7-28	Clay, clay loam, sandy clay.	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-75	12-35
	28-32	Loam, sandy clay loam, clay loam.	CL	A-4, A-6	0-3	90-100	85-100	70-95	50-80	20-40	7-20
	32-62	Variable---------	---	---	---	---	---	---	---	---	---
MdB2, MdC2------- Madison	0-5	Sandy clay loam	CL, ML, SC	A-4, A-6, A-7-6	0-3	90-100	85-100	70-95	48-80	30-50	7-20
	5-26	Clay, clay loam, sandy clay.	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-75	12-35
	26-34	Loam, sandy clay loam, clay loam.	CL	A-4, A-6	0-3	90-100	85-100	70-95	50-80	20-40	7-20
	34-62	Variable---------	---	---	---	---	---	---	---	---	---
MsB, MsC--------- Masada	0-8	Sandy loam	SM	A-4	0-5	90-100	75-98	60-95	35-50	<30	NP-9
	8-15	Sandy clay loam	SM, SC, CL, ML	A-2, A-4, A-7, A-5	0-5	75-100	75-100	68-95	38-81	21-35	3-15
	15-55	Clay loam, clay, sandy clay.	CH, CL	A-7, A-6	0-10	90-100	80-100	65-95	50-80	35-60	15-35
	55-62	sandy loam, clay loam, sandy clay loam.	CL, ML	A-6, A-7, A-4	0-10	90-100	80-100	65-95	50-80	30-45	7-20
PaB, PaC--------- Pacolet	0-9	Sandy loam-------	SM, SM-SC	A-2, A-1-b, A-4	0-2	85-100	80-100	42-90	16-42	<28	NP-7
	9-27	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0-1	80-100	80-100	60-95	51-75	38-65	11-30
	27-35	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	35-62	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-2	80-100	70-100	60-80	30-50	<28	NP-6

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
PaD, PaE--------- Pacolet	0-5	Sandy loam-------	SM, SM-SC	A-2, A-1-b, A-4	0-2	85-100	80-100	42-90	16-42	<28	NP-7
	5-23	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0-1	80-100	80-100	60-95	51-75	38-65	11-30
	23-32	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	32-62	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-2	80-100	70-100	60-80	30-50	<28	NP-6
PeB2, PeC2------- Pacolet	0-7	Sandy clay loam	SM-SC, SC	A-4, A-6	0-1	95-100	90-100	65-85	36-50	20-40	4-17
	7-26	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0-1	80-100	80-100	60-95	51-75	38-65	11-30
	26-35	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	35-62	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-2	80-100	70-100	60-80	30-50	<28	NP-6
PmB*, PmC*:											
Pacolet---------	0-7	Sandy clay loam	SM-SC, SC	A-4, A-6	0-1	95-100	90-100	65-85	36-50	20-40	4-17
	7-26	Sandy clay, clay loam, clay.	ML, MH	A-6, A-7	0-1	80-100	80-100	60-95	51-75	38-65	11-30
	26-35	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SM-SC, SC	A-2, A-4, A-6	0-2	80-100	70-100	60-80	30-60	20-35	5-15
	35-62	Sandy loam, fine sandy loam, loam.	SM, SM-SC	A-4, A-2-4	0-2	80-100	70-100	60-80	30-50	<28	NP-6
Madison---------	0-5	Sandy clay loam	CL, ML, SC	A-4, A-6, A-7-6	0-3	90-100	85-100	70-95	48-80	30-50	7-20
	5-26	Clay, clay loam, sandy clay.	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-75	12-35
	26-34	Loam, sandy clay loam, clay loam.	CL	A-4, A-6	0-3	90-100	85-100	70-95	50-80	20-40	7-20
	34-62	Variable---------	---	---	---	---	---	---	---	---	---
Urban land.											
Pt*. Pits											
RnB, RnC--------- Rion	0-5	Sandy loam-------	SM	A-2, A-4	0-2	90-100	85-100	60-80	20-45	<35	NP-7
	5-32	Sandy loam, sandy clay loam, clay loam.	SC, SM-SC, CL-ML, CL	A-2, A-4, A-6	0-2	90-100	85-100	60-85	30-60	20-35	5-15
	32-62	Sandy loam, loamy sand.	SC, SM, SM-SC	A-2, A-4, A-6	0-2	90-100	80-100	60-85	15-50	<36	NP-12
RvA-------------- Riverview	0-8	Loam-------------	CL, CL-ML, ML	A-4, A-6	0	100	100	90-100	60-80	15-30	3-14
	8-40	Sandy clay loam, silty clay loam, loam.	CL, ML, CL-ML	A-4, A-6	0	100	100	90-100	60-95	20-40	3-20
	40-60	Loamy fine sand, sandy loam, sand.	SM, SM-SC	A-2, A-4	0	100	100	50-95	15-45	<20	NP-7

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification Unified	Classification AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
SeB-------------- Sedgefield	0-10	Fine sandy loam	SM, SC, ML, CL	A-2, A-4, A-6	0-5	90-100	85-100	50-100	30-60	<35	NP-12
	10-33	Sandy clay, clay loam, clay.	CL, CH	A-7	0-5	95-100	95-100	73-93	60-85	45-85	25-60
	33-38	Sandy loam, sandy clay loam, clay loam.	SC, CL	A-6, A-7, A-4	0-5	95-100	90-100	60-90	36-65	20-45	8-25
	38-62	Variable---------	---	---	---	---	---	---	---	---	---
Ud*. Udorthents											
Ur*. Urban land											
WnB-------------- Winnsboro	0-8	Fine sandy loam	SM, ML	A-2, A-4	0-5	90-100	85-100	74-85	25-55	<35	NP-8
	8-37	Clay, clay loam	CH	A-7	0-5	90-100	85-100	75-96	65-95	51-93	25-64
	37-60	Loam, sandy clay loam, sandy loam.	ML, SM	A-2, A-4, A-6, A-7	0-5	90-100	70-100	60-95	22-75	25-48	3-15
WoA-------------- Worsham	0-7	Fine sandy loam	SM, SC, ML, CL	A-2, A-4	0-5	90-100	85-100	50-85	25-55	<30	NP-9
	7-55	Sandy clay loam, sandy clay, clay.	SC, CH, CL	A-2, A-7	0-5	90-100	85-100	70-100	30-95	42-66	22-40
	55-62	Sandy loam, sandy clay loam, clay loam.	SC, CL	A-2, A-4, A-6, A-7	0-10	90-95	80-95	50-90	30-70	20-50	8-30
ZmE*: Zion------------	0-8	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0-5	85-100	85-100	50-100	20-50	<25	NP-10
	8-18	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	95-100	90-100	85-100	80-95	41-80	20-50
	18-23	Gravelly clay, clay loam, clay.	CH, SC, GC	A-7	0-20	55-95	45-95	40-90	36-85	50-70	30-40
	23-28	Variable---------	---	---	---	---	---	---	---	---	---
	28-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mocksville------	0-4	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2-4, A-4	0-3	90-100	85-100	50-100	30-60	<25	NP-7
	4-21	Loam, sandy clay loam, clay loam.	SC, CL	A-6, A-7-6	0-3	90-100	85-100	80-100	35-70	29-45	11-20
	21-27	Sandy loam, fine sandy loam, loam.	SC, ML, CL, SM-SC	A-2-4, A-2-6, A-4, A-6	0-3	90-100	85-100	50-100	30-60	<35	NP-12
	27-62	Loamy sand, sandy loam, loam.	SM, SM-SC, ML, CL	A-2-4, A-2-6, A-4, A-6	0-5	85-100	80-100	50-100	15-60	<35	NP-12
ZwC*, ZwD*: Zion------------	0-8	Fine sandy loam	SM, SC, SM-SC	A-2, A-4	0-5	85-100	85-100	50-100	20-50	<25	NP-10
	8-18	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	95-100	90-100	85-100	80-95	41-80	20-50
	18-23	Clay loam, clay	CH, SC	A-7	0-20	55-95	45-95	40-90	36-85	50-70	30-40
	23-28	Variable---------	---	---	---	---	---	---	---	---	
	28-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ZwC*, ZwD*:											
Winnsboro-------	0-8	Fine sandy loam	SM, ML	A-2, A-4	0-5	90-100	85-100	74-85	25-55	<35	NP-8
	8-37	Clay, clay loam	CH	A-7	0-5	90-100	85-100	75-95	65-95	51-92	25-55
	37-60	Loam, sandy clay loam, sandy loam.	ML, SM	A-2, A-4, A-6, A-7	0-5	90-100	70-100	60-95	22-75	25-48	3-15
Mocksville------	0-4	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2-4, A-4	0-3	90-100	85-100	50-100	30-60	<25	NP-7
	4-21	Loam, sandy clay loam, clay loam.	SC, CL	A-6, A-7-6	0-3	90-100	85-100	80-100	35-70	29-45	11-20
	21-27	Sandy loam, fine sandy loam, loam.	SC, ML, CL, SM-SC	A-2-4, A-2-6, A-4, A-6	0-3	90-100	85-100	50-100	30-60	<35	NP-12
	27-62	Loamy sand, sandy loam, loam.	SM, SM-SC, ML, CL	A-2-4, A-2-6, A-4, A-6	0-5	85-100	80-100	50-100	15-60	<35	NP-12

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

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
AaA: Altavista	0-14	10-20	1.30-1.50	2.0-6.0	0.12-0.20	4.5-6.5	Low	0.24	5	.5-3
	14-57	18-35	1.30-1.50	0.6-2.0	0.12-0.20	4.5-6.0	Low	0.24		
	57-62	---	---	---	---	---	---	---		
ApB: Appling	0-8	5-20	1.40-1.65	2.0-6.0	0.10-0.15	4.5-6.5	Low	0.24	4	.5-2
	8-41	35-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low	0.28		
	41-47	20-50	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low	0.28		
	47-62	---	---	---	---	---	---	---		
BnB: Buncombe	0-10	3-10	1.60-1.75	>6.0	0.06-0.10	4.5-6.5	Low	0.10	5	.5-1
	10-61	3-12	1.60-1.75	>6.0	0.03-0.07	4.5-6.5	Low	0.10		
CcB: Cecil	0-7	5-20	1.30-1.50	2.0-6.0	0.12-0.14	4.5-6.5	Low	0.28	4	.5-2
	7-59	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low	0.28		
	59-70	---	---	---	---	---	---	---		
CeB2: Cecil	0-6	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.5	Low	0.28	3	.5-1
	6-56	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low	0.28		
	56-70	---	---	---	---	---	---	---		
ChA: Chewacla	0-6	10-27	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.28	5	1-4
	6-41	18-35	1.30-1.50	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.32		
	41-60	---	---	---	---	---	---	---		
GaD: Gaston	0-6	15-27	1.20-1.50	2.0-6.0	0.14-0.18	5.1-6.5	Low	0.32	4	.5-3
	6-44	35-70	1.30-1.60	0.6-2.0	0.12-0.16	4.5-6.5	Moderate	0.24		
	44-52	20-45	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.5	Low	0.28		
	52-62	---	---	---	---	---	---	---		
GnB2, GnC2: Gaston	0-8	20-35	1.30-1.60	0.6-2.0	0.12-0.16	5.1-6.5	Low	0.28	4	.5-3
	8-46	35-70	1.30-1.60	0.6-2.0	0.12-0.16	4.5-6.5	Moderate	0.24		
	46-55	20-45	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.5	Low	0.28		
	55-62	---	---	---	---	---	---	---		
GrB, GrC: Georgeville	0-9	5-27	1.20-1.40	0.6-2.0	0.15-0.20	4.5-6.5	Low	0.43	4	.5-2
	9-18	27-35	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.32		
	18-52	35-60	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.28		
	52-62	15-40	1.20-1.40	0.6-2.0	0.05-0.10	4.5-5.5	Low	0.32		
GrD: Georgeville	0-9	5-27	1.20-1.40	0.6-2.0	0.15-0.20	4.5-6.5	Low	0.43	4	.5-2
	9-13	27-35	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.32		
	13-47	35-60	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.28		
	47-62	15-40	1.20-1.40	0.6-2.0	0.05-0.10	4.5-5.5	Low	0.32		
GvB2, GvC2: Georgeville	0-5	27-35	1.20-1.40	0.6-2.0	0.13-0.18	4.5-6.5	Low	0.49	4	<.5
	5-15	27-35	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.32		
	15-46	35-60	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.28		
	46-62	15-40	1.20-1.40	0.6-2.0	0.05-0.10	4.5-5.5	Low	0.32		
HeB: Helena	0-10	5-20	1.58-1.62	2.0-6.0	0.10-0.12	4.5-6.5	Low	0.24	4	.5-2
	10-14	20-35	1.46-1.56	0.2-0.6	0.13-0.15	4.5-5.5	Moderate	0.28		
	14-35	35-60	1.44-1.55	0.06-0.2	0.13-0.15	4.5-5.5	High	0.28		
	35-44	20-35	1.46-1.56	0.2-0.6	0.12-0.16	4.5-5.5	Moderate	0.28		
	44-62	---	---	---	---	---	---	---		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
MaD-------------- Madison	0-7	5-20	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.5	Low-----------	0.24	4	.5-2
	7-28	30-50	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low-----------	0.32		
	28-32	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-5.5	Low-----------	0.28		
	32-62	---	---	---	---	---	-------------	----		
MdB2, MdC2------- Madison	0-5	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Low-----------	0.28	3	.5-2
	5-26	30-50	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low-----------	0.32		
	26-34	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-5.5	Low-----------	0.28		
	34-62	---	---	---	---	---	-------------	----		
MsB, MsC--------- Masada	0-8	10-27	1.20-1.50	2.0-6.0	0.10-0.17	4.5-6.5	Low-----------	0.32	4	1-3
	8-15	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.5	Moderate-----	0.24		
	15-55	27-55	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24		
	55-62	25-40	1.30-1.60	0.6-2.0	0.10-0.17	4.5-5.5	Moderate-----	0.24		
PaB, PaC--------- Pacolet	0-9	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low-----------	0.20	3	.5-2
	9-27	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.28		
	27-35	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
	35-62	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
PaD, PaE--------- Pacolet	0-5	8-20	1.00-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low-----------	0.20	3	.5-2
	5-23	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.28		
	23-32	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
	32-62	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
PeB2, PeC2------- Pacolet	0-7	20-35	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low-----------	0.24	2	.5-1
	7-26	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.28		
	26-35	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
	35-62	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
PmB*, PmC*:										
Pacolet---------	0-7	20-35	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low-----------	0.24	2	.5-1
	7-26	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low-----------	0.28		
	26-35	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
	35-62	10-25	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.28		
Madison---------	0-5	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Low-----------	0.28	3	.5-2
	5-26	30-50	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low-----------	0.32		
	26-34	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-5.5	Low-----------	0.28		
	34-62	---	---	---	---	---	-------------	----		
Urban land.										
Pt*. Pits										
RnB, RnC--------- Rion	0-5	5-20	1.30-1.50	2.0-6.0	0.08-0.12	4.5-6.5	Low-----------	0.24	3	.5-2
	5-32	18-35	1.40-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low-----------	0.20		
	32-62	2-20	1.30-1.50	2.0-6.0	0.06-0.12	4.5-6.0	Low-----------	0.20		
RvA-------------- Riverview	0-8	10-27	1.30-1.60	0.6-2.0	0.16-0.24	4.5-6.5	Low-----------	0.32	5	.5-2
	8-40	18-35	1.20-1.40	0.6-2.0	0.15-0.22	4.5-6.0	Low-----------	0.24		
	40-60	4-18	1.20-1.50	2.0-6.0	0.07-0.11	4.5-6.0	Low-----------	0.17		
SeB-------------- Sedgefield	0-10	8-20	1.40-1.60	2.0-6.0	0.10-0.15	4.5-6.5	Low-----------	0.28	3	.5-2
	10-33	35-60	1.25-1.40	0.06-0.2	0.14-0.18	4.5-6.5	High----------	0.28		
	33-38	10-35	1.35-1.50	0.6-2.0	0.12-0.15	5.6-8.4	Moderate-----	0.28		
	38-62	---	---	---	---	---	-------------	----		
Ud*. Udorthents										

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Ur*. Urban land										
WnB--------------- Winnsboro	0-8	10-20	1.30-1.70	2.0-6.0	0.11-0.15	5.1-6.5	Low-----------	0.28	4	.5-2
	8-37	35-81	1.20-1.50	0.06-0.2	0.15-0.20	6.1-7.8	High----------	0.20		
	37-60	15-35	1.30-1.60	0.2-0.6	0.15-0.20	6.1-7.8	Low-----------	0.28		
WoA--------------- Worsham	0-7	10-20	1.25-1.55	2.0-6.0	0.10-0.15	4.5-6.5	Low-----------	0.28	4	1-2
	7-55	30-55	1.35-1.65	<0.06	0.10-0.16	4.5-5.5	Moderate------	0.28		
	55-62	10-40	1.20-1.50	0.2-0.6	0.08-0.19	4.5-5.5	Moderate------	0.28		
ZmE*: Zion-------------	0-8	5-18	1.30-1.55	2.0-6.0	0.08-0.15	4.5-6.0	Low-----------	0.28	2	.5-2
	8-18	35-60	1.20-1.50	0.06-0.6	0.10-0.19	4.5-7.3	High----------	0.28		
	18-23	35-50	1.30-1.60	0.2-2.0	0.07-0.15	5.1-7.3	High----------	0.17		
	23-28	---	---	---	---	---	--------------	----		
	28-35	---	---	---	---	---	--------------	----		
Mocksville-------	0-4	8-20	1.30-1.55	2.0-6.0	0.12-0.18	5.1-7.3	Low-----------	0.28	3	0-2
	4-21	18-35	1.30-1.55	0.6-2.0	0.15-0.20	5.6-7.3	Low-----------	0.24		
	21-27	15-25	1.35-1.60	0.6-2.0	0.10-0.18	5.6-7.3	Low-----------	0.28		
	27-62	3-20	1.35-1.60	2.0-6.0	0.05-0.15	6.1-7.8	Low-----------	0.20		
ZwC*, ZwD*: Zion-------------	0-8	5-18	1.30-1.55	2.0-6.0	0.08-0.15	4.5-6.0	Low-----------	0.28	2	.5-2
	8-18	35-60	1.20-1.50	0.06-0.6	0.10-0.19	4.5-7.3	High----------	0.28		
	18-23	35-50	1.30-1.60	0.2-2.0	0.07-0.15	5.1-7.3	High----------	0.17		
	23-28	---	---	---	---	---	--------------	----		
	28-35	---	---	---	---	---	--------------	----		
Winnsboro--------	0-8	10-20	1.30-1.70	2.0-6.0	0.11-0.15	5.1-6.5	Low-----------	0.28	4	.5-2
	8-37	35-81	1.20-1.50	0.06-0.2	0.15-0.20	6.1-7.8	High----------	0.20		
	37-60	15-35	1.30-1.60	0.2-0.6	0.15-0.20	6.1-7.8	Low-----------	0.28		
Mocksville-------	0-4	8-20	1.30-1.55	2.0-6.0	0.12-0.18	5.1-7.3	Low-----------	0.28	3	0-2
	4-21	18-35	1.30-1.55	0.6-2.0	0.15-0.20	5.6-7.3	Low-----------	0.24		
	21-27	15-25	1.35-1.60	0.6-2.0	0.10-0.18	5.6-7.3	Low-----------	0.28		
	27-62	3-20	1.35-1.60	2.0-6.0	0.05-0.15	6.1-7.8	Low-----------	0.20		

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

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hard-ness	Uncoated steel	Concrete
					Ft			In			
AaA: Altavista	C	Rare	---	---	1.5-2.5	Apparent	Dec-Apr	>60	---	Moderate	Moderate.
ApB: Appling	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
BnB: Buncombe	A	Rare	---	---	>6.0	---	---	>60	---	Low	Moderate.
CcB, CeB2: Cecil	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
ChA: Chewacla	C	Frequent	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High	Moderate.
GaD, GnB2, GnC2: Gaston	C	None	---	---	>6.0	---	---	>60	---	High	Moderate.
GrB, GrC, GrD, GvB2, GvC2: Georgeville	B	None	---	---	>6.0	---	---	>60	---	High	High.
HeB: Helena	C	None	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High	High.
MaD, MdB2, MdC2: Madison	B	None	---	---	>6.0	---	---	>60	---	High	Moderate.
MsB, MsC: Masada	C	None	---	---	>6.0	---	---	>60	---	High	High.
PaB, PaC, PaD, PaE, PeB2, PeC2: Pacolet	B	None	---	---	>6.0	---	---	>60	---	High	High.
PmB*, PmC*:											
Pacolet	B	None	---	---	>6.0	---	---	>60	---	High	High.
Madison	B	None	---	---	>6.0	---	---	>60	---	High	Moderate.
Urban land.											
Pt*. Pits											
RnB, RnC: Rion	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
RvA: Riverview	B	Occasional	Brief	Dec-Mar	3.0-5.0	Apparent	Dec-Mar	>60	---	Low	Moderate.
SeB: Sedgefield	C	None	---	---	1.0-1.5	Perched	Jan-Mar	>60	---	High	Moderate.
Ud*. Udorthents											

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In			
Ur*. Urban land											
WnB---------------- Winnsboro	D	None---------	---	---	>6.0	---	---	>60	---	High------	Low.
WoA---------------- Worsham	D	None---------	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High------	Moderate.
ZmE*:											
Zion--------------	C	None---------	---	---	>6.0	---	---	20-40	Hard	High------	Moderate.
Mocksville--------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
ZwC*, ZwD*:											
Zion--------------	C	None---------	---	---	>6.0	---	---	20-40	Hard	High------	Moderate.
Winnsboro---------	D	None---------	---	---	>6.0	---	---	>60	---	High------	Low.
Mocksville--------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.

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

TABLE 18.--ENGINEERING INDEX TEST DATA

(Dashes indicate that data were not available. LL means liquid limit; PI, plasticity index; MD, maximum dry density; and OM, optimum moisture)

Soil name, report number, horizon, and depth in inches*	Classification		Grain-size distribution							LL	PI	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			MD	OM
										Pct		Lb/ cu ft	Pct
Cecil sandy clay loam:													
(S86NC-109-001)													
Ap----- 0 to 6	A-6(6)	CL	97	95	84	56	46	36	28	34	16	105	18
Bt1---- 6 to 34	A-7-5(20)	MH	100	99	89	74	66	57	53	57	27	94	26
C------ 56 to 70	A-7-6(11)	CL	98	98	91	65	44	30	25	44	18	103	20
Gaston sandy clay loam:													
(S85NC-109-003)													
Ap----- 0 to 8	A-6(4)	CL	98	97	85	52	42	31	23	31	14	112	17
Bt2---- 18 to 46	A-7-6(20)	CH	99	99	91	71	65	53	46	56	29	95	27
C------ 55 to 72	A-7-5(5)	MH	100	99	86	47	38	29	26	54	16	100	23
Georgeville loam:													
(S85NC-109-009)													
A------ 0 to 6	A-4(4)	ML	92	87	83	70	36	17	10	30	7	100	18
Bt2---- 18 to 38	A-7-6(20)	CL	98	97	94	85	61	49	43	48	24	102	22
C2----- 52 to 62	A-7-5(18)	ML	99	99	97	88	43	27	22	49	17	103	20
Masdison sandy clay loam:													
(S86NC-109-002)													
Ap----- 0 to 5	A-7-6(5)	SC	97	93	76	48	42	31	26	42	17	105	19
Bt1---- 5 to 17	A-7-5(17)	MH	98	96	88	63	56	45	41	60	27	95	25
C1----- 34 to 51	A-7-5(6)	ML	100	100	93	53	41	30	24	49	15	98	23
Winnsboro fine sandy loam:													
(S85NC-109-008)													
Ap----- 0 to 8	A-4(0)	SM	98	96	77	46	25	11	7	29	6	107	18
Bt1---- 11 to 25	A-7-6(20)	CH	99	99	96	87	81	71	66	93	64	91	29
C------ 37 to 60	A-6(10)	CL	100	99	95	68	40	21	14	40	17	103	22

* Location of pedon sampled is the same as that given for the typical pedon in "Soil Series and Their Morphology."

TABLE 19.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Altavista	Fine-loamy, mixed, thermic Aquic Hapludults
Appling	Clayey, kaolinitic, thermic Typic Kanhapludults
Buncombe	Mixed, thermic Typic Udipsamments
Cecil	Clayey, kaolinitic, thermic Typic Kanhapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Gaston	Clayey, mixed, thermic Humic Hapludults
Georgeville	Clayey, kaolinitic, thermic Typic Hapludults
Helena	Clayey, mixed, thermic Aquic Hapludults
Madison	Clayey, kaolinitic, thermic Typic Kanhapludults
Masada	Clayey, mixed, thermic Typic Hapludults
Mocksville	Fine-loamy, mixed, thermic Typic Hapludalfs
Pacolet	Clayey, kaolinitic, thermic Typic Kanhapludults
Rion	Fine-loamy, mixed, thermic Typic Hapludults
Riverview	Fine-loamy, mixed, thermic Fluventic Dystrochrepts
Sedgefield	Fine, mixed, thermic Aquultic Hapludalfs
Udorthents	Udorthents
*Winnsboro	Fine, mixed, thermic Typic Hapludalfs
Worsham	Clayey, mixed, thermic Typic Ochraquults
Zion	Fine, mixed, thermic Ultic Hapludalfs

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