United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
North Carolina
Department of Natural
Resources and
Community Development,
North Carolina
Agricultural Research
Service, North Carolina
Agricultural Extension
Service, Gaston County
Board of Commissioners,
and Gaston Soil and
Water Conservation
District

Soil Survey of Gaston County, North Carolina

How To Use This Soil Survey

General Soil Map

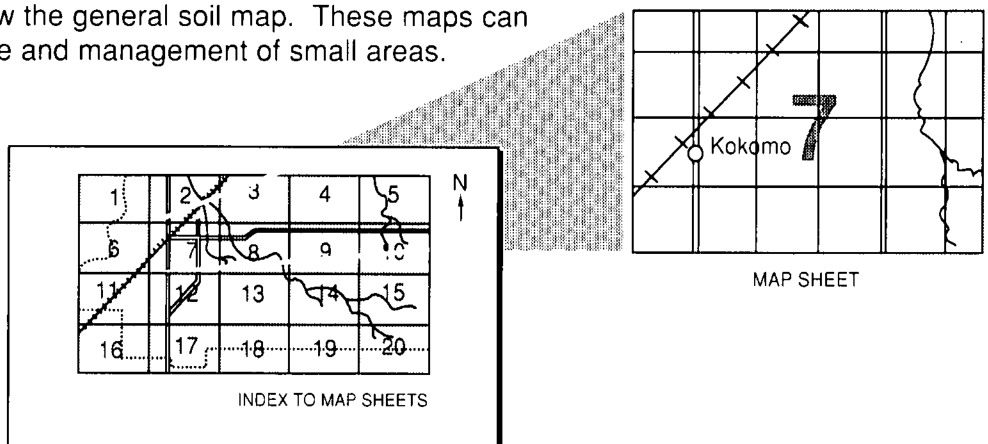
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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.

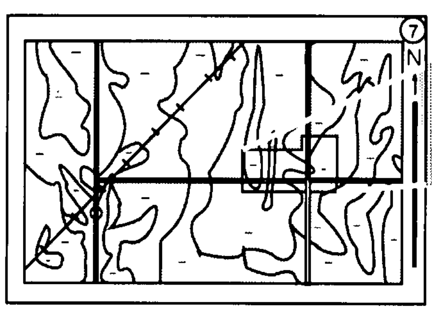
Detailed Soil Maps

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

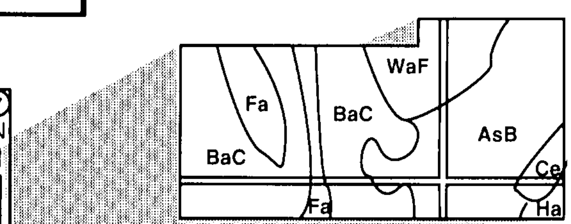
To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



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 1984. Soil names and descriptions were approved in 1985. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1985. This soil survey was made cooperatively by the Soil Conservation Service and the North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and Gaston County Board of Commissioners. It is part of the technical assistance furnished to the Gaston Soil and Water Conservation District.

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

This soil survey updates the first one published in 1917 and provides additonal 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: This restored historic farmhouse is at the Schiele Museum in Gastonia, North Carolina.

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Issued May 1989

Index to Map Units

Summary of Tables

Foreword

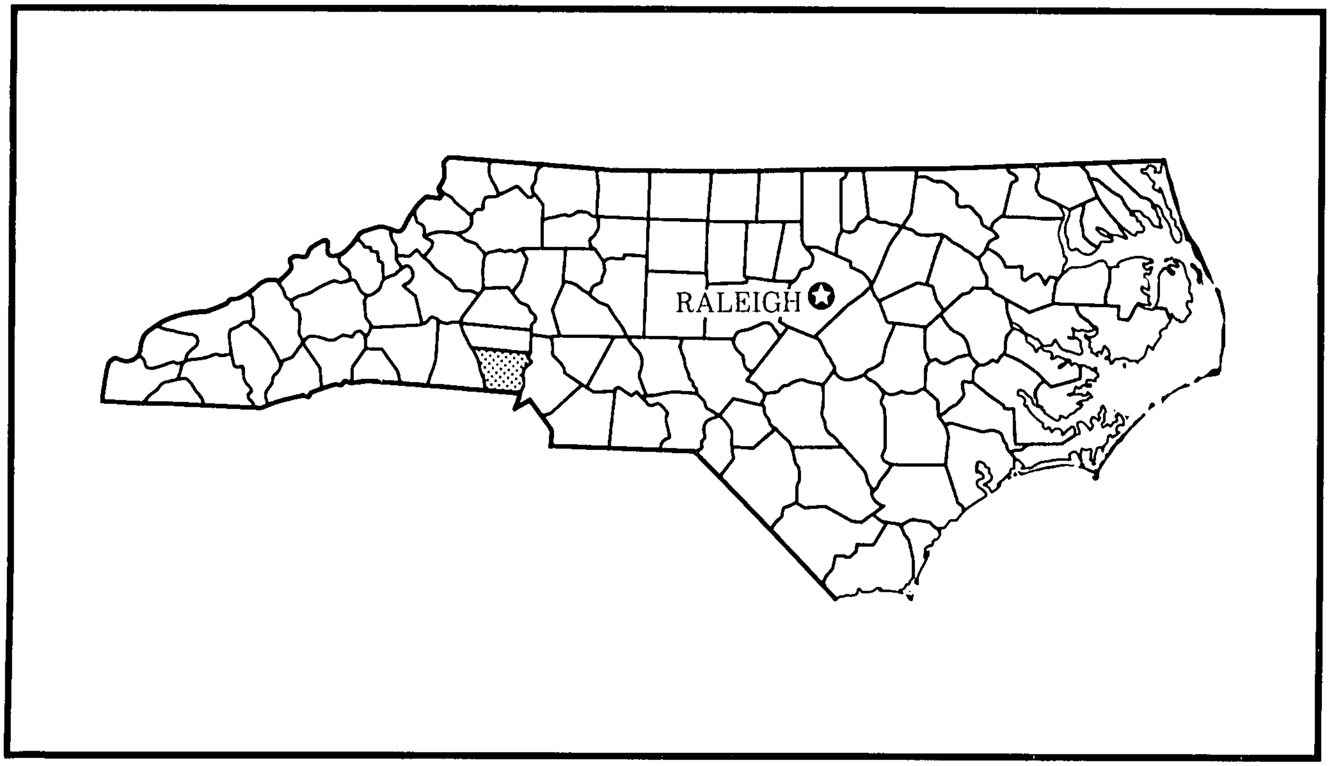
This soil survey contains information that can be used in land-planning programs in Gaston County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact 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 insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are unstable and need specially designed foundations for buildings or roads. Wet soils and some clayey soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

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

Bobbye Jack Jones
State Conservationist
Soil Conservation Service



Location of Gaston County in North Carolina.

Soil Survey of Gaston County, North Carolina

By William E. Woody, Soil Conservation Service

Fieldwork by William E. Woody, Gary R. Maynor, and Forrest F. Evans, Jr., Soil Conservation Service, and David V. McCloy, W.P. Carlin, and Randy Hudson, North Carolina Department of Natural Resources and Community Development

United States Department of Agriculture, Soil Conservation Service, in cooperation with the North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, Gaston County Board of Commissioners, and Gaston Soil and Water Conservation District

General Nature of the Survey Area

This section provides general information concerning the history and economic development of Gaston County and describes physiography, relief, and drainage; water resources; and climate of the area.

History and Economic Development

GASTON COUNTY, established in 1846, was once part of the territory known as Bath, which dates back to 1663 when Charles II presented it to the Lord Proprietors. Gaston County and the city of Gastonia are named for Judge William Gaston, who was an eminent jurist and orator in the early 1830's *(11)*.

The Catawba Indians, members of the eastern Siouan family in North Carolina, were the main inhabitants of Gaston County before the first European settlers arrived. The early settlers were Scotch-Irish; Germans, commonly called Pennsylvania Dutch; and Scotch Highlanders. The first settlements were established along the Catawba and South Fork Rivers *(11)*.

Early in the development of the county, agriculture was the main enterprise. The main crops were corn, cotton, soybeans, and wheat. The textile industry moved into Gaston County in 1848 when Thomas Randolph Tate built the Mountain Island mill along the Catawba River near Mount Holly. By the turn of the century, ten cotton mills were built and operating.

The textile industry has evolved into a major economic force in the county. It supplies almost 80 percent of the yarn that is used in the U.S. textile industry and employs over one-third of the work force of Gaston County *(11)*.

The farming industry is still important in Gaston County, although only 2 percent of the rural population is involved in farming. Sixty-five percent of all farmers are part-time and work in one of the other 85 industries in the county *(13)*.

In 1980, the U.S. Census reported a population of 161,290. Gastonia, the county seat, had a population of 69,692.

Physiography, Relief, and Drainage

Gaston County is in the southern Piedmont physiographic region. The land area of the county is 228,666 acres or about 357 square miles, which includes 1,850 acres of water in areas of less than 40 acres. In addition, 4,224 acres of water is in large lakes. The county generally is characterized as gently rolling or hilly with several prominent ridges and smaller mountain ranges in the central and western parts. Elevation ranges from 587 feet in the southeast corner of the county to 1,705 feet at the pinnacle of the Kings Mountain Range in the southwest. Generally, drainage is from northwest to southeast, and most streams drain into the Catawba River or its major tributary, the South Fork Catawba River *(13)*.

Water Resources

Gaston County has an abundant supply of water from rivers, streams, lakes, and ground water. The Catawba River and its principal tributary, the South Fork Catawba River, are the only reliable sources within the Catawba River basin capable of supplying large quantities of water for domestic and industrial use. Drilled and bored wells are used in Gaston County. Bored wells are the most common, generally ranging from 30 to 40 feet in depth and from 18 to 24 inches in diameter. Drilled wells are less common, but are more reliable than bored wells and seldom go dry. The average yield is 20 gallons per minute *(14)*.

Climate

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

Gaston County has long, hot summers because moist tropical air from the Gulf of Mexico persistently covers the area. Winters are cool and fairly short, with only a rare cold wave that moderates in 1 or 2 days. Precipitation is fairly heavy throughout the year, and prolonged droughts are rare. Summer precipitation, mainly afternoon thunderstorms, is adequate for all crops.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Gastonia in the period 1951 to 1981. 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 43 degrees F, and the average daily minimum temperature is 32 degrees. The lowest temperature on record, which occurred at Gastonia on March 3, 1980, is -1 degree. In summer the average temperature is 77 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Gastonia on June 28, 1954, is 107 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 47 inches. Of this, 24 inches, or 50 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 20 inches. The heaviest 1-day rainfall during the period of record was 4.86 inches at Gastonia on August 1, 1952. Thunderstorms occur on about 42 days each year, and most occur in summer.

The average seasonal snowfall is 3 inches. The greatest snow depth at any one time during the period of record was 4 inches. On the average, few days have as much as 1 inch of snow on the ground. The number of such days varies greatly from year to year.

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

The average relative humidity in midafternoon is about 70 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 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. 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 dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material from which the soil formed (fig. 1). The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms,

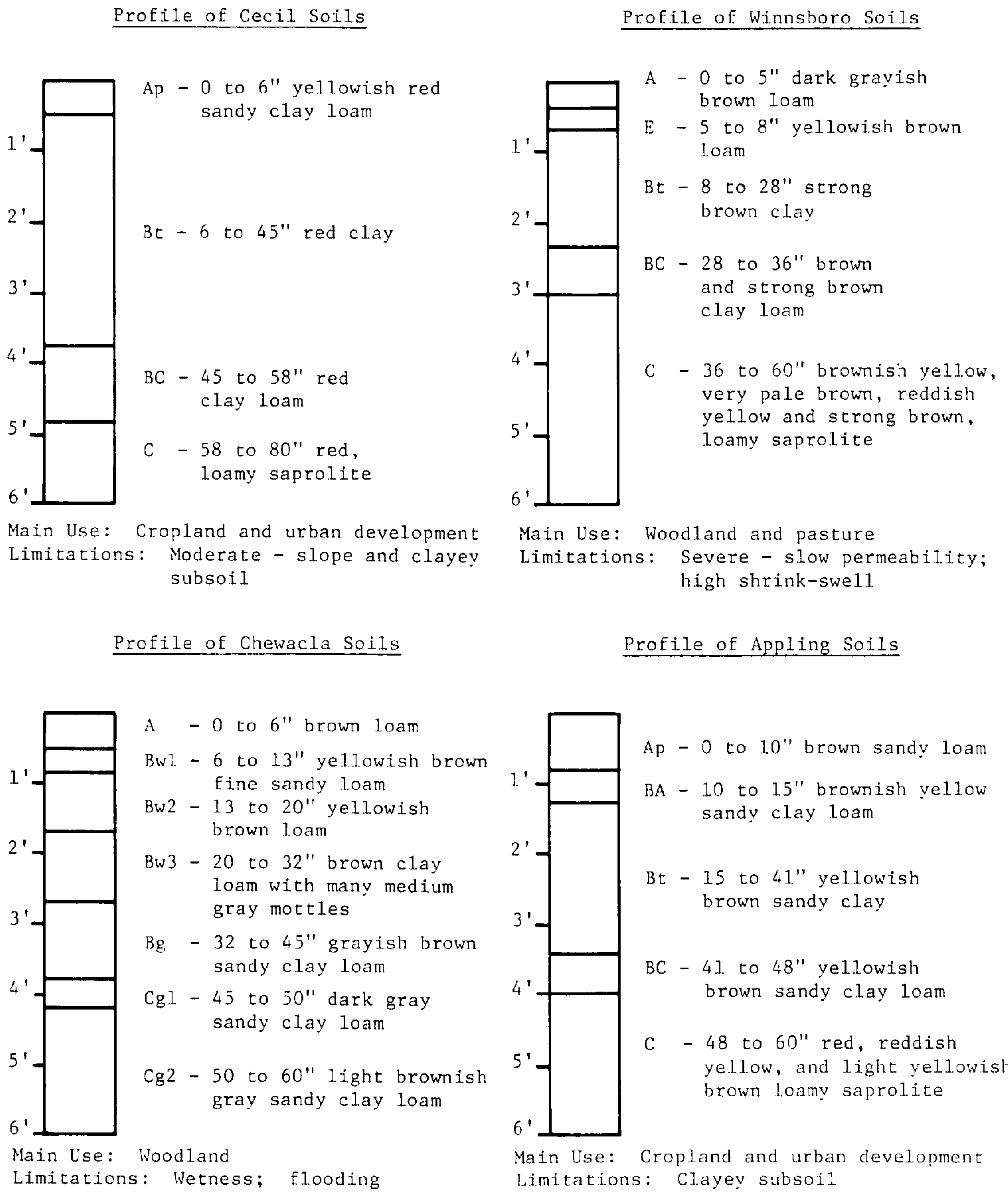


Figure 1.—Soil profile, main use, and limitations of four contrasting soils in Gaston County.

relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during the process of mapping, this model enables the soil scientist to predict with considerable 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, acidity, and other features that enable them to identify soils. After describing the soils in the survey area 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. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and new interpretations sometimes are developed to meet local needs. Data were 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 were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability 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 always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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 several kinds of soil. 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 soils of minor extent.

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 and 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 mentioned in the map unit descriptions. A few 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, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

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

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or 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.

The general soil map delineations in the vicinity of U.S. Highway 321 do not join with the published survey of York County, South Carolina, because of changes in dominance of similar soil series across the state boundary.

1. Cecil-Pacolet

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

These soils are mainly in the central and northwestern parts of the county. The landscape is broad ridges and side slopes (fig. 2). This map unit makes up 28 percent of the county. It is about 50 percent Cecil soils, 25 percent Pacolet soils, and 25 percent soils of minor extent.

The Cecil soils are on broad ridges and strongly sloping side slopes. They have a yellowish red sandy clay loam surface layer and a red, predominantly clay subsoil.

The Pacolet soils are on strongly sloping to steep side slopes and narrow ridges. They have a brown sandy loam or yellowish red sandy clay loam surface layer and a red, predominantly clay subsoil.

The soils of minor extent include Gaston, Madison, and Wedowee soils on ridges and side slopes and Helena and Worsham soils at the head of drainageways and along drainageways.

The Cecil soils are used mainly as cropland or pasture. The Pacolet soils are used mostly as woodland. The hazard of erosion and steepness of slope are the main limitations for use and management.

2. Cecil-Urban land

Gently sloping to strongly sloping, well drained soils and urban land; soils have a loamy surface layer and a predominantly clayey subsoil; formed in residuum from felsic igneous and metamorphic rock

This map unit, which makes up 18 percent of the county, is in the commercial, industrial, and residential areas of Gastonia and other communities. The map unit is about 38 percent Cecil soils, 30 percent urban land, and 32 percent soils of minor extent.

The Cecil soils are on gently sloping broad ridges and strongly sloping side slopes. They have a yellowish red sandy clay loam surface layer and a red, predominantly clay subsoil.

The Urban land part of this map unit consists of areas of impervious cover.

The soils of minor extent include Appling soils that are mainly in southwest Gastonia, Tatum soils that are mainly around Bessemer City, and Gaston soils that are mainly around Belmont and Mount Holly. Also included are Helena and Worsham soils at the head of drainageways and along drainageways.

The soils of this map unit are mainly in urban use. The hazard of erosion, steepness of slope, and surface runoff are the main limitations.

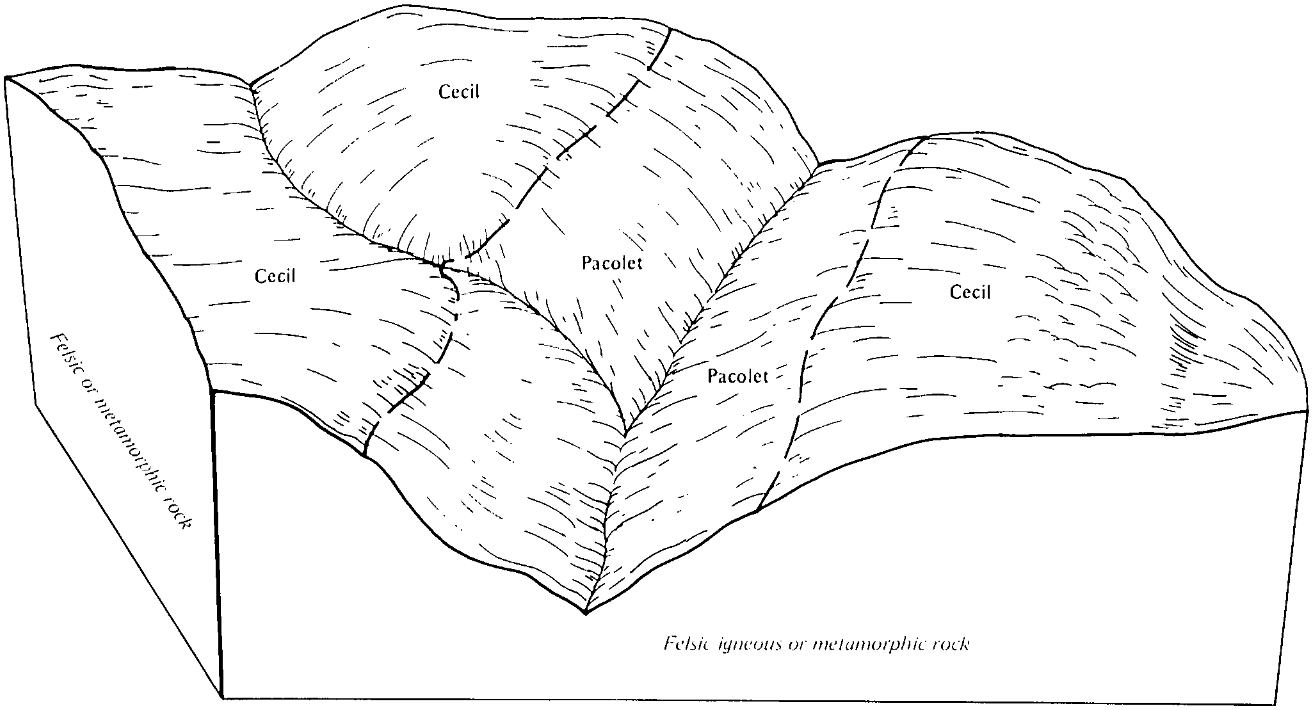


Figure 2.—The relationship of soils and landscape in the Cecil-Pacolet map unit.

3. Tatum

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

These soils are mainly in the southwestern to west central part of the county. The landscape is gently sloping, broad to narrow ridges and strongly sloping to moderately steep side slopes. This map unit makes up 16 percent of the county. It is about 89 percent Tatum soils, and 11 percent soils of minor extent.

The Tatum soils have a brown gravelly loam surface layer and a red, predominantly clay subsoil.

The soils of minor extent include Alamance Variant and Gaston soils on ridges and side slopes, Lignum soils at the head of drainageways and along drainageways, and the very bouldery Uwharrie soils on Crowders Mountain and the Pinnacle.

About three-fourths of the acreage of this map unit is woodland. The rest is used mainly as cropland or pasture, and some small areas are in urban development. The hazard of erosion, steepness of slope, and the moderate shrink-swell potential are the main concerns in use and management.

4. Gaston-Winnsboro-Cecil

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

These soils are mainly in the eastern part of the county. Two smaller areas are in the western part. The landscape consists of broad to narrow ridges and side slopes. This map unit makes up 16 percent of the county. It is about 70 percent Gaston soils, 9 percent Winnsboro soils, 8 percent Cecil soils, and 13 percent soils of minor extent.

The Gaston soils are on gently sloping, broad to narrow ridges and on strongly sloping to moderately steep side slopes. They formed in residuum weathered from intermediate rock (fig. 3). These soils have a dark reddish brown sandy clay loam or loam surface layer and a dark red and red, predominantly clay subsoil.

The Winnsboro soils are on gently sloping, broad to narrow ridges and strongly sloping side slopes. They formed in residuum weathered from mafic rock. Winnsboro soils are dominant in the area northwest of Mount Holly. These soils have a dark grayish brown

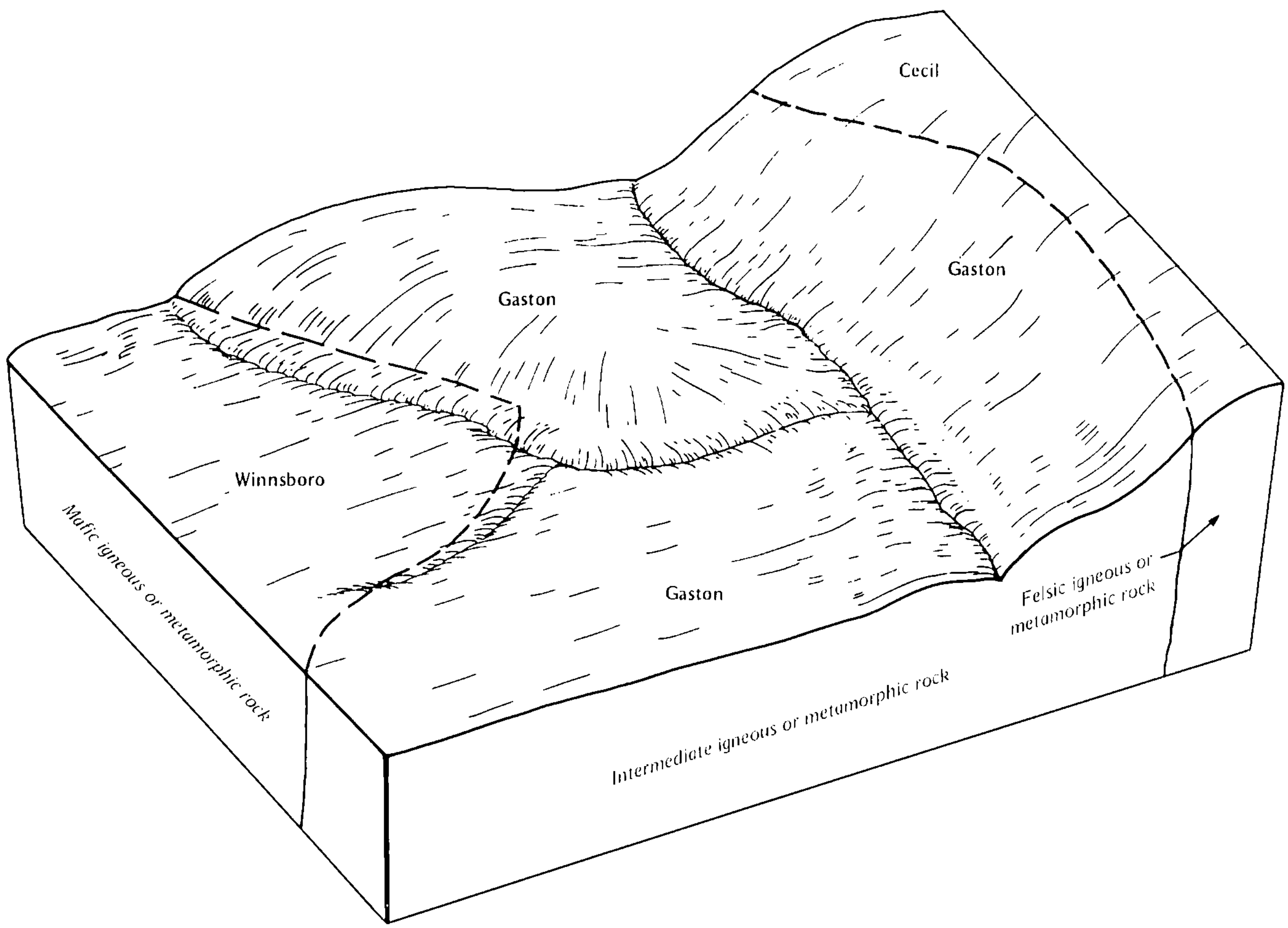


Figure 3.—The relationship of soils, landscape, and geology in the Gaston-Winnsboro-Cecil map unit.

loam surface layer and a strong brown and brown, predominantly clay subsoil.

The Cecil soils are on the higher parts of gently sloping, broad ridges and on strongly sloping side slopes. They formed in residuum weathered from felsic rock. These soils have a yellowish red sandy clay loam surface layer and a red, predominantly clay subsoil.

The soils of minor extent include Madison and Pacolet soils on ridges and side slopes, Wilkes soils on narrow ridgetops and shoulder slopes, and Helena and Worsham soils at the head of drainageways and along drainageways.

Gently sloping areas of Gaston and Cecil soils are used mainly as cropland or pasture. The rest of the acreage in this map unit is used mostly as woodland. The hazard of erosion and steepness of slope are limitations for use and management in addition to the moderate shrink-swell potential of Gaston soils and the high shrink-swell potential and slow permeability of Winnsboro soils.

5. Appling-Wedowee-Pacolet

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

These soils are mainly in the northeastern and northwestern parts of the county. A small area is in the south central part. The landscape is broad ridges, narrow ridges, and side slopes (fig. 4). This map unit makes up 8 percent of the county. It is about 47 percent

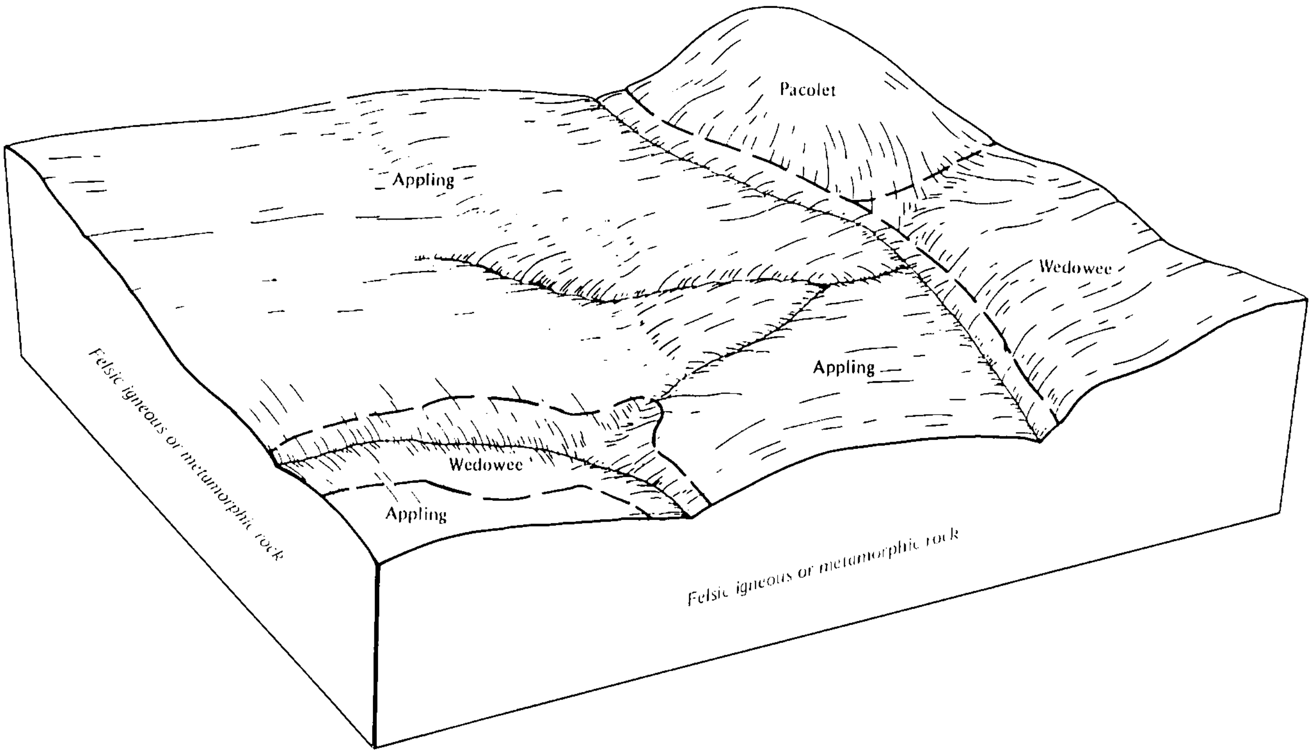


Figure 4.—The relationship of soils and landscape in the Appling-Wedowee-Pacolet map unit.

Appling soils, 21 percent Wedowee soils, 20 percent Pacolet soils, and 12 percent soils of minor extent.

The Appling soils are on gently sloping, broad ridges. They have a brown sandy loam surface layer. The subsoil is predominantly yellowish brown sandy clay.

The Wedowee soils are on strongly sloping side slopes and narrow ridges. They have a grayish brown sandy loam surface layer and a strong brown predominantly sandy clay subsoil.

The Pacolet soils are on strongly sloping to steep side slopes and narrow ridges. They have a brown sandy loam or yellowish red sandy clay loam surface layer and a red, predominantly clay subsoil.

The soils of minor extent include Cecil, Madison, and Vance soils on ridges and side slopes and Helena and Worsham soils around the head of drainageways and along drainageways.

The Appling soils are used mainly as cropland or pasture. The Wedowee and Pacolet soils are used mostly as woodland. The hazard of erosion and steepness of slope are the main concerns in use and management of these soils. In addition, moderate shrink-swell potential is a limitation for Wedowee soils.

6. Madison

Gently sloping to moderately steep, well drained soils that have a loamy surface layer and a predominantly clayey subsoil; formed in residuum weathered from felsic micaceous metamorphic rock

These soils are mainly in the northeastern, central, and southwestern parts of the county. The landscape is gently sloping, broad to narrow ridges and strongly sloping to moderately steep side slopes. This map unit makes up 7 percent of the county. It is about 75 percent Madison soils and 25 percent soils of minor extent.

Madison soils have a yellowish red sandy clay loam or yellowish brown sandy loam surface layer. The subsoil is predominantly red clay. The content of mica flakes is high.

The soils of minor extent include Cecil, Gaston, Pacolet, and Wedowee soils on ridges and side slopes and Helena and Worsham soils around the head of drainageways and along drainageways.

The strongly sloping and moderately steep areas are mostly woodland. Gently sloping areas are used mainly as cropland or pasture. The hazard of erosion and

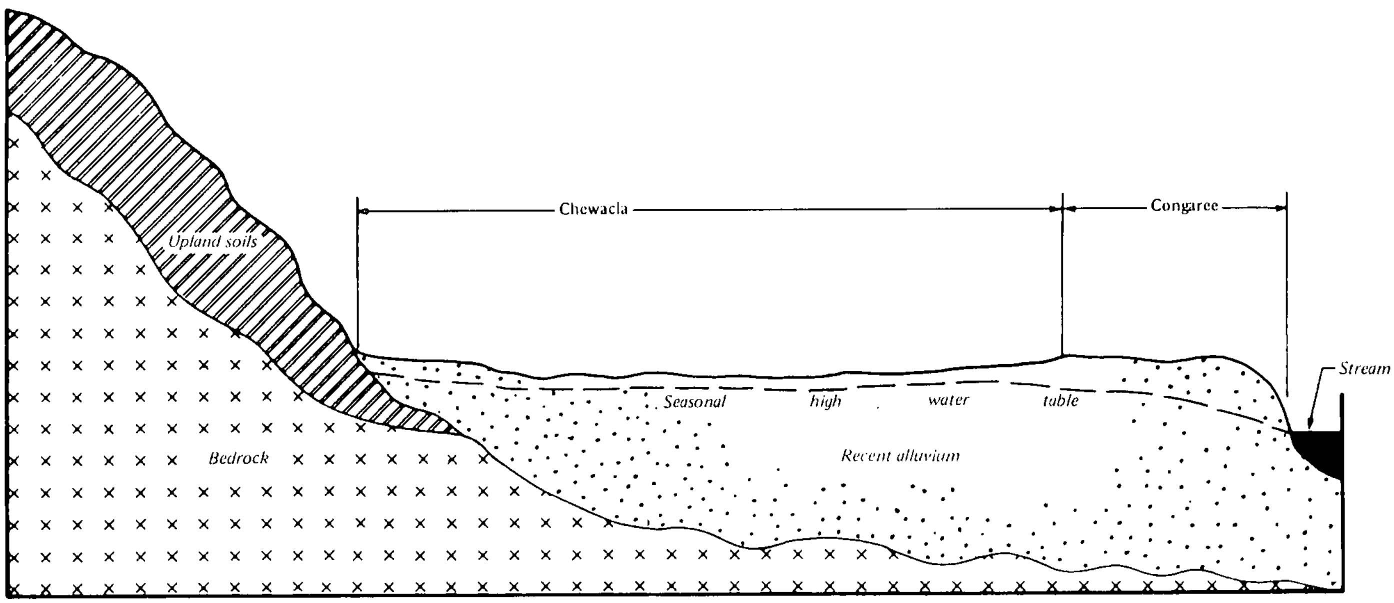


Figure 5.—The relationship of soils and landscape in the Chewacla-Congaree map unit.

steepness of slope are the main concerns in use and management.

7. Chewacla-Congaree

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

These soils are on flood plains along major streams in the county. The areas are long and narrow and are at the lowest elevations. This map unit makes up 7 percent of the county. It is about 70 percent Chewacla soils, 20 percent Congaree soils, and 10 percent soils of minor extent.

Chewacla soils are somewhat poorly drained. They are in the lower areas away from the larger stream channels (fig. 5). Chewacla soils have a brown loam surface layer. The subsoil is yellowish brown, brown, and grayish brown fine sandy loam, loam, clay loam, and sandy clay loam.

The Congaree soils are well drained or moderately well drained. They are in slightly higher places near the larger stream channels. Congaree soils have a brown loam surface layer. The underlying material is brown, strong brown, dark yellowish brown, yellowish brown, and light brownish gray fine sandy loam, loam, and silty clay loam.

The soils of minor extent are Helena and Worsham soils around the head of drainageways and along drainageways that join this map unit.

Chewacla soils are used mostly as woodland, and Congaree soils are used mainly as pasture or cropland. Wetness and the hazard of flooding are the main limitations.

Detailed Soil Map Units

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

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

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

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Gaston sandy clay loam, 2 to 8 percent slopes, eroded, is one of several phases in the Gaston 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 soils 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. Cecil-Urban land complex, 2 to 8 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 soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

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

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

AmB—Alamance Variant gravelly loam, 2 to 8 percent slopes. This soil is well drained. It is on broad ridges in the Kings Mountain belt that includes Crowders Mountain, Pasour Mountain, and Spencer Mountain. The areas are irregular in shape and range from 4 to 40 acres.

Typically, this soil has a dark grayish brown gravelly loam surface layer that is about 4 inches thick. The subsurface layer is strong brown gravelly loam to a depth of about 8 inches. The subsoil extends to a depth of about 34 inches. It is strong brown silt loam in the upper part and brownish yellow silt loam in the lower part. The underlying material to a depth of 45 inches is multicolored saprolite that has a silt loam texture. Weathered schist bedrock is between depths of 45 and 60 inches.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to weathered bedrock typically ranges from 40 to 60 inches. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is moderate in bare, unprotected areas.

Included with this soil in mapping are small areas of Lignum and Tatum soils. The Lignum soils are moderately well drained to somewhat poorly drained and are very slowly permeable. They are on toe slopes along intermittent drainageways. The Tatum soils, on small knolls and ridgetops, are red and clayey. In places are some areas of Alamance Variant soils that have a loam or silt loam surface layer and some moderately eroded areas that have a silty clay loam surface layer. Special map symbols indicate small areas of stony or severely eroded soils and large gullies. The included soils make up 15 to 20 percent of this map unit.

This Alamance Variant soil is used mainly as woodland. The rest is used mainly as cropland or pasture. A few small areas are in urban uses.

Where this soil is used as woodland, common trees are chestnut oak, southern red oak, northern red oak, red maple, white oak, loblolly pine, shortleaf pine, and hickory. Common understory plants are flowering dogwood, sourwood, American holly, eastern redcedar, black cherry, mountain laurel, and common greenbrier. There are no major limitations for woodland use and management.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Although there are few limitations for building site development, steepness of slope is a limitation for small commercial buildings and moderate permeability and depth to bedrock are the main limitations for septic tank absorption fields. The hazard of erosion is moderate where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is a limitation for local roads and streets. Small stones limit the use of this soil for recreational development.

This Alamance Variant soil is in capability subclass IIe. The woodland ordination symbol is 7A for loblolly pine.

AmD—Alamance Variant gravelly loam, 8 to 15 percent slopes. This soil is well drained. It is on narrow ridges and side slopes in the Kings Mountain belt that includes Crowders Mountain, Pasour Mountain, and Spencer Mountain. The areas are oblong, are irregular in width, and range from 4 to 25 acres.

Typically, this soil has a dark grayish brown gravelly loam surface layer that is about 4 inches thick. The subsurface layer is strong brown gravelly loam to a depth of about 8 inches. The subsoil extends to a depth of about 34 inches. It is strong brown silt loam in the upper part and brownish yellow silt loam in the lower part. The underlying material to a depth of 45 inches is multicolored saprolite that has a silt loam texture. Weathered schist bedrock is between depths of 45 and 60 inches.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to weathered bedrock typically ranges from 40 to more than 60 inches. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Tatum soils that are red and clayey. These soils are on the upper part of slopes. In places are areas of Alamance Variant soils that have a loam or silt loam surface layer and some moderately eroded areas that have a silty clay loam surface layer. Special map symbols indicate small areas of stony or severely eroded soils and large gullies. The included soils make up 15 to 20 percent of this map unit.

This Alamance Variant soil is used mainly as woodland. The rest is used mainly as cropland or pasture.

Where this soil is used as woodland, common trees are chestnut oak, southern red oak, northern red oak, white oak, loblolly pine, shortleaf pine, red maple, and hickory. Common understory plants are flowering dogwood, sourwood, American holly, eastern redcedar, mountain laurel, black cherry, red maple, and sassafras. There are no major limitations for woodland use and management.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used as pasture.

Steepness of slope is the main limitation for building site development. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Moderate permeability, steepness of slope, and depth to bedrock are the main limitations for septic tank absorption fields. Low strength is a limitation for local roads and streets.

Steepness of slope and small stones are the main limitations for recreational development.

This Alamance Variant soil is in capability subclass IVe. The woodland ordination symbol is 7A for loblolly pine.

ApB—Appling sandy loam, 1 to 6 percent slopes. This soil is well drained. It is on broad, smooth ridges throughout the county. Some of the larger areas are southeast of Gastonia and east of Cherryville. The areas are irregular in shape and range from 4 to 100 acres.

Typically, this soil has a brown sandy loam surface layer that is about 10 inches thick. The subsoil extends to a depth of about 48 inches. It is brownish yellow sandy clay loam in the upper part and yellowish brown sandy clay in the middle part. The lower part is yellowish brown sandy clay loam mottled with red, yellow, and strong brown. The underlying material to a depth of 60 inches is multicolored saprolite that has a sandy clay loam texture.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is moderate in bare, unprotected areas.

Included with this soil in mapping are small areas of Cecil, Helena, Vance, and Wedowee soils. The Cecil soils are red and moderately eroded. They are on small knolls and ridgetops. The Helena soils, along intermittent drainageways, are moderately well drained and slowly permeable. The Vance soils are slowly permeable and are in intermingled areas, in saddles, and on toe slopes. The Wedowee soils, on narrow side slopes, have a thinner, clayey subsoil. Some intermingled areas of soils east of Cherryville have a high content of mica and a thinner subsoil. Special map symbols indicate small areas of severely eroded or very gravelly soils, wet spots, and large gullies. The included soils make up 10 to 15 percent of this map unit.

This Appling soil is used mainly as cropland or pasture. The rest is used mainly as woodland or is in urban uses.

The main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed (fig. 6). Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, southern red oak, white oak, hickory, sweetgum, and yellow poplar. Common understory plants are flowering dogwood, sourwood, blackberry, eastern redcedar, running cedar, and red maple. There are no major limitations for woodland use and management.

There are few limitations for building site and recreational development. The hazard of erosion is moderate where vegetation is removed at construction sites, and erosion control practices are needed. The moderate permeability is the main limitation for septic tank absorption fields.

This Appling soil is in capability subclass IIe. The woodland ordination symbol is 8A for loblolly pine.

CeB2—Cecil sandy clay loam, 2 to 8 percent slopes, eroded. This soil is well drained. It is on broad ridges throughout the county. Some of the larger areas are around Gastonia, Dallas, Cherryville, and Stanley. The areas are irregular in shape and range from 10 to 200 acres.

Typically, this soil has a yellowish red sandy clay loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 58 inches. It is red clay in the upper part and red clay loam in the lower part. The underlying material to a depth of 80 inches is red saprolite that has a loam texture.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. The surface layer is medium acid to very strongly acid unless lime has been added. The subsoil is strongly acid or very strongly acid. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Appling, Gaston, Madison, and Pacolet soils. The Appling soils are more yellow and are less eroded than Cecil soil. They are on the more level landscapes. The Gaston soils are dark red and are less acid. The Madison soils have a higher content of mica and a thinner, clayey subsoil. They occur at random within the map unit. The Pacolet soils, on narrow ridges and side slopes, have a thinner, clayey subsoil. In places, mostly in hardwood forests, are some areas of slightly eroded Cecil soils that have a sandy loam surface layer. Special map symbols indicate small areas of very gravelly or stony soils, wet spots, and large gullies. The included soils make up 10 to 15 percent of this map unit.

This Cecil soil is used mainly as cropland or pasture. The rest is used as woodland.

Figure 6.—A grassed waterway helps reduce erosion in an area of Appling sandy loam, 1 to 6 percent slopes.

The main crops are corn, soybeans, and small grains. Steepness of slope, texture of the surface layer, surface runoff, and susceptibility to erosion are the main limitations. Good tilth is difficult to maintain because of the sandy clay loam surface layer. As the surface layer dries after a hard rain, a crust commonly forms, and clods form if the soil is worked when wet. This limitation causes difficulties in seedbed preparation and can affect germination, resulting in poor or uneven crop growth. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, hickory, and yellow poplar. Common understory plants are flowering dogwood, sourwood, American holly, black cherry, eastern redcedar, red maple, and running cedar. The eroded condition of the soil is the main limitation for woodland use and management.

There are few limitations for building site and recreational development; however, the hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. The moderate permeability is the main limitation for septic tank absorption fields.

This Cecil soil is in capability subclass IIIe. The woodland ordination symbol is 7C for loblolly pine.

CeD2—Cecil sandy clay loam, 8 to 15 percent slopes, eroded. This soil is well drained. It is on side slopes throughout the county. Some of the larger areas are around Gastonia, Dallas, Cherryville, and Stanley. The areas are irregular in shape and range from 5 to 75 acres.

Typically, this soil has a yellowish red sandy clay loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 58 inches. It is red clay in the upper part and red clay loam in the lower part. The underlying material to a depth of 80 inches is red saprolite that has a loam texture.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. The surface layer is medium acid to very strongly acid unless lime has been added. The subsoil is strongly acid or very strongly acid. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Gaston, Madison, Pacolet, and Wedowee soils. The Gaston soils are dark red and less acid than the Cecil soil. They are on the lower part of the slopes. The Madison and Wedowee soils have a thinner, clayey subsoil and occur at random within the map unit. In addition, Madison soils have a high content of mica, and Wedowee soils are more yellow and have a moderate shrink-swell potential. In places, mostly in hardwood forests, are some areas of slightly eroded Cecil soils that have a sandy loam surface layer. Special map symbols indicate small areas of very gravelly or stony soils, rock outcrops, and large gullies. The inclusions make up 10 to 15 percent of this map unit.

This Cecil soil is used mainly as woodland. The rest is used as cropland or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, yellow poplar, and hickory. Common understory plants are flowering dogwood, sourwood, American holly, black cherry, eastern redcedar, red maple, and Christmas fern. The eroded condition of the soil is the main limitation for woodland use and management.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, texture of the surface layer, surface runoff, and the susceptibility to erosion are the main limitations. Good tilth is difficult to maintain because of the sandy clay loam surface layer. As this layer dries after a hard rain, a crust commonly forms, and clods form if the soil is worked when wet. This limitation causes difficulties in seedbed preparation and can affect germination, resulting in poor or uneven crop growth. Because of the slope, erosion is a severe hazard. Conservation practices that reduce erosion and surface runoff and that add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Steepness of slope is the main limitation for building site and recreational development. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. The moderate permeability and steepness of slope are the main limitations for septic tank absorption fields.

This Cecil soil is in capability subclass IVe. The woodland ordination symbol is 7C for loblolly pine.

CfB—Cecil-Urban land complex, 2 to 8 percent slopes. This map unit consists of intermingled areas of Cecil soil and Urban land. Cecil soil is well drained. It is on broad ridges mostly in and around Gastonia, Cherryville, Dallas, and Stanley. Cecil soil makes up 50 to 65 percent of the map unit, and Urban land makes up 25 to 50 percent. The areas are irregular in shape and range from 10 to 400 acres.

Typically, this Cecil soil has a yellowish red sandy clay loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 58 inches. It is red clay in the upper part and red clay loam in the lower part. The underlying material to a depth of 80 inches is red saprolite that has a loam texture.

This Cecil soil has moderate permeability, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. The surface layer is medium acid to very strongly acid unless lime has been added. The subsoil is strongly acid or very strongly acid. The hazard of erosion is severe in bare, unprotected areas.

Areas of Urban land are covered with buildings, streets, driveways, parking lots, and runways.

Included in mapping are small areas of Appling, Gaston, Helena, and Tatum soils. The Appling soils are less eroded and are on the smoother parts of the landscape. The Gaston soils are dominant around

Figure 7.—Cecil soil is well suited to building site development. This development is in an area of Cecil-Urban land complex, 2 to 8 percent slopes.

Mount Holly and Belmont. The Helena soils are along intermittent drainageways and are moderately well drained and slowly permeable. The Tatum soils are dominant around Bessemer City and Kings Mountain. Also included are small cut and fill areas where the natural soils have been altered or covered and the slope modified. These areas are commonly adjacent to the Urban land. The inclusions make up 10 to 25 percent of this map unit.

There are no major limitations for building site development and recreational development; however, onsite investigation is needed before planning the use and management of specific sites (fig. 7). The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Moderate permeability is a limitation for septic tank absorption fields.

This Cecil-Urban land complex has not been assigned a capability subclass nor a woodland ordination symbol.

CfD—Cecil-Urban land complex, 8 to 15 percent slopes. This map unit consists of intermingled areas of Cecil soil and Urban land. Cecil soil is well drained. It is on narrow ridges and side slopes mostly in and around Gastonia, Cherryville, Dallas, and Stanley. Cecil soil makes up 50 to 65 percent of the map unit, and Urban land makes up 25 to 50 percent. The areas are oblong, are irregular in width, and range from 4 to 20 acres.

Typically, this Cecil soil has a yellowish red sandy clay loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 58 inches. It is red clay in the upper part and red clay loam in the lower part. The underlying material to a depth of 80 inches is red saprolite that has a loam texture.

This Cecil soil has moderate permeability, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. The surface layer is medium acid to very strongly acid unless lime has been added. The subsoil is strongly acid or very strongly acid. The hazard of erosion is severe in bare, unprotected areas.

Areas of Urban land are covered with buildings, streets, driveways, and parking lots.

Included in mapping are small areas of Gaston, Tatum, and Wedowee soils. Gaston soils are dominant around Mount Holly and Belmont. Tatum soils are dominant around Bessemer City and Kings Mountain. Wedowee soils have a thinner subsoil and a moderate shrink-swell potential and occur at random within the map unit. Also included are small cut and fill areas where the natural soils have been altered or covered and the slope modified. These areas are commonly adjacent to the Urban land. The inclusions make up 10 to 25 percent of this map unit.

Steepness of slope is the main limitation for building site and recreational development. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Onsite investigation is needed before planning the use and management of specific sites. Moderate permeability and steepness of slope are the main limitations for septic tank absorption fields.

This Cecil-Urban land complex has not been assigned a capability subclass nor a woodland ordination symbol.

CH—Chewacla loam, frequently flooded. This soil is nearly level and is somewhat poorly drained. It is on flood plains along creeks and rivers throughout the county. Some of the larger areas are along Catawba Creek, Long Creek, and the South Fork Catawba River. In mapping, the number of observations was fewer than in other areas because of flooding and dense vegetation, but the detail is adequate for the expected use of the soil. The areas are long, are irregular in width, and range from 5 to more than 150 acres.

Typically, this soil has a brown loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 45 inches. It is yellowish brown fine sandy loam and loam in the upper part, brown clay loam in the middle part, and grayish brown sandy clay loam in the lower part. The underlying material to a depth of 60 inches is dark gray and light brownish gray sandy clay loam.

Permeability is moderate, and the shrink-swell potential is low. The seasonal high water table is within 1.5 feet of the surface, and this soil is subject to frequent flooding for brief periods mostly during the winter and spring. Depth to bedrock is more than 5 feet. The soil ranges from very strongly acid to slightly acid unless lime has been added.

Included with this soil in mapping are small areas of Congaree and Worsham soils. The Congaree soils, in slightly higher places closer to stream channels, are well drained. The Worsham soils are poorly drained and clayey. They are at the base of upland slopes and along the smaller intermittent drainageways. Also included are some small areas of poorly drained loamy soils in depressions. The included soils make up 10 to 25 percent of this map unit.

This Chewacla soil is used mainly as woodland. The rest is used mainly as cropland or pasture.

Where this soil is used as woodland, common trees are loblolly pine, yellow poplar, American sycamore, sweetgum, water oak, blackgum, green ash, and eastern cottonwood. Common understory plants are flowering dogwood, willow, sourwood, American holly, arrowhead, and poison ivy. Wetness is the main limitation for woodland use and management.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Wetness and the hazard of flooding are the main limitations. Crops are subject to damage if they are not protected from flooding. Tall fescue and ladino clover are the main forage plants where this soil is used for pasture. Drainage and flood prevention are needed, but the drainage systems are limited because of a lack of suitable outlets.

This soil generally is not used for building sites, sanitary facilities, and recreational development because of wetness and flooding.

This Chewacla soil is in capability subclass IVw. The woodland ordination symbol is 9W for sweetgum.

Co—Congaree loam, occasionally flooded. This soil is well drained or moderately well drained. It is in nearly level areas on flood plains along creeks and rivers throughout the county. Some of the larger areas are along Catawba Creek, Long Creek, and the South Fork Catawba River. The areas are long, are irregular in width, and range from 5 to 75 acres.

Typically, this soil has a brown loam surface layer that is about 8 inches thick. The underlying material to a depth of 62 inches is alternating layers of strong brown fine sandy loam, dark yellowish brown loam, strong brown silty clay loam, brown loam, yellowish brown silty clay loam, and light brownish gray fine sandy loam.

Permeability is moderate, and the shrink-swell potential is low. The seasonal high water table is at a depth of 2.5 to 4.0 feet. This soil is subject to occasional flooding for brief periods during winter and spring. Depth to bedrock is more than 10 feet. The soil ranges from very strongly acid to neutral unless lime has been added.

Included with this soil in mapping are small areas of Chewacla and Worsham soils. The Chewacla soils are somewhat poorly drained. They are in slightly lower places, generally away from the stream channel. The Worsham soils are poorly drained. They are at the base of slopes or along the smaller intermittent drainageways. A few areas of loamy soils that are well drained and that have bedrock at a depth of 3 to 6 feet are along the more narrow flood plains. Also included are a few areas of sandy soils along the stream channel. The included soils make up 15 to 20 percent of this map unit.

This Congaree soil is used mainly as cropland or pasture. The rest is used as woodland.

Where this soil is cultivated, the major crops are corn, soybeans, and small grains. These crops can be damaged by occasional flooding. Tall fescue and ladino clover are the main pasture forage plants.

Where this soil is used as woodland, common trees are yellow poplar, American sycamore, water oak, willow oak, sweetgum, eastern cottonwood, and loblolly pine. Common understory plants are flowering dogwood, boxelder, sourwood, American holly, green ash, red mulberry, and poison ivy. There are no major limitations for woodland use and management.

This soil generally is not used for building sites and sanitary facilities because of wetness and occasional flooding. The hazard of flooding is a moderate limitation for most recreational development and a severe limitation for camp areas.

This Congaree soil is in capability subclass IIw. The woodland ordination symbol is 10A for sweetgum.

GaB2—Gaston sandy clay loam, 2 to 8 percent slopes, eroded. This soil is well drained. It is on broad ridges throughout the county. The most extensive areas are southeast of Belmont and in the northeastern part of the county. The areas are irregular in shape and range from 10 to 200 acres.

Typically, this soil has a dark reddish brown sandy clay loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 57 inches. It is dark red clay in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 72 inches is multicolored saprolite that has a loam texture.

Permeability and the shrink-swell potential are moderate. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. This soil is strongly acid to slightly acid unless lime has been added. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Cecil, Madison, Pacolet, Wilkes, and Winnsboro soils. The Cecil soils, on the higher ridgetops, are less plastic than the Gaston soil. The Madison soils have a high content of mica and a thinner, clayey subsoil. They occur at random within the map unit. The Wilkes soils have weathered bedrock within 20 inches of the surface. They are on the lower part of the slopes and at the end of ridges. The Winnsboro soils are browner and slowly permeable. They are on the lower part of the slopes and along small drainageways. In hardwood forests are some slightly eroded areas of Gaston soils that have a fine sandy loam or loam surface layer. Special map symbols indicate small areas of very gravelly soils, wet spots, and large gullies. The included soils make up 10 to 20 percent of this map unit.

This Gaston soil is used mainly as cropland or pasture. The rest is used as woodland.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, texture of the surface layer, surface runoff, and susceptibility to erosion are the main limitations. Good tilth is difficult to maintain because of the sandy clay loam surface layer. As this layer dries after a hard rain, a crust commonly forms, and clods form if the soil is worked when wet. This limitation makes seedbed preparation difficult and can affect germination, resulting in poor or uneven crop growth. Conservation practices that reduce erosion (fig. 8) and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, northern red oak, southern red oak, white oak, hickory, yellow poplar, and sweetgum. Common understory plants are flowering dogwood, sourwood, winged elm, American holly, black cherry, eastern redcedar, eastern redbud,

Figure 8.—Stripcropping on Gaston sandy clay loam, 2 to 8 percent slopes, eroded, is an effective soil and water conservation practice.

red maple, running cedar, poison ivy, and honeysuckle. The eroded condition of the soil is the main limitation for woodland use and management.

Moderate shrink-swell potential is the main limitation for dwellings or small commercial buildings. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Moderate permeability is a limitation for septic tank absorption fields. Low strength is a limitation for local roads and streets. There are few limitations for recreational development.

This Gaston soil is in capability subclass IIIe. The woodland ordination symbol is 8C for loblolly pine.

GaD2—Gaston sandy clay loam, 8 to 15 percent slopes, eroded. This soil is well drained. It is on side slopes and narrow ridges throughout the county, but the most extensive areas are southeast of Belmont and in the northeastern part of the county. The areas are oblong, are irregular in width, and range from 5 to 100 acres.

Typically, this soil has a dark reddish brown sandy clay loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 57 inches. It is dark red clay in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 72 inches is multicolored saprolite that has a loam texture.

Permeability and the shrink-swell potential are moderate. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. The soil is strongly acid to slightly acid unless lime has been added. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Cecil, Madison, Pacolet, Wilkes, and Winnsboro soils. The Cecil soils, on ridgetops and the higher part of the slopes, are less plastic than the Gaston soil. The Madison and Pacolet soils have a thinner, clayey subsoil. They occur at random within the map unit. The Wilkes soils have weathered bedrock within 20 inches of the surface. They are at the end of ridges and on the lower part of the slopes. The Winnsboro soils are browner than the Gaston soil and are slowly permeable. They are on the lower part of the slopes and along small drainageways. In hardwood forests are some slightly eroded areas of Gaston soils that have a fine sandy loam or loam surface layer. Special map symbols indicate small areas of very gravelly or stony soils, rock outcrops, and large gullies. The inclusions make up 10 to 20 percent of this map unit.

This Gaston soil is used mainly as woodland. The rest is used as cropland or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, hickory, yellow poplar, and sweetgum. Common understory plants are flowering dogwood, sourwood, winged elm, American holly, eastern redcedar, red maple, Christmas fern, Virginia creeper, and running cedar. The eroded condition of the soil is the main limitation for woodland use and management.

Where this soil is cultivated, the major crops are corn, soybeans, and small grains. Steepness of slope, texture of the surface layer, surface runoff, and susceptibility to erosion are the main limitations. Good tilth is difficult to maintain because of the sandy clay loam surface layer. As this layer dries after a hard rain, a crust commonly forms, and clods form if the soil is worked when wet. This limitation causes difficulty in seedbed preparation and can affect germination, resulting in poor or uneven crop growth. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Moderate shrink-swell potential and steepness of slope are the main limitations for dwellings. Steepness of slope is the main limitation for small commercial buildings. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Moderate permeability and steepness of slope are the main limitations for septic tank absorption fields. Low strength is a limitation for local roads and streets. Steepness of slope is the main limitation for recreational development.

This Gaston soil is in capability subclass IVe. The woodland ordination symbol is 8C for loblolly pine.

GaE—Gaston loam, 15 to 25 percent slopes. This soil is well drained. It is on side slopes and narrow ridges, mostly in the southeastern and northeastern parts of the county along the Catawba and South Fork Catawba Rivers and major creeks. The areas are oblong, are irregular in width, and range from 5 to 50 acres.

Typically, this soil has a dark reddish brown loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 44 inches. It is dark red clay in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 62 inches is multicolored saprolite that has a loam texture.

Permeability and the shrink-swell potential are moderate. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. This soil is strongly acid to slightly acid unless lime has been added. The hazard of erosion is very severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Madison, Pacolet, and Wilkes soils. Madison and Pacolet soils have a thinner, clayey subsoil and occur at random within the map unit. Wilkes soils, on the lower part of the slopes, have weathered bedrock within 20 inches of the surface and are at the end of narrow ridges. In places are some moderately eroded areas of Gaston soils that have a sandy clay loam or clay loam surface layer. Special map symbols indicate small areas of very gravelly or stony soils, rock outcrops, and large gullies. The inclusions make up 15 to 25 percent of this map unit.

This Gaston soil is used mainly as woodland. The rest is used mainly as pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, hickory, yellow poplar, and sweetgum. Common understory plants are flowering dogwood, American holly, eastern redcedar, sourwood, eastern hophornbeam, muscadine grape, and brackenfern. Steepness of slope and the hazard of erosion are the main limitations for woodland use and management.

Where this soil is used as pasture, tall fescue and ladino clover are the main forage plants. Moderately steep slopes, surface runoff, and a very severe hazard of erosion are the main limitations. Conservation practices that reduce runoff and erosion are needed in cleared areas. This soil is not used as cropland.

Steepness of slope is the main limitation for building site development, sanitary facilities, and recreational development. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is a limitation for local roads and streets.

This Gaston soil is in capability subclass VIe. The woodland ordination symbol is 9R for loblolly pine.

HeB—Helena sandy loam, 1 to 6 percent slopes. This soil is moderately well drained. It is on smooth ridges, toe slopes, and along drainageways throughout the county. The areas are irregular in shape and range from 5 to 40 acres.

Typically, this soil has a grayish brown sandy loam surface layer that is about 8 inches thick. The subsoil extends to a depth of about 39 inches. It is light yellowish brown sandy clay loam in the upper part. In the middle part, it is pale brown and strong brown sandy clay that has light gray mottles, and in the lower part, it is reddish yellow sandy clay loam that has light gray mottles. The underlying material to a depth of 60 inches is multicolored saprolite that has a sandy clay loam texture.

Permeability is slow, and the shrink-swell potential is high. The seasonal high water table is at a depth of 1.5 to 2.5 feet. Depth to bedrock is more than 5 feet. This soil is very strongly acid or strongly acid unless lime has been added. The hazard of erosion is moderate in bare, unprotected areas.

Included with this soil in mapping are small areas of Appling, Vance, and Worsham soils. The Appling and Vance soils, on small knolls and ridgetops, are well drained. The Appling soils are more permeable than Helena soil. The Worsham soils, in small depressions and drainageways, are poorly drained. Also included are small intermingled areas of soils that are less acid than Helena soil. Special map symbols indicate small areas of gravelly or severely eroded soils and large gullies. The included soils make up 10 to 15 percent of this map unit.

This Helena soil is used mainly as woodland. The rest is used mainly as cropland or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, yellow poplar, sweetgum, southern red oak, northern red oak, black oak, white oak, and hickory. 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 for woodland use and management. When this soil is wet, logging causes compaction, deep ruts, poor surface drainage, and lower productivity.

Where this soil is cultivated, the major crops are corn, soybeans, and small grains. Wetness and susceptibility to erosion are the main limitations. A drainage system may be needed in some areas. The most common method for drainage is open ditches. Tile generally is not used. If the soil is wet when tilled, soil structure is destroyed and large clods form, resulting in ponding and a poor seedbed. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

High shrink-swell potential is the main limitation for dwellings and small commercial buildings. Wetness is an additional limitation for dwellings with basements. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. The hazard of erosion is moderate where vegetation is removed at construction sites, and erosion control practices are needed. Wetness and the slow permeability are major limitations for septic tank absorption fields. Low strength and shrink-swell potential are the main limitations for local roads and streets. Wetness and slow permeability are the main limitations for most recreational development.

This Helena soil is in capability subclass IIe. The woodland ordination symbol is 8W for loblolly pine.

HuB—Helena-Urban land complex, 1 to 6 percent slopes. This map unit consists of intermingled areas of Helena soil and Urban land. Helena soil is moderately well drained. It is on smooth ridges, toe slopes, and along drainageways. This map unit is mostly in and around Gastonia and Cherryville. Helena soils make up 50 to 65 percent of the map unit, and Urban land makes up 25 to 50 percent. The areas are oblong, are irregular in width, and range from 4 to 20 acres.

Typically, this Helena soil has a grayish brown sandy loam surface layer that is 8 inches thick. The subsoil extends to a depth of about 39 inches. It is light yellowish brown sandy clay loam in the upper part. In the middle part, it is pale brown and strong brown sandy clay that has light gray mottles, and in the lower part, it is reddish yellow sandy clay loam that has light gray mottles. The underlying material to a depth of 60 inches is multicolored saprolite that has a sandy clay loam texture.

This Helena soil has a slowly permeable, clayey subsoil. The shrink-swell potential is high. The seasonal high water table is within a depth of 1.5 to 2.5 feet. Depth to bedrock is more than 5 feet. This soil is very strongly acid or strongly acid unless lime has been added. The hazard of erosion is moderate in bare, unprotected areas.

Areas of Urban land are covered with buildings, streets, driveways, parking lots, and runways.

Included in mapping are small areas of Appling and Vance soils on ridges and Worsham soils in depressions. Appling and Vance soils are well drained, and Worsham soils are poorly drained. Also included are small cut and fill areas where the natural soils have been altered or covered and the slope modified. These areas commonly are adjacent to the Urban land. The inclusions make up 5 to 15 percent of this map unit.

High shrink-swell potential is the main limitation for dwellings and small commercial buildings. Wetness is an additional limitation for dwellings with basements. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. Wetness and the slow permeability are major limitations for septic tank absorption fields. The hazard of erosion is moderate where vegetation is removed at construction sites, and erosion control practices are needed. Wetness and slow permeability are the main limitations for most recreational development. Onsite investigation is needed before planning the use and management of specific sites.

This Helena-Urban land complex is not assigned a capability subclass nor a woodland ordination symbol.

LgB—Lignum silt loam, 1 to 6 percent slopes. This soil is moderately well drained to somewhat poorly drained. It is on smooth ridges, toe slopes, and along drainageways. It is in the Kings Mountain belt that includes Crowders Mountain, Pasour Mountain, and Spencer Mountain. The areas are oblong, are irregular in width, and range from 4 to 20 acres.

Typically, this soil has a grayish brown silt loam surface layer that is about 4 inches thick. The subsoil extends to a depth of about 36 inches. It is pale brown silty clay loam in the upper part. In the middle part, it is light yellowish brown clay that has light gray mottles, and in the lower part, it is light yellowish brown, light gray, and strong brown silty clay loam. The underlying material to a depth of 60 inches is multicolored saprolite that has a gravelly silty clay loam texture.

Permeability is very slow, and the shrink-swell potential is moderate. The seasonal perched water table is within a depth of 1.0 to 2.5 feet. Depth to bedrock is more than 60 inches. This soil is very strongly acid or strongly acid unless lime has been added. The hazard of erosion is moderate in bare, unprotected areas.

Included with this soil in mapping are small areas of Alamance Variant, Tatum, and Worsham soils. The Alamance Variant and Tatum soils are well drained and more permeable than Lignum soil. They are on small knolls and ridgetops. The Worsham soils, in small depressions and drainageways, are poorly drained. Special map symbols indicate small areas of gravelly, stony, or severely eroded soils and large gullies. The included soils make up 10 to 15 percent of this map unit.

This Lignum soil is used mainly as woodland. The rest is used mainly as cropland or pasture.

Where this soil is used as woodland, common trees are chestnut oak, hickory, sweetgum, white oak, loblolly pine, Virginia pine, shortleaf pine, southern red oak, northern red oak, and yellow poplar. Common understory plants are witchhazel, red maple, common greenbrier, poison ivy, running cedar, and honeysuckle. Wetness is the main limitation for woodland use and management. When this soil is wet, logging causes compaction, deep ruts, poor surface drainage, and lower productivity.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Wetness and susceptibility to erosion are the main limitations. Tile generally is not used for drainage. If the soil is wet when tilled, soil structure is destroyed and large clods form, resulting in ponding and a poor seedbed. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Wetness is the main limitation for building site development. Because of the moderate shrink-swell potential, foundations should be designed to resist cracking. The seasonal perched water table and the slow percolation rate are a problem for septic tank absorption fields. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is a limitation for local roads and streets. Wetness and slow permeability are the main limitations for most recreational development.

This Lignum soil is in capability subclass IIe. The woodland ordination symbol is 7W for loblolly pine.

MaB2—Madison sandy clay loam, 2 to 8 percent slopes, eroded. This soil is well drained. It is on broad ridges throughout the county. Some of the larger areas are southwest of Stanley and Gastonia. The areas are irregular in shape and range from 10 to 80 acres.

Typically, this soil has a yellowish red sandy clay loam surface layer that is about 4 inches thick. The subsoil extends to a depth of about 32 inches. It is red clay in the upper part and yellowish red clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture. Mica flakes range from common to many.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Cecil and Pacolet soils. These soils occur at random within the map unit and contain less mica than Madison soil. In addition, Cecil soils have a thicker, clayey subsoil. In places, mostly in hardwood forests, are some slightly eroded areas of Madison soils that have a sandy loam surface layer. Gullies are common along drainageways in some areas. Special map symbols indicate small areas of gravelly soils and the larger gullies. The included soils make up 10 to 20 percent of this map unit.

This Madison soil is used mainly as cropland or pasture. The rest is used as woodland.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, texture of the surface layer, surface runoff, and susceptibility to erosion are the main limitations. Good tilth is difficult to maintain because of the sandy clay loam surface layer. As this layer dries after a hard rain, a crust commonly forms, and clods form if the soil is worked when wet. This limitation makes seedbed preparation difficult and can affect germination, resulting in poor or uneven crop growth. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, hickory, and yellow poplar. Common understory plants are flowering dogwood, sourwood, American holly, black cherry, eastern redcedar, winged elm, red maple, running cedar, and poison ivy. The eroded condition of the soil is the main limitation for woodland use and management.

There are no major limitations for dwellings. Steepness of slope is a limitation for small commercial buildings. Moderate permeability is the main limitation for septic tank absorption fields. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is a limitation for local roads and streets. There are few limitations for most recreational development.

This Madison soil is in capability subclass IIIe. The woodland ordination symbol is 7C for loblolly pine.

MaD2—Madison sandy clay loam, 8 to 15 percent slopes, eroded. This soil is well drained. It is on side slopes and narrow ridges throughout the county. Some of the larger areas are southwest of Stanley and Gastonia. The areas of this map unit are oblong, are irregular in width, and range from 5 to 70 acres.

Typically, this soil has a yellowish red sandy clay loam surface layer that is about 4 inches thick. The subsoil extends to a depth of about 36 inches. It is red clay in the upper part and yellowish red clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture. Mica flakes range from common to many.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is very severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Cecil and Pacolet soils. These soils occur at random within the map unit and contain less mica than Madison soil. In addition, Cecil soils have a thicker, clayey subsoil. In places, mostly in hardwood forests, are some slightly eroded areas of Madison soils that have a sandy loam surface layer. Gullies are common along drainageways in some areas. Special map symbols indicate small areas of gravelly or stony soils, rock outcrops, and the larger gullies. The inclusions make up 10 to 20 percent of this map unit.

This Madison soil is used mainly as woodland. The rest is used as cropland or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, hickory, and yellow poplar. Common understory plants are flowering dogwood, red maple, sourwood, American holly, eastern redcedar, running cedar, honeysuckle, and brackenfern.

The eroded condition of the soil is the main limitation for woodland use and management.

Where this soil is cultivated, the major crops are corn, soybeans, and small grains. Steepness of slope, texture of the surface layer, surface runoff, and susceptibility to erosion are the main limitations. Good tilth is difficult to maintain because of the sandy clay loam surface layer. As the surface layer dries after a hard rain, a crust commonly forms, and clods form if the soil is worked when wet. This limitation makes seedbed preparation difficult and can affect germination, resulting in poor and uneven crop growth. The hazard of erosion is very severe. Conservation practices that reduce erosion and surface runoff and that add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Steepness of slope is the main limitation for building site and recreational development. Steepness of slope and moderate permeability are the main limitations for septic tank absorption fields. The hazard of erosion is very severe where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is a limitation for local roads and streets.

This Madison soil is in capability subclass IVe. The woodland ordination symbol is 7C for loblolly pine.

MaE—Madison sandy loam, 15 to 25 percent slopes. This soil is well drained. It is on side slopes and narrow ridges throughout the county. Some of the larger areas are southwest of Stanley and Gastonia. The areas are oblong, are irregular in width, and range from 5 to 50 acres.

Typically, this soil has a yellowish brown sandy loam surface layer that is about 5 inches thick. The subsoil extends to a depth of about 38 inches. It is red clay in the upper part and yellowish red clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture. Mica flakes range from common to many.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is very severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Pacolet soils that occur at random within the map unit. These soils contain less mica than the Madison soil. In places are some intermingled areas of moderately eroded Madison soils that have a sandy clay loam or clay loam surface layer. Gullies are common along drainageways in some areas. Special map symbols indicate small areas of severely eroded or gravelly soils, rock outcrops, and large gullies. The inclusions make up 10 to 20 percent of this map unit.

This Madison soil is used mainly as woodland. The rest is used mainly as pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, southern red oak, northern red oak, white oak, hickory, yellow poplar, and sweetgum. Common understory plants are flowering dogwood, American holly, eastern redcedar, sourwood, American hornbeam, and mountain laurel. Steepness of slope and the hazard of erosion are the main limitations for woodland use and management.

This soil generally is not used as cropland. The moderately steep slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for pasture.

Steepness of slope is the major limitation for building site development, septic tank absorption fields, and recreational development. The hazard of erosion is very severe where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is a limitation for local roads and streets.

This Madison soil is in capability subclass VIe. The woodland ordination symbol is 8R for loblolly pine.

PaD2—Pacolet sandy clay loam, 8 to 15 percent slopes, eroded. This soil is well drained. It is on side slopes and narrow ridges throughout the county. The most extensive areas are in the northwestern part of the county. The areas are oblong, are irregular in width, and range from 4 to 40 acres.

Typically, this soil has a yellowish red sandy clay loam surface layer that is about 4 inches thick. The subsoil extends to a depth of about 36 inches. It is red clay loam in the upper part, red clay in the middle part, and yellowish red clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil is medium acid to very strongly acid unless lime has been added. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Cecil, Madison, and Wedowee soils that occur at random within the map unit. Cecil soils have a thicker clayey subsoil than the Pacolet soil. Madison soils have a high mica content, and Wedowee soils are more yellow and have a moderate shrink-swell potential. In places, mostly in hardwood forests, are some areas of slightly eroded Pacolet soils that have a sandy loam surface layer. Special map symbols indicate small areas of gravelly or stony soils and large gullies. The included soils make up 10 to 20 percent of this map unit.

This Pacolet soil is used mainly as woodland. The rest is used as cropland or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, northern red oak, white oak, southern red oak, yellow poplar, sweetgum, and hickory. Common understory plants are flowering dogwood, sourwood, American holly, black cherry, black locust, sumac, eastern redcedar, and red maple. The eroded condition of the soil is the main limitation for woodland use and management.

In areas where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Good tilth is difficult to maintain because of the sandy clay loam surface layer. As this layer dries after a hard rain, a crust commonly forms, and clods form if the soil is worked when wet. This limitation causes difficulties in seedbed preparation and can affect germination, resulting in poor or uneven crop growth. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for pasture.

Steepness of slope is the main limitation for building site development. Steepness of slope and moderate permeability are the main limitations for septic tank absorption fields. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is a limitation for local roads and streets. Steepness of slope is the main limitation for most recreational development.

This Pacolet soil is in capability subclass IVe. The woodland ordination symbol is 6C for loblolly pine.

PaE—Pacolet sandy loam, 15 to 25 percent slopes. This soil is well drained. It is on side slopes and narrow ridges throughout the county. Some of the larger areas are around High Shoals, north of Stanley, and in the southeastern part of the county. The areas are oblong, are irregular in width, and range from 5 to 50 acres.

Typically, this soil has a brown sandy loam surface layer that is about 5 inches thick. The subsoil extends to a depth of about 39 inches. It is red clay loam in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil ranges from medium acid to very strongly acid unless lime has been added. The hazard of erosion is very severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Madison soils. These soils have a high content of mica and occur at random within the map unit. In places are some moderately eroded areas of Pacolet soils that have a sandy clay loam surface layer. Special map symbols indicate small areas of gravelly, stony, or severely eroded soils, rock outcrops, and large gullies. The inclusions make up 10 to 15 percent of this map unit.

This Pacolet soil is used mainly as woodland. The rest is used mainly as pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, southern red oak, northern red oak, and hickory. Common understory plants are flowering dogwood, American holly, eastern redcedar, sourwood, and mountain laurel. Steepness of slope and the hazard of erosion are the main limitations for woodland use and management.

This soil generally is not used as cropland. The moderately steep slopes, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for pasture.

Steepness of slope is the major limitation for building site development, sanitary facilities, and recreational development. The hazard of erosion is very severe where vegetation is removed at construction sites, and erosion control practices are needed.

This Pacolet soil is in capability subclass VIe. The woodland ordination symbol is 8R for loblolly pine.

PaF—Pacolet sandy loam, 25 to 45 percent slopes. This soil is well drained. It is on side slopes and narrow ridges throughout the county. The areas are oblong, are irregular in width, and range from 5 to 15 acres.

Typically, this soil has a brown sandy loam surface layer that is about 5 inches thick. The subsoil extends to a depth of about 39 inches. It is red clay loam in the upper part, red clay in the middle part, and red clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture.

Permeability is moderate, and the shrink-swell potential is low. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil ranges from medium acid to very strongly acid unless lime has been added. The hazard of erosion is very severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Madison soils that have a high content of mica and occur at random within the map unit. Special map symbols indicate small areas of stony, gravelly, or severely eroded soils, rock outcrops, and large gullies. The inclusions make up 10 to 15 percent of this map unit.

Nearly all of this soil is used as woodland. Common trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, northern red oak, southern red oak, and hickory. Common understory plants are mountain laurel, flowering dogwood, American holly, and eastern redcedar. Steepness of slope is the main limitation for woodland use and management.

This soil generally is not used for crops or pasture, building site development, sanitary facilities, or recreational development because of steepness of slope.

This Pacolet soil is in capability subclass VIIe. The woodland ordination symbol is 8R for loblolly pine.

Pt—Pits. Pits consist of open excavations from which the soil and commonly the underlying material have 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 mineral resources, such as lithium and mica. A lithium quarry is north of Bessemer City. The areas are irregular in shape and range in depth to 300 feet. Pits less than 4 acres in size are shown with a special symbol. Parts of the pits contain water at times.

Onsite investigation is needed before planning the use and management of specific areas of this map unit.

This map unit has not been assigned a capability subclass nor a woodland ordination symbol.

Ro—Rock outcrop. This map unit consists of very steep areas where bedrock, boulders, or stones cover more than 90 percent of the surface, generally on the highest ridges in the county. The largest areas are on top of Crowders Mountain and Kings Mountain. The areas are oblong, are irregular in width, and range from 4 to 40 acres. Rock outcrop is composed mostly of acid crystalline and metamorphic rock. The vegetation is sparse.

Included in mapping are small areas of Uwharrie soils. These soils are on the lower part of slopes and are very bouldery. Also included are soils that are shallow to bedrock and are vegetated mainly with mountain laurel and scrub pine. These soils are in the larger cracks and fissures. The included soils make up less than 10 percent of this map unit.

Onsite investigation is needed before planning the use and management of specific areas of this map unit.

This map unit has not been assigned a capability subclass nor a woodland ordination symbol.

TaB—Tatum gravelly loam, 2 to 8 percent slopes. This soil is well drained. It is on broad ridges in the Kings Mountain belt that includes Crowders Mountain, Pasour Mountain, and Spencer Mountain. The areas are irregular in shape and range from 4 to 100 acres.

Typically, this soil has a brown gravelly loam surface layer that is about 3 inches thick. The subsurface layer to a depth of about 6 inches is strong brown gravelly loam. The subsoil extends to a depth of about 48 inches. It is red clay in the upper part and red clay loam in the lower part. The underlying material to a depth of 58 inches is multicolored saprolite that has a silt loam texture. The saprolite is underlain by weathered schist bedrock.

Permeability and the shrink-swell potential are moderate. The water table is not within a depth of 6 feet. Depth to weathered bedrock ranges from 40 to 60 inches. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is moderate in bare, unprotected areas.

Included with this soil in mapping are small areas of Alamance Variant and Lignum soils. Alamance Variant soils are loamy and browner than Tatum soil and occur at random within the map unit. Lignum soils are moderately well drained and somewhat poorly drained. They are very slowly permeable and are along intermittent drainageways. In places are areas of Tatum soils that have a loam or silt loam surface layer and some moderately eroded areas where the surface layer is silty clay loam. Also included are areas of soils that are more than 60 inches to bedrock. Special map symbols indicate small areas of stones, severely eroded soils, wet spots, and large gullies. The included soils make up 10 to 15 percent of this map unit.

This Tatum soil is used mainly as woodland. The rest is used mainly as cropland or pasture. A few areas are in urban uses.

Where this soil is used as woodland, common trees are chestnut oak, loblolly pine, Virginia pine, shortleaf pine, yellow poplar, northern red oak, white oak, hickory, red maple, and post oak. Common understory plants are flowering dogwood, black cherry, sourwood, sassafras, mountain laurel, running cedar, and common greenbrier. There are no major limitations for woodland use and management.

Where this soil is cultivated, the major crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Moderate shrink-swell potential is the main limitation for dwellings and small commercial buildings. Steepness of slope is an additional limitation for small commercial buildings. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. Depth to bedrock and moderate permeability are the main limitations for septic tank absorption fields. The hazard of erosion is moderate where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is the main limitation for local roads and streets. Small stones are the main limitation for most recreational development.

This Tatum soil is in capability subclass IIe. The woodland ordination symbol is 8A for loblolly pine.

TaD—Tatum gravelly loam, 8 to 15 percent slopes. This soil is well drained. It is on side slopes and narrow ridges in the Kings Mountain belt that includes Crowders Mountain, Pasour Mountain, and Spencer Mountain. The areas are oblong, are irregular in width, and range from 5 to 80 acres.

Typically, this soil has a brown gravelly loam surface layer that is about 3 inches thick. The subsurface layer to a depth of about 6 inches is strong brown gravelly loam. The subsoil extends to a depth of about 48 inches. It is red clay in the upper part and red clay loam in the lower part. The underlying material to a depth of 58 inches is multicolored saprolite that has a silt loam texture. The saprolite is underlain by weathered schist bedrock.

Permeability and the shrink-swell potential are moderate. The water table is not within a depth of 6 feet. Depth to weathered bedrock ranges from 40 to 60 inches. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Alamance Variant soils that are loamy and browner than Tatum soil and occur at random within the map unit. In places are areas of Tatum soils that have a loam or silt loam surface layer and some moderately eroded areas where the surface layer is silty clay loam. Also included are areas of soils that are more than 60 inches to bedrock. Special map symbols indicate small areas of stones, severely eroded soils, rock outcrops, and large gullies. The inclusions make up 10 to 15 percent of this map unit.

This Tatum soil is used mainly as woodland. The rest is used mainly as cropland or pasture. A few areas are in urban uses.

Where this soil is used as woodland, common trees are chestnut oak, loblolly pine, Virginia pine, shortleaf pine, yellow poplar, white oak, northern red oak, hickory, red maple, and post oak. Common understory plants are flowering dogwood, black cherry, sourwood, mountain laurel, sassafras, running cedar, and common greenbrier. There are no major limitations for woodland use and management.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Slope and shrink-swell potential are the main limitations for dwellings. Steepness of slope is the main limitation for small commercial buildings. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. Steepness of slope, moderate permeability, and depth to bedrock are the main limitations for septic tank absorption fields. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is the main limitation for local roads and streets. Steepness of slope and small stones are the main limitations for most recreational development.

This Tatum soil is in capability subclass IIIe. The woodland ordination symbol is 8A for loblolly pine.

TaE—Tatum gravelly loam, 15 to 25 percent slopes. This soil is well drained. It is on side slopes and narrow ridges in the Kings Mountain belt that includes Crowders Mountain, Pasour Mountain, and Spencer Mountain. The areas are oblong, are irregular in width, and range from 5 to 100 acres.

Typically, this soil has a brown gravelly loam surface layer that is about 3 inches thick. The subsurface layer to a depth of about 6 inches is strong brown gravelly loam. The subsoil extends to a depth of about 48 inches. It is red clay in the upper part and red clay loam in the lower part. The underlying material to a depth of 58 inches is multicolored saprolite that has a silt loam texture. The saprolite is underlain by weathered schist bedrock.

Permeability and the shrink-swell potential are moderate. The water table is not within a depth of 6 feet. Depth to weathered bedrock ranges from 40 to 60 inches. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is very severe in bare, unprotected areas.

Included with this soil in mapping are intermingled areas of Uwharrie soils that are very bouldery. Generally, they are on the upper and steepest part of the slopes. In places are some areas of Tatum soils that have a loam or silt loam surface layer and some moderately eroded areas where the surface layer is silty clay loam. Small areas of soils that have bedrock within 3 feet of the surface are also included. Special map symbols indicate small areas of stones, severely eroded soils, rock outcrops, and large gullies. The inclusions make up 10 to 20 percent of this map unit.

This Tatum soil is used mainly as woodland. The rest is used mainly as pasture.

Where this soil is used as woodland, common trees are chestnut oak, loblolly pine, Virginia pine, shortleaf pine, yellow poplar, white oak, northern red oak, hickory, red maple, and post oak. Common understory plants are flowering dogwood, American holly, sourwood, eastern hophornbeam, mountain laurel, and common greenbrier. Steepness of slope and the hazard of erosion are the main limitations for woodland use and management.

This soil generally is not used as cropland. The moderately steep slopes, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for pasture.

Steepness of slope is the major limitation for building site development, sanitary facilities, and recreational development. The hazard of erosion is very severe where vegetation is removed at construction sites, and erosion control practices are needed. Low strength is a limitation for local roads and streets.

This Tatum soil is in capability subclass IVe. The woodland ordination symbol is 8R for loblolly pine.

Ud—Udorthents, loamy. This map unit consists of areas where all the original soil has been altered by cutting, filling, and shaping. It includes borrow areas, landfills, mine tailings, fly ash deposits, and cut and fill areas. Slope is highly variable. The areas are rectangular and range from 4 to 200 acres.

Borrow areas are areas where 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 and generally are level or gently sloping. The sides 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 have stabilized under pine or other vegetation. These areas are generally rectangular and range from 4 to more than 50 acres.

Landfills are excavated areas where deeply graded trenches as much as 30 feet deep have been backfilled with alternate layers of solid refuse and soil material. After the final cover is added, the areas are nearly level to gently sloping. Most areas are seeded to grass or planted in trees (fig. 9). These areas are unsuitable for most building purposes because of subsidence and the danger of methane gas from the decomposition of refuse.

Mine tailings are areas where by-products of mining have been deposited in holding ponds or piles on the original land surface. Piles of tailings are as high as 200 feet. Vegetation is sparse, and the areas are subject to accelerated erosion. Conservation practices to control erosion are needed.

Fly ash deposits generally are pits or ponds where fly ash from coal burning plants is deposited or allowed to settle out. When the pits are full, they are covered with as much as 3 feet of soil material and seeded to grass. The major problems are the hazard of erosion, sediment, and the acidity of the material.

Cut and fill areas consist of places where soil has been removed and placed in an adjacent area. Examples are where parts of flood plains are filled in from adjacent hillsides and are used for farming and where soil is removed from construction sites and deposited nearby. These areas are subject to accelerated erosion. Conservation practices to control erosion are needed.

Onsite investigation is needed before planning the use and management of specific areas of this map unit.

This map unit has not been assigned a capability subclass nor a woodland ordination symbol.

Ur—Urban land. This map unit consists of areas where more than 85 percent of the surface is covered

Figure 9.—Vegetation will soon cover this landfill in an area mapped as Udorthents, loamy.

with asphalt, concrete, buildings, or other impervious cover. Most areas are in or near the business districts of Gastonia, Dallas, Mount Holly, and Cherryville. The areas are irregular in shape and range from 5 to 500 acres.

The original soils 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 is excessive water runoff from roofs, streets, and parking lots, which increases the hazard of flooding in low-lying areas. Onsite investigation is needed before planning the use and management of specific areas of this map unit.

This map unit has not been assigned a capability subclass nor a woodland ordination symbol.

UwF—Uwharrie stony loam, 25 to 45 percent slopes, very bouldery. This soil is well drained. It is on narrow ridgetops and side slopes in the Kings Mountain belt that includes Crowders Mountain, Pasour Mountain, and Spencer Mountain. The areas are irregular in shape and range from 5 to 60 acres.

Typically, this soil has a brown stony loam surface layer that is about 4 inches thick. The subsoil extends to a depth of about 40 inches. It is red clay loam in the upper part and red silt loam in the lower part. The underlying material to a depth of 50 inches is multicolored saprolite that has a silt loam texture. The saprolite is underlain by weathered schist bedrock. Many boulders and stones are on the surface.

Permeability and the shrink-swell potential are moderate. The water table is not within a depth of 6 feet. Depth to weathered bedrock ranges from 40 to 60 inches. This soil is medium acid to very strongly acid. The hazard of erosion is very severe in bare, unprotected areas.

Included with this soil in mapping are areas of Tatum soils on the lower part of slopes. Tatum soils are less stony than Uwharrie soil. In places are some areas of Uwharrie soils that are moderately eroded and have a stony silty clay loam surface layer. Special map symbols indicate small areas of severely eroded soils and large gullies. The included soils make up 10 to 20 percent of this map unit.

This soil is used as woodland. Common trees are chestnut oak, white oak, southern red oak, black oak, yellow poplar, hickory, and post oak. Common understory plants are sourwood, American holly, mountain laurel, Christmas fern, and brackenfern. Steepness of slope is the major limitation for woodland use and management. Stones and boulders on the surface are an additional limitation.

This soil is not used for crops or pasture, building site development, sanitary facilities, or recreational development because of the steep slopes and the many boulders and stones on the surface.

This Uwharrie soil is in capability subclass VIIs. The woodland ordination symbol is 5R for black oak.

VaB—Vance sandy loam, 2 to 8 percent slopes. This soil is well drained. It is on broad ridges throughout the county. Some of the larger areas are southeast of Gastonia and east of Cherryville. The areas are irregular in shape and range from 4 to 60 acres.

Typically, this soil has a brown sandy loam surface layer that is about 5 inches thick. The subsoil extends to a depth of about 37 inches. It is yellowish brown clay in the upper part, strong brown clay in the middle part, and reddish yellow clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture.

Permeability is slow, and the shrink-swell potential is moderate. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. This soil is strongly acid or medium acid in the surface layer unless lime has been added. It is strongly acid or very strongly acid in the subsoil and underlying material. The hazard of erosion is moderate in bare, unprotected areas.

Included with this soil in mapping are small areas of Appling, Cecil, and Helena soils. The Appling and Cecil soils are more permeable and less plastic than Vance soil. They are on small knolls and ridgetops. The Helena soils, in small depressions, along intermittent drainageways, and on toe slopes, are moderately well drained. In places are some small intermingled areas of Vance soils that are moderately eroded and have a sandy clay loam surface layer. Special map symbols indicate small areas of gravelly or severely eroded soils, wet spots, and large gullies. The included soils make up 10 to 20 percent of this map unit.

This Vance soil is used mainly as cropland or pasture. The rest is used mainly as woodland. A few small areas are in urban uses.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants in areas used for hay or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, southern red oak, northern red oak, white oak, hickory, yellow poplar, and sweetgum. Common understory plants are flowering dogwood, sourwood, sumac, American holly, eastern redcedar, common greenbrier, and sassafras. There are no major limitations for woodland use and management.

The shrink-swell potential is the main limitation for dwellings or small commercial buildings. Steepness of slope is an additional limitation for small commercial buildings. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. The hazard of erosion is moderate where vegetation is removed at construction sites, and erosion control practices are needed. Slow permeability is the main limitation for septic tank absorption fields. Low strength is the main limitation for local roads and streets. Slow permeability is the main limitation for most recreational development.

This Vance soil is in capability subclass IIIe. The woodland ordination symbol is 7A for loblolly pine.

VaD—Vance sandy loam, 8 to 15 percent slopes. This soil is well drained. It is on side slopes and narrow ridges throughout the county. Some of the larger areas are southeast of Gastonia and east of Cherryville. The areas are oblong, are irregular in width, and range from 5 to 30 acres.

Typically, this soil has a brown sandy loam surface layer that is about 5 inches thick. The subsoil extends to a depth of about 37 inches. It is yellowish brown clay in the upper part, strong brown clay in the middle part, and reddish yellow clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture.

Permeability is slow, and the shrink-swell potential is moderate. The water table is not within a depth of 6 feet. Depth to bedrock is more than 6 feet. This soil is strongly acid or medium acid in the surface layer unless lime has been added. It is strongly acid or very strongly acid in the subsoil and underlying material. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Cecil, Pacolet, and Wedowee soils. The Cecil and Pacolet soils are red and more permeable than the Vance soil. They are on the ridgetops and the upper part of the slopes. The Wedowee soils are more permeable and occur at random within the map unit. In places are some small intermingled areas of Vance soils that are moderately eroded and have a sandy clay loam surface layer. Special map symbols indicate small areas of gravelly or severely eroded soils and large gullies. The inclusions make up 10 to 20 percent of this map unit.

This Vance soil is used mainly as woodland. The rest is used mainly as cropland or pasture. A few small areas are in urban uses.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, southern red oak, northern red oak, white oak, hickory, yellow poplar, and sweetgum. Common understory plants are flowering dogwood, sourwood, American holly, eastern redcedar, common greenbrier, and sassafras. There are no major limitations for woodland use and management.

Where this soil is cultivated, the major crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay and pasture.

Slow permeability and moderate shrink-swell potential are the main limitations for dwellings. Steepness of slope is a limitation for small commercial buildings. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Slow permeability is the main limitation for septic tank absorption fields. Low strength is the main limitation for local roads and streets. Slope is the main limitation for recreational development.

This Vance soil is in capability subclass IVe. The woodland ordination symbol is 7A for loblolly pine.

WeD—Wedowee sandy loam, 6 to 15 percent slopes. This soil is well drained. It is on side slopes and narrow ridges throughout the county. Some of the larger areas are southeast of Gastonia and east of Cherryville. The areas are oblong, are irregular in width, and range from 4 to 40 acres.

Typically, this soil has a grayish brown sandy loam surface layer that is about 2 inches thick. The subsurface layer to a depth of about 7 inches is brownish yellow sandy loam. The subsoil extends to a depth of about 31 inches. It is brownish yellow sandy clay loam in the upper part, strong brown sandy clay in the middle part, and strong brown sandy clay loam in the lower part. The underlying material to a depth of 62 inches is multicolored saprolite that has a sandy clay loam texture.

Permeability and the shrink-swell potential are moderate. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil is strongly acid or very strongly acid unless lime has been added. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Cecil, Helena, Pacolet, and Vance soils. The Pacolet and Cecil soils are red and are on ridgetops. The Helena soils, along intermittent drainageways, are slowly permeable and moderately well drained. The Vance soils, on toe slopes, are slowly permeable. Some intermingled areas of soils east of Cherryville have a high content of mica. In places are some areas of Wedowee soils that are moderately eroded and have a sandy clay loam surface layer. Special map symbols indicate small areas of very gravelly, stony, or severely eroded soils and large gullies. The included soils make up 10 to 20 percent of this map unit.

This Wedowee soil is used mainly as woodland. The rest is used as cropland or pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, northern red oak, post oak, southern red oak, white oak, yellow poplar, sweetgum, and hickory. Common understory plants are flowering dogwood, sourwood, American holly, eastern redcedar, red maple, running cedar, and poison ivy. There are no major limitations for woodland use and management.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Steepness of slope is the main limitation for dwellings and small commercial buildings. Shrink-swell potential is an additional limitation for dwellings with basements. Moderate permeability and steepness of slope are the main limitations for septic tank absorption fields. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Steepness of slope, shrink-swell potential and low strength are limitations for local streets and roads. Slope is the main limitation for most recreational development.

This Wedowee soil is in capability subclass IVe. The woodland ordination symbol is 8A for loblolly pine.

WkD—Wilkes loam, 6 to 15 percent slopes. This soil is well drained. It is on broad to narrow ridges and side slopes throughout the county. Some of the larger areas are northwest of Mount Holly. The areas are oblong, are irregular in width, and range from 5 to 40 acres.

Typically, this soil has a dark yellowish brown loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 15 inches. It is strong brown clay in the upper part and strong brown sandy clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored weathered diorite bedrock that can be dug with difficulty with a spade. Manganese concretions and black streaks range from few to common.

Permeability is moderately slow, and the shrink-swell potential is moderate. The water table is not within a depth of 6 feet. Depth to weathered bedrock is 10 to 20 inches. Depth to hard bedrock is more than 40 inches. This soil is strongly acid to slightly acid in the upper part of the profile and slightly acid to mildly alkaline in the lower part. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Gaston and Winnsboro soils. The Gaston soils, on ridgetops and the upper parts of the slopes, are red and more permeable and deeper to bedrock than Wilkes soil. The Winnsboro soils are deeper than the Wilkes soil and occur at random within the map unit. In places are some small areas of Wilkes soils that are moderately eroded and have a clay loam surface layer. Special map symbols indicate small areas of gravelly, stony, or severely eroded soils, rock outcrops, and large gullies. The inclusions make up 10 to 25 percent of this map unit.

This Wilkes soil is used mainly as woodland. The rest is used as cropland or pasture.

Where this soil is used as woodland, common trees are loblolly pine, Virginia pine, shortleaf pine, white oak, post oak, hickory, yellow poplar, and southern red oak. Common understory plants are flowering dogwood, eastern redcedar, American holly, sourwood, and common greenbrier. There are no major limitations for woodland use and management.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, restricted rooting depth, and the hazard of erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

The moderate shrink-swell potential, shallow depth to weathered bedrock, and steepness of slope are the major limitations for dwellings without basements and local roads and streets. Depth to bedrock is the main limitation for dwellings with basements, septic tank absorption fields, and recreational development. Steepness of slope is the main limitation for small commercial buildings. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed.

This Wilkes soil is in capability subclass VIe. The woodland ordination symbol is 7D for loblolly pine.

WkF—Wilkes loam, 15 to 30 percent slopes. This soil is well drained. It is on side slopes and narrow ridgetops throughout the county. Some of the larger areas are northwest of Mount Holly. Areas are oblong, are irregular in width, and are 5 to 40 acres in size.

Typically, this soil has a dark yellowish brown loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 15 inches. It is strong brown clay in the upper part and strong brown sandy clay loam in the lower part. The underlying material to a depth of 60 inches is multicolored, weathered diorite that can be dug with difficulty with a spade. Manganese concretions and black streaks range from few to common.

Permeability is moderately slow, and the shrink-swell potential is moderate. The water table is not within a depth of 6 feet. Depth to weathered bedrock is 10 to 20 inches. Depth to hard bedrock is more than 40 inches. This soil is strongly acid to slightly acid in the upper part of the profile and medium acid to mildly alkaline in the lower part.

Included with this soil in mapping are small areas of Gaston soils that are red, more permeable, and deeper. They generally are on the ridgetops and upper part of the slopes. In places are small areas of Wilkes soils that are moderately eroded and have a clay loam surface layer. Special map symbols indicate small areas of gravelly, stony, or severely eroded soils, rock outcrops, and large gullies. The inclusions make up 10 to 15 percent of this map unit.

This Wilkes soil is used mainly as woodland. The rest is used mainly as pasture.

Where this soil is used as woodland, common trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, southern red oak, post oak, white oak, and hickory. Common understory plants are flowering dogwood, American holly, eastern redcedar, sourwood, and mountain laurel. The moderately steep to steep slopes, restricted rooting depth, and the hazard of erosion are the main limitations for woodland use and management.

This soil generally is not used as cropland. The steep slopes, surface runoff, restricted rooting depth, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for pasture.

Steepness of slope and depth to bedrock are the major limitations for building site development, sanitary facilities, and most recreational development. The hazard of erosion is very severe where vegetation is removed at construction sites, and erosion control practices are needed.

This Wilkes soil is in capability subclass VIIe. The woodland ordination symbol is 7R for loblolly pine.

WnB—Winnsboro loam, 2 to 8 percent slopes. This soil is well drained. It is on broad ridges throughout the county. Some of the larger areas are northwest of Mount Holly. The areas are irregular in shape and range from 4 to 60 acres.

Typically, this soil has a dark grayish brown loam surface layer that is about 5 inches thick. The subsurface layer to a depth of about 8 inches is yellowish brown loam. The subsoil extends to a depth of about 36 inches. The upper part is strong brown clay, and the lower part is brown and strong brown clay loam. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture. Manganese concretions and black streaks range from few to common.

Permeability is slow, and the shrink-swell potential is high. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil ranges from strongly acid to slightly acid in the surface and subsurface layers and from slightly acid to mildly alkaline in the subsoil and underlying material. The hazard of erosion is very severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Gaston and Wilkes soils. The Gaston soils are red and more permeable than Winnsboro soil. They are on small knolls and ridgetops. The Wilkes soils have weathered bedrock within 20 inches of the surface and are on narrow side slopes and at the end of ridges. In places are some small intermingled areas of Winnsboro soils that are moderately eroded and have a clay loam surface layer. Special map symbols indicate small areas of gravelly or severely eroded soils, wet spots, and large gullies. The included soils make up 10 to 20 percent of this map unit.

This Winnsboro soil is used mainly as woodland. The rest is used mainly as cropland or pasture. A few small areas are in urban uses.

Where this soil is used as woodland, common trees are loblolly pine, Virginia pine, shortleaf pine, red maple, southern red oak, white oak, post oak, northern red oak, sweetgum, and yellow poplar. Common understory plants are flowering dogwood, eastern redcedar, American holly, sourwood, running cedar, and poison ivy. There are no major limitations for woodland use and management.

Where this soil is cultivated, the major crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

The shrink-swell potential is the main limitation for dwellings or small commercial buildings. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Slow permeability is the main limitation for septic tank absorption fields. Shrink-swell potential and low strength are limitations for local roads and streets. Slow permeability is the main limitation for most recreational development.

This Winnsboro soil is in capability subclass IIe. The woodland ordination symbol is 7A for loblolly pine.

WnD—Winnsboro loam, 8 to 15 percent slopes. This soil is well drained. It is on side slopes and narrow ridges throughout the county. Some of the larger areas are northwest of Mount Holly. The areas are oblong, are irregular in width, and range from 5 to 50 acres.

Typically, this soil has a dark grayish brown loam surface layer that is about 5 inches thick. The subsurface layer is yellowish brown loam to a depth of about 8 inches. The subsoil extends to a depth of about 36 inches. The upper part is strong brown clay, and the lower part is brown and strong brown clay loam. The underlying material to a depth of 60 inches is multicolored saprolite that has a loam texture. Manganese concretions and black streaks range from few to common.

Permeability is slow, and the shrink-swell potential is high. The water table is not within a depth of 6 feet. Depth to bedrock is more than 5 feet. This soil ranges from strongly acid to slightly acid in the surface and subsurface layers and from slightly acid to mildly alkaline in the subsoil and underlying material. The hazard of erosion is severe in bare, unprotected areas.

Included with this soil in mapping are small areas of Gaston and Wilkes soils. The Gaston soils are red and more permeable than the Winnsboro soil. They are on ridgetops and the upper part of the slopes. The Wilkes soils have weathered bedrock within 20 inches of the surface and are on the more narrow and steep side slopes. In places are some small areas of Winnsboro soils that have a gravelly surface layer and moderately eroded areas that have a clay loam surface layer. Special map symbols indicate small areas of gravelly or severely eroded soils, rock outcrops, and large gullies. The inclusions make up 15 to 25 percent of this map unit.

This Winnsboro soil is used mainly as woodland. The rest is used mainly as cropland or pasture. A few small areas are in urban uses.

Where this soil is used as woodland, common trees are loblolly pine, Virginia pine, shortleaf pine, red maple, white oak, northern red oak, southern red oak, post oak, sweetgum, and yellow poplar. Common understory plants are flowering dogwood, eastern redcedar, American holly, and sourwood. There are no major limitations for woodland use and management.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Steepness of slope, surface runoff, and susceptibility to erosion are the main limitations. Conservation practices that reduce erosion and add organic matter are needed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Shrink-swell potential is the main limitation for dwellings without basements. Steepness of slope is the main limitation for dwellings with basements. Steepness of slope and shrink-swell potential are limitations for small commercial buildings. Foundations should be designed to resist cracking because the subsoil shrinks and swells during changes in moisture. The hazard of erosion is severe where vegetation is removed at construction sites, and erosion control practices are needed. Slow permeability is the main limitation for septic tank absorption fields. Shrink-swell potential and low strength are the main limitations for local roads and streets. The slope is the main limitation for most recreational development.

This Winnsboro soil is in capability subclass IVe. The woodland ordination symbol is 7A for loblolly pine.

WoA—Worsham loam, 0 to 2 percent slopes. This soil is poorly drained. It is on uplands around intermittent drainageways throughout the county. The areas are oblong and range from 4 to 20 acres.

Typically, this soil has a dark grayish brown loam surface layer that is about 6 inches thick. The subsoil extends to a depth of about 60 inches. It is gray clay loam in the upper part, gray clay in the middle part, and light gray clay loam in the lower part.

Permeability is very slow, and the shrink-swell potential is moderate. The seasonal high water table is within a depth of 1 foot mostly during winter and spring. Depth to bedrock is more than 5 feet. This soil is strongly acid or very strongly acid unless lime has been added.

Included with this soil in mapping are small areas of Helena soils on small knolls. The Helena soils are moderately well drained. In places are some small intermingled areas of Worsham soils that have gravel on the surface and some intermingled areas of soils that have a loamy subsoil. The included soils make up 10 to 20 percent of this map unit.

This soil is used mainly as woodland. The rest is used mainly as pasture.

Where this soil is used as woodland, common trees are sweetgum, loblolly pine, Virginia pine, willow oak, red maple, and yellow poplar. Common understory plants are red mulberry, sourwood, common greenbrier, sedge, arrowhead, alder, and poison ivy. Wetness is the main limitation for woodland use and management. When the soil is wet, logging causes compaction, deep ruts, poor surface drainage, and lower productivity.

Where this soil is cultivated, the main crops are corn, soybeans, and small grains. Wetness is the main limitation. Drainage systems are mainly open ditches. If the soil is wet when tilled, soil structure is destroyed and the soil compacts, resulting in ponding and a poor seedbed. Tall fescue and ladino clover are the main forage plants where this soil is used for hay or pasture.

Wetness is the major limitation for building site development. Very slow permeability and wetness are the main limitations for septic tank absorption fields and for recreational development. Low strength is a limitation for local roads and streets.

This Worsham soil is in capability subclass Vw. The woodland ordination symbol is 6W for yellow poplar.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Gaston County are listed.

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 producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They are used for producing 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 get 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 subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 8 percent.

About 94,101 acres, or slightly over 41 percent of the county, is prime farmland. The northwestern and south-central parts of the county are dominantly prime farmland. Many smaller areas scattered throughout the rest of the county are also prime farmland.

The following map units, or soils, make up prime farmland in Gaston 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.

Soils that have limitations, such as a high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. In addition to prime farmland determinations, the Agricultural Land Evaluation and Site Assessment (LESA) System has been adopted by Gaston County. This system determines the quality of the land for agricultural uses and evaluates the conditions that justify conversion of prime and important farmland soils. The LESA System provides a basis for rating land in more detail than the prime farmland criteria. Additional information is available at the Gaston Soil and Water Conservation District office. In the following list, the measures needed to overcome the limitations of a map unit, if any, are shown in parentheses after the map unit name. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

AmB Alamance Variant gravelly loam, 2 to 8 percent slopes
ApB Appling sandy loam, 1 to 6 percent slopes

CeB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded
Co	Congaree loam, occasionally flooded (if protected)
GaB2	Gaston sandy clay loam, 2 to 8 percent slopes, eroded
HeB	Helena sandy loam, 1 to 6 percent slopes
LgB	Lignum silt loam, 1 to 6 percent slopes
MaB2	Madison sandy clay loam, 2 to 8 percent slopes, eroded
TaB	Tatum gravelly loam, 2 to 8 percent slopes
VaB	Vance sandy loam, 2 to 8 percent slopes
WnB	Winnsboro loam, 2 to 8 percent slopes

Use and Management of the Soils

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

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

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

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment. 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

G.E. Still, Jr., district conservationist, and B.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 "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

More than 48,000 acres in Gaston County was used for crops and pasture, according to the 1983 North Carolina Agricultural Statistics. Of this total, 18,466 acres was used as pastureland and hayland; 14,570 acres was used for row crops, mainly corn and soybeans; 6,310 acres was used for close-growing crops, mainly wheat and oats; and 4,400 acres was used as harvested hayland. The rest was idle cropland in conservation use or in other miscellaneous uses.

A small acreage throughout the county is used for commercial production of melons, strawberries, sweet corn, tomatoes, peppers, and other vegetables and small fruits. Deep soils, such as Appling, Cecil, and Gaston soils, that have good drainage and that warm up early in spring, are especially well suited to truck crops. Table 5, prepared by North Carolina Extension Service, shows crop adaptation to soil types.

The cropland and pastureland acreage is gradually decreasing as farmland is converted to urban development.

Cropland Management

Soil erosion is a major concern on three-fourths of the cropland in the county. Erosion is a hazard on all the upland soils that have slope of more than 2 percent.

Soil erosion is costly when expensive herbicides, fertilizers, and lime are lost along with valuable topsoil and organic matter, and eroded soil is damaging to the environment when it is deposited into streams, lakes, and reservoirs. Productivity and soil tilth are decreased when the surface layer is washed away. Tilling or preparing a seedbed on eroded soils, such as Cecil, Gaston, and Madison soils, is difficult because much of the original friable surface layer has eroded away, leaving the more clayey subsoil exposed at the surface.

Erosion affects soils that have clayey subsoils, such as Cecil and Gaston soils, in several ways. As more subsoil is incorporated into the surface layer, the available water capacity declines. Because of the increase in clay, more lime and fertilizer are needed and soil porosity is reduced. Cecil and Gaston soils tend to crust on the surface, which limits infiltration, causes rapid surface runoff, and increases the hazard of erosion.

In many sloping fields, tilling or preparing a good seedbed is difficult on clayey spots because the original friable surface layer has eroded away. Such spots are common in areas of moderately eroded soils, such as Cecil, Gaston, and Madison soils.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. A cropping system that keeps plant cover on the soil for extended periods can hold soil erosion losses to amounts that will not reduce the productive capacity of the soils. Legume and grass forage crops in the cropping system reduce erosion on sloping land, provide nitrogen, and improve tilth for the next crop.

Contour tillage and terracing are practical in most areas of gently sloping soils. Cropping systems that provide substantial plant cover are required to control erosion unless conservation tillage is used. Minimizing tillage and leaving crop residue on the surface increase infiltration and reduce the hazards of runoff and erosion (fig. 10). These practices can be adapted to most soils in the survey area, but they are more difficult to use successfully on the eroded soils and on the soils that have fairly high amounts of clay in the surface layer. No-tillage farming is effective in reducing erosion on sloping land and can be adapted to most soils in the survey area; however, it is more difficult to practice successfully on the soils that have a fairly high clay content in the surface layer.

Terraces and diversions reduce the length of slope and reduce runoff and erosion on slopes of 8 percent or less. They intercept excess surface runoff and safely divert water to suitable outlets, such as grassed waterways or field borders. Grassed waterways, generally planted in tall fescue, provide safe disposal areas for field water runoff. Field borders help filter sediment-laden runoff around the field boundaries. These conservation practices are practical and highly effective on soils that have uniform slope patterns, such as Appling, Cecil, Gaston, Madison, and Tatum soils.

Contour tillage and stripcropping are effective conservation practices on many Gaston County soils. Like terraces and diversions, they are most effective on the more uniform slopes. They can, however, be adapted to a wide range of slope patterns.

Pasture Management

The major pasture and hayland plants are tall fescue and ladino clover. Other pasture and hayland plants, however, are better suited to summer weather. Those plants include such perennial grasses as hybrid bermuda, common bermuda, and switchgrass, and such legumes as alfalfa and sericea lespedeza. Livestock producers need a combination of plants that are best suited to the soils they plan to manage for pasture and hayland. Using the suited species and good management techniques, such as proper annual fertilization, weed control, insect control, and rotation grazing, will increase yields from pasture and hayland.

The deep, well drained soils, such as Cecil, Gaston, and Tatum soils, are suited to all major grasses and legumes grown in the county. Fescue, ladino clover, and common bermuda can provide six to nine animal unit months of grazing on these soils each year. Hybrid bermuda and switchgrass can provide an average of 10 animal unit months of grazing. An animal unit month is the amount of feed or forage required by one animal unit for one month.

A well rounded pasture and hayland management program will include summer-adapted grasses, such as bermuda, and spring- and fall-adapted grasses, such as tall fescue or a grass-legume mixture. Proper fencing for rotation grazing and an intensive fertilizer management program can produce pasture grazing from March through November. Alfalfa, sericea lespedeza, red clover, orchardgrass, and hybrid bermuda can be used during the winter for hay. These combinations can provide a successful pasture and hayland program for livestock producers. Perennials generally are preferred in forage programs because of less soil loss and less production costs.

Drainage

Soil drainage is a management need on some of the acreage used for crops and pasture in the county. Poor soil drainage is a problem on about 10 percent of the pastureland and cropland. Helena, Lignum, and Worsham soils are affected by seasonal wetness.

Figure 10.—No-tillage farming of soybeans in wheat stubble reduces erosion on Cecil sandy clay loam, 2 to 8 percent slopes, eroded.

Tillage patterns can increase the problem by creating low areas and by blocking surface drainage. Grassed waterways along with surface shaping can be used to maintain surface drainage. Artificial drainage with tile is difficult because of clayey subsoils and the lack of suitable outlets. Open ditches generally are used. The Chewacla soils are somewhat poorly drained. They are on flood plains and are subject to frequent flooding. Crop production generally is not practical on Chewacla soils because of periodic flooding and restricted equipment use. Tile drainage and ditches are used to remove the water and lower the water table where wet spots, seeps, and springs occur.

The design of surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and open ditches is needed in most areas of poorly drained to moderately well drained soils when they are used for intensive row cropping. Drains must be more closely spaced in slowly permeable soils.

Information for the design and applicability of erosion control and drainage practices for each soil type is available from the local Soil Conservation Service office and from the Gaston Soil and Water Conservation District office.

Soil Fertility

Most of the soils in Gaston County generally are low in natural fertility. They require additions of lime and fertilizer for most crop production.

Liming requirements are a major concern because the acidity level in the soil affects the activity of beneficial bacteria and the availability of many of the nutrient elements. Lime also neutralizes exchangeable aluminum, which counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (calcitic lime) or calcium and magnesium (dolomitic lime) to the soil.

A soil test is used as a guide to indicate the amount and kind of lime that should be used. In soils that have a sandy surface texture, for example, magnesium and available calcium levels can be low. The desired pH levels can differ depending upon the soil properties and the crop.

Nitrogen fertilization is required for most crops. Generally, it is not required for peanuts, for clovers, in some rotations of soybeans, or for alfalfa after it has been established. A dependable soil test is not available for predicting nitrogen requirements.

Phosphorus and potassium fertilizer needs can be predicted by soil tests. Requirements for these nutrients are needed because past applications of phosphorus and potassium tend to build up in the soil.

Requirements for specific crops are determined by sampling each field and obtaining the soil test recommendations. The Soil Conservation Service and the Agricultural Extension Service can help in determining the kind and amount of fertilizer and lime to apply.

Chemical Weed Control

Using herbicides for weed control leads to less tillage and is an integral part of modern farming in Gaston County. Soil properties, such as organic matter content and texture of the surface layer, affect the rate of herbicide application. Estimates for these properties were determined for the soils in the county. Table 16 shows a general range of organic matter content. The surface texture is shown in table 15 in the USDA texture column.

In some cases, the organic matter content of a soil is outside the range shown in table 16. The organic matter 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 organic matter content in the surface layer than similar soils that have been in cultivation for a long period of time. Conservation tillage increases levels of organic matter content in the surface layer. Lower levels are common in soils where the surface layer has been partly or completely removed by erosion, land smoothing, or other activities. Current soil tests are needed to measure organic matter content before determining required herbicide rates. The labels of herbicides show specific application rates based on organic matter content and texture of the surface layer.

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 are also considered.

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

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

Crops other than those shown in table 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 Agricultural 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 *(22)*. 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. These levels are defined in the following paragraphs.

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

Class I soils have 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.

No class I or class VIII soils are recognized in Gaston County.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, or *s*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is 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) and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

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, rangeland, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w* or *s*.

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

Woodland Management and Productivity

Edwin J. Young, forester, Soil Conservation Service, helped prepare this section.

Forest managers are faced with the challenge of producing greater yields from smaller areas of forest land. Meeting this challenge requires an intensity of management and silvicultural practices little thought of a few decades ago. Many of the silvicultural techniques applied in forestry resemble those long practiced in agriculture. The techniques include establishing, weeding, and thinning a desirable young stand; propagating more productive species and genetic varieties; planning for short rotations and complete fiber utilization; controlling insects, diseases, and weeds; and increasing growth by fertilization and drainage. Even though timber crops require decades to grow, the goal of intensive management is similar to the goal of intensive agriculture—to produce the greatest yield of the most valuable crop as quickly as possible.

Commercial forests cover 108,254 acres or about 47 percent of the land area of Gaston County *(27)*. Commercial forest land is land that is producing or is capable of producing crops of industrial wood and is not withdrawn from timber utilization. Loblolly pine can be an 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. 11).

Four predominant forest type groups are identified in the county *(19, 27)*. They are:

Loblolly-shortleaf pine. This forest type covers 50,376 acres. Loblolly and shortleaf pines make up more than 50 percent of the stand. Common associates include red oak, white oak, gum, hickory, and yellow poplar.

Oak-pine. In this forest type that covers 20,863 acres, hardwoods make up more than 50 percent of the stand, and pines make up 25 to 50 percent in association with upland oaks, gum, hickory, and yellow poplar. If left undisturbed, this forest type will develop into a forest of predominantly oak and other upland hardwoods. The understory in the loblolly-shortleaf and oak-pine forest types generally consists of hardwood seedlings and saplings because they are more tolerant of shade than pine. Hardwoods compete with pines so vigorously for light and moisture in a shaded understory that few pine seedlings are able to survive. When mature stands of pine are cut, the dense understory of young hardwoods becomes dominant.

Figure 11.—This well managed stand of loblolly pine is on Gaston sandy clay loam, 2 to 8 percent slopes, eroded.

Oak-hickory. This forest type covers 46,503 acres. Upland oaks and hickory make up more than 50 percent of the stand. Common associates include red maple and yellow poplar.

Elm-ash-cottonwood. In this forest type that covers 4,564 acres, elm, ash, or cottonwood, singly or in combination, make up most of the stockings. Common associates include willow, sycamore, and maple.

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

The productive capacity of forest lands 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 water table, affect forest productivity primarily by influencing available water capacity, aeration, and root development. The interaction of these soil properties and site characteristics determine site productivity. Other site factors, such as steepness and length of slope, affect water movement and availability. The amount of rainfall and length of growing season also 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 fertilization than others, and some are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special efforts to reforest. In the section "Detailed Soil Map Units," each map unit in the survey area suitable for producing timber presents information about productivity, limitations for harvesting timber, and management concerns for producing timber. The common forest understory plants are also listed. In each map unit description, important or common woodland plants are listed by common names *(15, 18)*. Local plants by their common and scientific names are listed in table 7. Table 8 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.

The first tree listed for each soil under the column "Common trees" 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.

Table 8 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. 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 for use and management. The letter *R* indicates a soil that has a significant limitation because of steepness of slope. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *D* indicates a soil that has a limitation because of restricted rooting depth, such as a shallow soil that is underlain by hard rock. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the soil. The letter *A* indicates a soil that has no significant restrictions or limitations for forest use and management. If a soil has more than one limitation, the priority is as follows: R, W, D, and C.

Ratings of the *erosion hazard* indicate the probability that damage may occur if site preparation activities or harvesting operations 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 of harvesting and reforestation operations, or use of specialized 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, or susceptibility of the surface layer to compaction. As slope gradient and length increase, it becomes more difficult to use wheeled equipment. On the steeper slopes, tracked equipment must be used. On the steepest slopes, even tracked equipment cannot operate; more sophisticated systems are needed. The rating is *slight* if equipment use is restricted by soil wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are steep enough that wheeled equipment cannot be operated safely across the slope, if soil wetness restricts equipment use for 2 to 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. The rating is *severe* if slopes are steep enough that tracked equipment cannot be operated safely across the slope, if soil wetness restricts equipment use for more than 6 months per year, if stoniness restricts ground-based equipment, or if special equipment is needed to avoid or reduce soil compaction. Ratings of *moderate* or *severe* indicate a need to choose the most suitable equipment and to carefully plan the timing of harvesting and other management operations.

Ratings of *seedling mortality* refer to the probability of death of 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 and duration of the water table, rock fragments in the surface layer, rooting depth, and the aspect of the slope. Mortality generally is greatest 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 surface drainage, or 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*.

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. This index applies to fully stocked, even-aged, unmanaged stands. The procedure and techniques for determining site index are given in site index tables *(3, 4, 5, 6, 7, 10, 16, 17, 23, 25)*.

The *productivity class* represents an expected volume produced by the most important trees, expressed in cubic meters per hectare per year. Cubic meters per hectare can be converted to cubic feet per acre by multiplying by 14.3. It can be converted to board feet by multiplying by a factor of about 71. For example, a productivity class of 8 means the soil can be expected to produce 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 568 board feet per acre per year.

Trees to plant are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and will produce a commercial wood crop. Desired product, topographic position (such as a low, wet area), and personal preference are three factors of many that can influence the choice of trees to use for reforestation.

Recreation

Carl M. Babor, Director, Gaston County Recreation and Parks Department, helped prepare this section.

Gaston County offers a variety of recreation activities. The Gaston County Recreation and Parks Department has parks in each township. Within the park system are ballfields, soccer fields, lighted tennis courts, fishing lakes, lighted horse arenas and stables, lighted jogging tracks, nature trails, community-size picnic shelters, and undeveloped river front property. Gaston and Belmont Abbey Colleges offer additional recreational opportunity by making their facilities available to the public. Crowders Mountain State Park is in the western part of the county. Gaston County has eight golf courses and five public swimming pools. Boating and fishing are popular on the Catawba River and Lake Wylie. The Gaston County Art and History Museum and the Schiele Museum of Natural History offer opportunities for cultural activities, both indoor and outdoor.

Rapid population growth is increasing the demands on existing recreational facilities. New public and private recreational facilities are continually being developed. A knowledge of soils and soil properties is needed in planning and developing new facilities and in maintaining existing facilities.

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

In table 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 or a hardpan 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

John P. Edwards, biologist, Soil Conservation Service, and Dave Cohen, Schiele Nature Museum, helped prepare this section.

Gaston County has an abundance and a great variety of wildlife. Because of existing land use patterns, small-game development generally has greater potential than big-game development. The interspersing of cropland with pine woodlands, hardwood stands, and old fields creates a great variety of habitat for resident wildlife. Openland wildlife, such as mourning dove, quail, rabbit, and many species of songbird, are throughout the county. Woodland wildlife includes squirrel, raccoon, and weasel. Although the amount of wetland habitat is more limited, some species, such as raccoon and woodcock, are abundant.

The population of the game and nongame species in Gaston County is moderate to good and will continue to be so as long as old fields and other habitat essentials are maintained. Because Gaston County is virtually all privately owned, the only means of improving wildlife habitat is through the individual landowners. Information and assistance relating to problems and potentials of wildlife and wildlife habitat are available from the Soil Conservation Service and the North Carolina Wildlife Resources Commission.

Gaston County soils offer a high potential for more wildlife through good habitat management. The existing populations are the result of the county's productive soils and the variety of wildlife habitats available.

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

In table 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 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 flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, lespedeza, 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 flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, 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 hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, 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 loblolly pine and redcedar.

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, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are 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, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

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

Habitat for wetland wildlife consists of open, marshy, or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, muskrat, mink, and beaver.

Engineering

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

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, and 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 must be considered in planning, in site selection, and in design.

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

This information can be used to 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 the depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, and shrink-swell potential can cause the movement of footings. 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 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, 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), 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 generally required to determine lime and fertilizer needs. The local office of the Soil Conservation Service or the Agricultural Extension Service can provide information about soil tests or soil amendments.

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 landfills. 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. The Gaston County Health Department can provide detailed information and guidance.

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. Aerobic lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 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. The ratings may not reflect the soil suitability for lagoons deeper than 5 feet (anaerobic type).

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and 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 needs to 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, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

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

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock 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 determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

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

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

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 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 up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as 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, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

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

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

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

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

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. 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 of the aquifer. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; 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. 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 reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

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 *(26)*. 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 characterize key soils.

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

Engineering Index Properties

Table 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 "Soil Series and Their Morphology."

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

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

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, MH, and CH. 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 clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They influence the soil's adsorption of cations, moisture retention, 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 $\frac{1}{3}$ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of 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, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage 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.

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

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

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

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. 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 of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 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 intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission. No group A soils are recognized in Gaston County.

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

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

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have 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 soil 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 to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency generally is expressed as *none*, *occasional*, or *frequent*. *None* means that flooding is not probable. *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). *Common* is used when classification as occasional or frequent does not affect interpretations. Duration 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). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. 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 absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

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

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 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.

The two numbers in the "High water table—Depth" column 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. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "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 creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

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

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and 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, Division of Highways, Materials and Tests Unit.

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) *(1, 2)*.

The tests and methods are: AASHTO classification—M 145 (AASHTO), D 3282 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM); Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—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 *(24)*. 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. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is 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 1:1 layer silicate clays, plus *hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that is in a humid climate).

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. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is 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 substratum within a series. The Cecil series is an example and is classified in the clayey, kaolinitic, thermic Typic Kanhapludults family.

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. The exact location of a representative site for each series is shown on the detailed soil maps with a special symbol.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (21)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (24)*. 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."

Alamance Variant

Alamance Variant consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from sericite schist and phyllite. Slope ranges from 2 to 15 percent. These soils are fine-silty, siliceous, thermic Typic Hapludults.

Alamance Variant is commonly adjacent to Tatum and Lignum soils. Tatum soils have a red clayey Bt horizon. Lignum soils are moderately well drained to somewhat poorly drained.

Typical pedon of Alamance Variant gravelly loam, 2 to 8 percent slopes; 2 miles southwest of Crowders Mountain on State Road 1125, 0.6 mile on State Road 1214, 1,500 feet north of end of road:

Oi—2 to 1 inches; undecomposed deciduous forest litter of leaves and twigs.

Oe—1 to 0 inches; black (10YR 2/1) partly decomposed forest litter and root mat.

A—0 to 4 inches; dark grayish brown (10YR 4/2) gravelly loam; weak fine granular structure; very friable; many fine and medium roots; 20 percent, by volume, quartz gravel; strongly acid; abrupt wavy boundary.

E—4 to 8 inches; strong brown (7.5YR 5/6) gravelly loam; moderate fine granular structure; very friable; common fine and medium roots; 15 percent, by volume, quartz gravel; strongly acid; clear wavy boundary.

Bt1—8 to 20 inches; strong brown (7.5YR 5/8) silt loam; moderate medium subangular blocky structure; friable, slightly plastic and slightly sticky; common fine and medium roots; common fine pores; common faint clay films on faces of peds; about 1 percent, by volume, quartz gravel; very strongly acid; clear wavy boundary.

Bt2—20 to 27 inches; strong brown (7.5YR 5/8) silt loam; few fine yellow streaks; moderate medium subangular blocky structure; friable, slightly plastic and slightly sticky; few fine roots; common faint clay films on faces of peds; about 5 percent, by volume, sericite schist channers; strongly acid; gradual wavy boundary.

BC—27 to 34 inches; brownish yellow (10YR 6/8) silt loam; common coarse faint yellowish brown (10YR 5/4) mottles; weak fine subangular blocky structure; friable; few fine roots; about 10 percent, by volume, sericite schist channers; strongly acid; gradual wavy boundary.

C—34 to 45 inches; mottled strong brown (7.5YR 4/6), reddish yellow (7.5YR 7/6), yellow (10YR 7/6), and very pale brown (10YR 7/3) saprolite that has a silt loam texture; weak platy rock controlled structure; friable; about 12 percent, by volume, sericite schist channers; few roots in seams; strongly acid; clear irregular boundary.

Cr—45 to 60 inches; multicolored, weathered sericite schist bedrock; few seams of silt loam; can be dug with difficulty with a spade.

Alamance Variant has loamy A and Bt horizons that are underlain by a Cr horizon of weathered bedrock at a depth of 40 to 60 inches. The solum is 25 to 50 inches thick. The Alamance Variant soils are strongly acid or very strongly acid unless lime has been added. Content of coarse fragments ranges from 15 to 25 percent in the A and E horizons and is as much as 10 percent in the B horizons.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. The E horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 2 to 6. Some pedons do not have an E horizon.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. It is clay loam, silty clay loam, or silt loam. The BC horizon has colors similar to the Bt horizon. It is silt loam, loam, or very fine sandy loam.

The C horizon is multicolored saprolite that is variable in texture but typically is loamy. It contains few to many fragments of weathered sericite schist or phyllite.

The Cr horizon is multicolored, weathered sericite schist or phyllite rock that can be dug with difficulty with hand tools.

Appling Series

The Appling series consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from felsic igneous and metamorphic rocks, such as granite and gneiss. Slope ranges from 1 to 6 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Appling soils are commonly adjacent to Cecil, Vance, Pacolet, Wedowee, and Helena soils. Cecil and Pacolet soils have hue redder than 5YR in the Bt horizon. Wedowee soils have a thinner subsoil. Pacolet and Wedowee soils are on side slopes. Vance soils have a very firm subsoil. Helena soils are moderately well drained, have a very firm subsoil, and occur along drainageways.

Typical pedon of Appling sandy loam, 1 to 6 percent slopes; 6 miles southeast of Gastonia on North Carolina Highway 274, 700 feet northeast of intersection with State Road 2439:

Ap—0 to 10 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; very friable; common fine and medium roots; strongly acid; clear smooth boundary.

BA—10 to 15 inches; brownish yellow (10YR 6/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine flakes of mica; common fine roots; common fine and medium pores; very strongly acid; clear wavy boundary.

Bt—15 to 41 inches; yellowish brown (10YR 5/8) sandy clay; few medium distinct red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common distinct clay films on faces of peds; few fine flakes of mica; few fine roots; few fine pores; very strongly acid; gradual wavy boundary.

BC—41 to 48 inches; yellowish brown (10YR 5/8) sandy clay loam; common coarse distinct red (2.5YR 4/6) and yellow (10YR 7/6) mottles and few medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine flakes of mica; few fine roots; few fine pores; very strongly acid; gradual wavy boundary.

C—48 to 60 inches; mottled red (2.5YR 4/6), reddish yellow (7.5YR 6/8), and light yellowish brown (10YR 6/4) saprolite that has a sandy clay loam texture; massive; friable; common bodies of clay loam; common fine flakes of mica; very strongly acid.

Appling soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 30 to 58 inches. The solum is 40 to 60 inches thick. Depth to bedrock is more than 6 feet. Appling soils are strongly acid or very strongly acid unless lime has been added. Content of mica flakes ranges from few to common 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. Some pedons have an E horizon. It has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 3 to 8.

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. Mottles in shades of red, yellow, or brown range from few to many. The BC horizon is similar in color to the Bt horizon. It is sandy clay loam, sandy clay, or clay loam.

The C horizon is multicolored saprolite weathered from felsic igneous and metamorphic rock. The texture is variable but typically is loamy.

Cecil Series

The Cecil series consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from felsic igneous and metamorphic rock, such as granite. Slope ranges from 2 to 15 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Cecil soils are commonly adjacent to Appling, Gaston, Madison, and Pacolet soils. Appling soils are more yellow, Gaston soils are darker red in the upper part of the Bt horizon, and Madison soils have a high content of mica. Pacolet soils are on side slopes and have a thinner subsoil.

Typical pedon of Cecil sandy clay loam, 2 to 8 percent slopes, eroded; 3 miles northwest of Cherryville on North Carolina Highway 274, 1.5 miles west on State Road 1650, 50 feet northwest of intersection with State Road 1647:

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

Bt1—6 to 26 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky and plastic; common fine roots; common fine pores; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

Bt2—26 to 45 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; few fine pores; common faint clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

BC—45 to 58 inches; red (2.5YR 4/6) clay loam; few medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; few pockets of saprolite; strongly acid; gradual wavy boundary.

C—58 to 80 inches; red (2.5YR 4/8) saprolite that has a loam texture; common medium distinct brownish yellow (10YR 6/8) mottles and few fine faint dark red mottles; massive; friable; common fine flakes of mica; strongly acid.

Cecil soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 30 to 58 inches. The solum is 35 to 60 inches thick. Depth to bedrock is more than 6.5 feet. The A horizon is medium acid to very strongly acid unless lime has been added. The Bt and BC horizons are very strongly acid or strongly acid. Content of mica flakes ranges from few to common in most pedons.

The A or Ap horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 8.

The Bt horizon has hue of 10R or 2.5YR, value of 4 or 5, and chroma of 6 to 8. Hue can range to 5YR in some pedons where the soil is not mottled. The Bt horizon is clay or clay loam. The BC horizon has hue of 2.5YR to 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 weathered from felsic igneous and metamorphic rock. The texture is variable but typically is loamy.

Chewacla Series

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

Chewacla soils are commonly adjacent to Congaree soils. Congaree soils are well drained to moderately well drained and are in a slightly higher position, generally near the stream channel.

Typical pedon of Chewacla loam, frequently flooded; 4.5 miles south of Gastonia on U.S. Highway 321 on State Road 1136, 0.8 mile northwest of intersection with U.S. Highway 321, 200 feet west of road:

A—0 to 6 inches; brown (10YR 4/3) loam; weak fine granular structure; friable; many fine and medium roots; common fine flakes of mica; medium acid; clear wavy boundary.

Bw1—6 to 13 inches; yellowish brown (10YR 5/4) fine sandy loam; common medium distinct strong brown (7.5YR 4/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; common fine and medium roots; common fine flakes of mica; medium acid; abrupt smooth boundary.

Bw2—13 to 20 inches; yellowish brown (10YR 5/4) loam; many medium distinct gray (10YR 6/1) mottles 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 distinct red (2.5Y 4/6) mottles in old root channels; medium acid; abrupt smooth boundary.

Bw3—20 to 32 inches; brown (10YR 5/3) clay loam; many medium distinct dark gray (10YR 4/1) mottles and few fine distinct strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few medium roots; common fine and medium flakes of mica; few fine distinct red (2.5Y 4/6) mottles in old root channels; medium acid; gradual wavy boundary.

Bg—32 to 45 inches; grayish brown (2.5Y 5/2) sandy clay loam; common fine and medium distinct strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common fine flakes of mica; few fine distinct red (2.5Y 4/6) mottles in old root channels; medium acid; gradual wavy boundary.

Cg1—45 to 50 inches; dark gray (10YR 4/1) sandy clay loam; common fine and medium prominent strong brown (7.5YR 4/6) mottles and common medium faint light brownish gray (2.5Y 6/2) mottles; massive; friable, slightly sticky and slightly plastic; few fine roots; few fine flakes of mica; medium acid; gradual wavy boundary.

Cg2—50 to 60 inches; light brownish gray (2.5Y 6/2) sandy clay loam; many fine and medium distinct brownish yellow (10YR 6/6) mottles; massive; friable, slightly sticky and slightly plastic; few fine flakes of mica; few quartz gravel; medium acid.

Chewacla soils have loamy A and B horizons that extend to a depth of more than 35 inches. Depth to bedrock is more than 5 feet. Throughout the soil are few to common flakes of mica. Chewacla soils range from very strongly acid to slightly acid unless lime has been added.

The Ap or A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 4. This horizon is less than 7 inches thick where value is 3.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8. Mottles of chroma of 2 or less are within 24 inches of the surface. The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The Bw and Bg horizons are loam, clay loam, sandy clay loam, fine sandy loam, or sandy loam.

The Cg horizon is similar in color to the Bg horizon and is alluvium of variable texture.

Congaree Series

The Congaree series consists of occasionally flooded, well drained or moderately well drained, moderately permeable soils on flood plains. They formed in recent alluvium. Slope ranges from 0 to 4 percent. These soils are fine-loamy, mixed, nonacid thermic Typic Udifluvents.

Congaree soils are adjacent to Chewacla soils. Chewacla soils are somewhat poorly drained and are on lower parts of the flood plains.

Typical pedon of Congaree loam, occasionally flooded; 3.8 miles southeast of Gastonia on Linwood Road (State Road 1131), on State Road 1132 0.6 mile southeast of intersection of State Road 1131 and State Road 1132, 250 feet east of road:

Ap—0 to 8 inches; brown (7.5YR 4/4) loam; weak fine granular structure; friable; many fine and medium roots; common fine flakes of mica; medium acid; clear smooth boundary.

C—8 to 21 inches; strong brown (7.5YR 4/6) fine sandy loam; massive; very friable; many fine roots; common fine flakes of mica; slightly acid; gradual wavy boundary.

Ab—21 to 25 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; few fine roots; common fine flakes of mica; slightly acid; gradual wavy boundary.

Bb1—25 to 35 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; few fine flakes of mica; slightly acid; gradual smooth boundary.

Bb2—35 to 42 inches; brown (7.5YR 4/4) loam; many fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable, slightly sticky and slightly plastic; few medium roots; few fine flakes of mica; common fine black manganese concretions; slightly acid; gradual wavy boundary.

C'—42 to 54 inches; yellowish brown (10YR 5/6) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and reddish yellow (7.5YR 6/6) mottles; massive; friable, slightly sticky and slightly plastic; common fine flakes of mica; few fine black manganese concretions; medium acid; gradual wavy boundary.

Cg—54 to 62 inches; light brownish gray (10YR 6/2) fine sandy loam; common fine distinct strong brown (7.5YR 5/6) mottles; massive; very friable; common fine flakes of mica; slightly acid.

Congaree soils have loamy horizons that extend to a depth of 40 inches or more. Depth to bedrock is more than 10 feet. Throughout the soil are few to common flakes of mica. Congaree soils range from very strongly acid to neutral unless lime has been added.

The Ap or A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6. Where the value is 3, the horizon is less than 6 inches thick.

The C or C' horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. In some pedons, mottles of chroma of 2 or less are below a depth of 24 inches. A Cg horizon is below a depth of 50 inches in some pedons. It has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2. The C, C', and Cg horizons are fine sandy loam, silty clay loam, or loam with thin strata of sandier or more clayey material.

Most pedons have Ab and Bb horizons. The Ab horizon is similar in color to the A horizon and is loam or fine sandy loam. The Bb horizon is similar in color to the C or C' horizon. It is loam or silty clay loam.

Gaston Series

The Gaston series consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from intermediate igneous and metamorphic rock, such as diorite. Slope ranges from 2 to 25 percent. These 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. In addition, Madison soils have a thinner subsoil and high content of mica. Winnsboro soils are less acid and are more yellow.

Typical pedon of Gaston sandy clay loam, 2 to 8 percent slopes, eroded; 5 miles south of Belmont on North Carolina Highway 273, 0.9 mile south on State Road 2525, 500 feet south on a field road and 250 feet west of road:

Ap—0 to 6 inches; dark reddish brown (5YR 3/4) sandy clay loam; weak medium granular structure; friable; many fine roots; slightly acid; clear smooth boundary.

Bt1—6 to 14 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; medium acid; gradual wavy boundary.

Bt2—14 to 47 inches; red (2.5YR 4/6) clay; few medium distinct reddish yellow (7.5YR 6/8) mottles;

moderate medium subangular blocky structure; firm, sticky and plastic; common fine roots; common distinct clay films on faces of peds; few fine flakes of mica; few black streaks; medium acid; clear wavy boundary.

BC—47 to 57 inches; red (2.5YR 4/6) clay loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable; slightly sticky and slightly plastic; common fine flakes of mica; few pockets of weathered black minerals; medium acid; clear wavy boundary.

C—57 to 72 inches; mottled red (2.5YR 4/6), yellowish red (5YR 5/6), and yellowish brown (10YR 5/4) saprolite that has a loam texture; massive; common black specks and streaks; common fine flakes of mica; medium acid.

Gaston soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 34 to 58 inches. The solum is 40 to 65 inches thick. Depth to bedrock is more than 6 feet. Most pedons have few to common flakes of mica in the Bt horizon and few to many flakes of mica in the BC and C horizons. Gaston soils are strongly acid to slightly acid unless lime has been added.

The A or Ap horizon has hue of 2.5YR to 7.5YR, value of 3, and chroma of 3 to 6.

The Bt horizon has hue of 10R or 2.5YR, value of 3 or 4, and chroma of 4 to 8. Dark streaks or stains occur in most pedons. The Bt horizon is clay or clay loam. The BC horizon has hue of 2.5YR to 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 weathered from intermediate igneous and metamorphic rock. The texture is variable but typically is loamy.

Helena Series

The Helena series consists of moderately well drained, slowly permeable soils on uplands. They formed in residuum weathered from felsic igneous and metamorphic rocks, such as granite or granite gneiss that is cut by dykes of gabbro and diorite. Slope ranges from 1 to 6 percent. These soils are clayey, mixed, thermic Aquic Hapludults.

Helena soils are commonly adjacent to Appling, Vance, and Worsham soils. Appling and Vance soils are well drained and are on ridges and side slopes. In addition, Appling soils have kaolinitic mineralogy. Worsham soils are poorly drained and are in lower areas.

Typical pedon of Helena sandy loam, 1 to 6 percent slopes; 1.3 miles northeast of Cherryville on North Carolina Highway 150, 0.35 mile southeast on State Road 1628, 1,000 feet northeast of intersection of road and railroad track:

Ap—0 to 8 inches; grayish brown (10YR 5/2) sandy loam; weak medium granular structure; very friable; common fine and medium roots; slightly acid; abrupt smooth boundary.

BA—8 to 13 inches; light yellowish brown (2.5Y 6/4) 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; slightly acid; clear wavy boundary.

Bt1—13 to 18 inches; pale brown (10YR 6/3) sandy clay; common medium distinct brown (7.5YR 5/4) mottles; moderate medium angular blocky structure; firm, sticky and plastic; few fine roots; common faint clay films on faces of peds; strongly acid; clear wavy boundary.

Bt2—18 to 31 inches; strong brown (7.5YR 5/8) sandy clay; common medium distinct light gray (10YR 7/1) mottles; moderate medium angular blocky structure; very firm, sticky and plastic; few fine roots; common faint clay films on faces of peds; strongly acid; clear wavy boundary.

BC—31 to 39 inches; reddish yellow (7.5YR 6/8) sandy clay loam; many coarse distinct light gray (10YR 7/1) mottles and few fine distinct red (2.5YR 4/8) mottles; weak fine subangular blocky structure; firm, slightly sticky and slightly plastic; few faint clay films on faces of peds; common pockets of sandy clay; strongly acid; clear wavy boundary.

C—39 to 60 inches; reddish yellow (7.5YR 7/8) saprolite that has a sandy clay loam texture; common coarse distinct light gray (10YR 7/1) mottles; massive; friable; few coarse veins of light gray (10YR 7/1) and white (10YR 8/1) clay; strongly acid.

Helena soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 21 to 48 inches. The solum is 35 to 60 inches thick. Depth to bedrock is more than 5 feet. Helena soils are strongly acid or very strongly acid unless lime has been added.

The A or Ap horizon has hue of 10YR, value of 4 to 6, and chroma of 1 to 4. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. Mottles with chroma of 2 or less are in the upper 24 inches of the Bt horizon. Some pedons are gray in the lower part of the Bt horizon. The Bt horizon is sandy clay, clay, or clay loam. The BC horizon is similar in color to the Bt horizon and includes colors of gray, light gray, and white. It is clay loam, sandy clay loam, or sandy loam.

The C horizon is multicolored saprolite that has weathered from felsic igneous and metamorphic rock. The texture is variable but typically is loamy.

Lignum Series

The Lignum series consists of moderately well drained to somewhat poorly drained, very slowly permeable soils on uplands. They formed in residuum weathered from sericite schist or phyllite. Slope ranges from 1 to 6 percent. These soils are clayey, mixed, thermic Aquic Hapludults.

Lignum soils are commonly adjacent to Tatum and Alamance Variant soils. Tatum and Alamance Variant soils are well drained and are on ridges and side slopes.

Typical pedon of Lignum silt loam, 1 to 6 percent slopes; 3 miles southeast of Kings Mountain Pinnacle, 1,000 feet south of the intersection of State Road 1112 and State Road 1106:

A—0 to 4 inches; grayish brown (10YR 5/2) silt loam; moderate medium granular structure; very friable; many fine and few medium roots; very strongly acid; clear wavy boundary.

BA—4 to 8 inches; pale brown (10YR 6/3) silty clay loam; weak medium subangular blocky structure; friable; many fine roots; very strongly acid; clear wavy boundary.

Bt1—8 to 20 inches; light yellowish brown (10YR 6/4) clay; few medium distinct light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common medium roots; many distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—20 to 28 inches; light yellowish brown (10YR 6/4) clay; many medium distinct light gray (10YR 7/1) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common medium roots; many distinct clay films on faces of peds; few quartz pebbles; very strongly acid; gradual wavy boundary.

BC—28 to 36 inches; mottled light yellowish brown (10YR 6/4), light gray (10YR 7/1), and strong brown (7.5YR 5/8) silty clay loam; weak medium subangular blocky structure; friable; common quartz pebbles and schist channers; very strongly acid; clear irregular boundary.

C—36 to 60 inches; strong brown (7.5YR 5/8) saprolite that has a gravelly silty clay loam texture; common medium distinct light gray (10YR 7/2) mottles; massive; friable; 25 percent, by volume, schist channers and quartz gravel; very strongly acid.

Lignum soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 18 to 38 inches. The solum is 20 to 40 inches thick. Depth to bedrock is more than 60 inches. Lignum soils are very strongly acid or strongly acid unless lime has been added.

The Ap or A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 4.

The Bt horizon has hue of 7.5YR or 10YR, value of 5 or 7, and chroma of 3 to 8. Mottles with chroma of 2 or less are in the upper 10 inches of the Bt horizon. In some pedons, the lower part of the Bt horizon has dominant chroma of 2 or less. The Bt horizon is silty clay, silty clay loam, clay loam, or clay. The BC horizon is similar in color to the lower part of the Bt horizon. It is silty clay loam or clay loam.

The C horizon is brownish or multicolored saprolite that is weathered from sericite schist or phyllite. It contains 15 to 35 percent, by volume, schist channers and quartz gravel. The texture is variable but typically is loamy.

Madison Series

The Madison series consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from felsic micaceous metamorphic rock, such as mica schist and mica gneiss. Slope ranges from 2 to 25 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Madison soils are commonly adjacent to Cecil, Gaston, and Pacolet soils. These soils have less mica than Madison soils. In addition, Cecil and Gaston soils have thicker subsoils.

Typical pedon of Madison sandy clay loam, 2 to 8 percent slopes, eroded; 3.5 miles northeast of Dallas on North Carolina Highway 275, 0.4 mile south on State Road 2002, 50 feet west of road:

Ap—0 to 4 inches; yellowish red (5YR 4/6) sandy clay loam; weak medium granular structure; very friable; common fine and medium roots; common fine flakes of mica; strongly acid; clear smooth boundary.

Bt1—4 to 20 inches; red (2.5YR 4/6) clay; few fine distinct reddish yellow (7.5YR 6/8) mottles; 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—20 to 28 inches; red (2.5YR 4/6) clay; common medium distinct 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; few quartz pebbles; strongly acid; gradual wavy boundary.

BC—28 to 36 inches; yellowish red (5YR 5/6) clay loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable; many fine flakes of mica that feel greasy; common medium fragments of rock and pockets of saprolite that crushes easily to loam; strongly acid; gradual wavy boundary.

C—36 to 60 inches; mottled red (2.5YR 4/6), yellowish red (5YR 5/6), reddish yellow (7.5YR 6/8), reddish brown (5YR 5/4), and pale brown (10YR 6/3) saprolite that has a loam texture; friable; many fine mica flakes that feel greasy; very strongly acid.

Madison soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 20 to 30 inches. The solum is 20 to 40 inches thick. Depth to bedrock is more than 5 feet. Content of mica ranges from few to many flakes in the upper horizons to many in the lower horizons. Madison soils are strongly acid or very strongly acid unless lime has been added.

The A or Ap horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 8.

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 is similar in color to the Bt horizon and is clay loam, sandy clay loam, or loam.

The C horizon is multicolored saprolite weathered from felsic micaceous metamorphic rock. The texture is variable but typically is loamy.

Pacolet Series

The Pacolet series consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from felsic igneous and metamorphic rock, such as granite and gneiss. Slope ranges from 8 to 45 percent. These soils are clayey, kaolinitic, thermic Typic Kanhapludults.

Pacolet soils are commonly adjacent to Cecil, Madison, and Wedowee soils. Cecil soils have thicker subsoils. Madison soils have a high content of mica. Wedowee soils have a more yellow Bt horizon.

Typical pedon of Pacolet sandy loam, 15 to 25 percent slopes; 2 miles northeast of Dallas, 800 feet northeast of intersection of State Road 1804 and State Road 1800:

A—0 to 5 inches; brown (7.5YR 4/2) sandy loam; moderate medium granular structure; friable; many fine and medium roots; strongly acid; clear wavy boundary.

BA—5 to 8 inches; red (2.5YR 4/8) clay loam; weak fine subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; very strongly acid; clear wavy boundary.

Bt—8 to 27 inches; red (2.5YR 4/6) clay; few medium distinct reddish yellow (7.5YR 7/6) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common faint clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.

BC—27 to 39 inches; red (2.5YR 4/6) clay loam; common medium distinct dark red (2.5YR 3/6), reddish yellow (7.5YR 7/6), and brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—39 to 60 inches; mottled red (2.5YR 4/6), dark red (2.5YR 3/6), yellowish red (5YR 4/6), and brownish yellow (10YR 6/8) saprolite that has a loam texture; massive; friable; common fine flakes of mica; very strongly acid.

Pacolet soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 20 to 30 inches. The solum is 30 to 50 inches thick. The depth to bedrock is more than 5 feet. Content of mica flakes ranges from few to common in most pedons. The Pacolet soils are medium acid to very strongly acid unless lime has been added.

The A or Ap horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 8. Some pedons have an E horizon that has hue of 5YR to 10YR, value of 4 to 6, and chroma of 3 to 8.

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 is mottled in shades of red, yellow, or brown. It is clay loam, sandy clay loam, or sandy loam. Some pedons do not have have a BC horizon.

The C horizon is multicolored saprolite weathered from felsic igneous and metamorphic rock. The texture is variable but typically is loamy.

Tatum Series

The Tatum series consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from sericite schist and phyllite. Slope ranges from 2 to 25 percent. These soils are clayey, mixed, thermic Typic Hapludults.

Tatum soils are commonly adjacent to Alamance Variant, Uwharrie, and Lignum soils. Alamance Variant soils have a more yellow Bt horizon. Uwharrie soils have many boulders and stones on the surface and are on steep side slopes. Lignum soils are moderately well drained to somewhat poorly drained and are along drainageways.

Typical pedon of Tatum gravelly loam, 2 to 8 percent slopes; 0.5 mile south of Crowders Mountain State Park Center on State Road 1125, 100 feet west of road:

Oe—1 to 0 inches; fresh and partly decomposed leaves and twigs.

A—0 to 3 inches; brown (10YR 5/3) gravelly loam; weak fine granular structure; very friable; common fine and medium roots; 20 percent, by volume, quartz gravel; very strongly acid; abrupt smooth boundary.

E—3 to 6 inches; strong brown (7.5YR 5/6) gravelly loam; weak fine granular structure; very friable; common fine and medium roots; 15 percent, by volume, quartz gravel; very strongly acid; abrupt smooth boundary.

Bt1—6 to 15 inches; red (2.5YR 4/8) clay; moderate medium subangular blocky structure; firm, plastic and sticky; common fine and medium roots; common fine pores; common faint clay films on faces of peds; about 1 percent, by volume, quartz gravel; very strongly acid; gradual wavy boundary.

Bt2—15 to 30 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, plastic and sticky; few fine and medium roots; few fine pores; common faint clay films on faces of peds; about 1 percent, by volume, schist channers and quartz gravel; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Bt3—30 to 38 inches; red (2.5YR 4/8) clay; weak medium subangular blocky structure; firm, plastic and sticky; few fine roots; few fine pores; common faint clay films on faces of peds; about 5 percent, by volume, schist channers and quartz gravel; strongly acid; gradual wavy boundary.

BC—38 to 48 inches; red (2.5YR 5/8) clay loam; common pockets of yellow (10YR 7/6), and pinkish white (5YR 8/2) saprolite; weak medium and fine subangular blocky structure; friable; about 10 percent, by volume, schist channers; very strongly acid; gradual wavy boundary.

C—48 to 58 inches; mottled red (2.5YR 4/6), yellowish red (5YR 5/6), yellowish brown (10YR 5/6), and pinkish white (5YR 8/2) saprolite that has a silt loam texture; massive; about 15 percent, by volume, schist channers; very strongly acid; gradual wavy boundary.

Cr—58 to 62 inches; multicolored weathered schist bedrock; partly consolidated but can be dug with difficulty with a spade.

Tatum soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 14 to 40 inches. The solum is 25 to 50 inches thick. Content of coarse fragments ranges from 15 to 25 percent in the A and E horizons. Depth to weathered bedrock ranges from 40 to 60 inches. Tatum soils are very strongly acid or strongly acid unless lime has been added.

The Ap or A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 8. The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 to 6. Some pedons do not have an E horizon.

The Bt horizon has hue of 2.5YR or 10R, value of 4 or 5, and chroma of 6 to 8. It is silty clay, clay loam, or clay. The BC horizon typically has hue of 2.5YR, value of 5, and chroma of 6 to 8, or is mottled in shades of red, yellow, or brown. It is clay loam, silty clay loam, or silt loam.

The C horizon is multicolored saprolite weathered from sericite schist and phyllite. The texture is variable but typically is loamy.

The Cr horizon is weathered sericite schist or phyllite that can be cut with difficulty with hand tools.

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 borrow pits, landfills, natural drainageways, or low-lying 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. Most areas are deep or very deep to bedrock, but some areas, particularly borrow areas, are moderately deep or shallow to bedrock. 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, browns, yellows, and grays. The texture is variable but typically is loamy. The material ranges from extremely acid to slightly acid.

Uwharrie Series

The Uwharrie series consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from sericite schist and phyllite. Slope ranges from 25 to 45 percent. These soils are clayey, mixed, thermic Typic Hapludults.

The Uwharrie soils as mapped in Gaston County are considered taxadjuncts to the Uwharrie series. They differ by being typically less than 60 inches to weathered bedrock, having a thinner Bt horizon, and being less clayey. Interpretations are controlled by slope and surface boulders.

Uwharrie soils are commonly adjacent to Tatum soils, which are on slopes of less than 25 percent and do not have surface stones and boulders.

Typical pedon of Uwharrie stony loam, 25 to 45 percent slopes, very bouldery; 8 miles southwest of Gastonia, on State Road 1104, 2.5 miles west of intersection of State Road 1125 and State Road 1104, 0.5 mile east of State Road 1104 on trail, 300 feet west of base of the Pinnacle:

A—0 to 4 inches; brown (7.5YR 4/4) stony loam; weak medium granular structure; friable; common fine and medium roots; 30 percent, by volume, stones; boulders 2 to 6 feet long and about 10 feet apart on the surface; very strongly acid; clear wavy boundary.

Bt1—4 to 12 inches; red (2.5YR 5/8) clay loam; moderate medium subangular blocky structure; firm; common fine and few medium roots; common distinct clay films on faces of peds; 5 percent, by volume, schist channers; very strongly acid; gradual wavy boundary.

Bt2—12 to 30 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; firm; few fine and medium roots; common distinct clay films on faces of peds; 10 percent, by volume, schist channers; very strongly acid; gradual irregular boundary.

BC—30 to 40 inches; red (2.5YR 4/6) silt loam; weak medium subangular blocky structure; friable; few medium roots; 10 percent, by volume, schist channers; very strongly acid; gradual irregular boundary.

C—40 to 50 inches; mottled red (2.5YR 4/6), yellowish red (5YR 5/6), brown (7.5YR 5/4), and gray (10YR 6/1) saprolite that has a silt loam texture; massive; 12 percent, by volume, schist channers; very strongly acid.

Cr—50 to 60 inches; multicolored weathered fine grained schist; difficult to dig with spade.

Uwharrie soils have a loamy A horizon and a loamy or clayey Bt horizon that extend to a depth of 30 to 50 inches. The solum is 40 to 70 inches thick. Most pedons have weathered bedrock between 40 and 60 inches. Content of coarse fragments, dominantly stone size but can be cobbles or boulders in some areas, range from 15 to as much as 35 percent, by volume, in the A and E horizon and as much as 10 percent in the Bt horizon. Many boulders and stones are on the surface. Uwharrie soils are medium acid to very strongly acid unless lime has been added.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 6. Some pedons have an E horizon that has hue of 10YR, value of 5 or 6, and chroma of 3 to 6.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 to 8. It is clay, clay loam, or silty clay. The BC horizon is similar in color to the Bt horizon. It is clay loam, silty clay loam, or silt loam.

The C horizon is multicolored saprolite. It contains 5 to 15 percent, by volume, schist channers. The texture is variable but typically is loamy.

The Cr horizon is multicolored weathered sericite schist or phyllite that can be dug with difficulty with hand tools.

Vance Series

The Vance series consists of well drained, slowly permeable soils on uplands. They formed in residuum weathered from felsic igneous and metamorphic rock, such as gneiss and granite. Slope ranges from 2 to 15 percent. These soils are clayey, mixed, thermic Typic Hapludults.

Vance soils are commonly adjacent to Helena, Appling, Cecil, and Worsham soils. Helena soils are moderately well drained. Appling and Cecil soils have kaolinitic mineralogy. In addition, Cecil soils have hue redder than 5YR in the Bt horizon. Worsham soils are poorly drained and are in shallow depressions and along drainageways.

Typical pedon of Vance sandy loam, 2 to 8 percent slopes; 2.3 miles south of Gastonia Municipal Airport on North Carolina Highway 274, on State Road 2426, 0.5 mile southwest of intersection of State Road 2425 and State Road 2426, 50 feet west of road:

Ap—0 to 5 inches; brown (10YR 5/3) sandy loam; weak fine granular structure; friable; many fine and few medium roots; neutral; abrupt smooth boundary.

Bt1—5 to 12 inches; yellowish brown (10YR 5/6) clay; common medium prominent red (2.5YR 4/6) mottles; moderate medium angular blocky structure; very firm, sticky and plastic; few fine roots; common fine pores; common distinct clay films on faces of peds; neutral; clear wavy boundary.

Bt2—12 to 20 inches; strong brown (7.5YR 5/6) clay; common coarse prominent red (2.5YR 4/6) mottles; moderate medium angular blocky structure; very firm, sticky and plastic; few fine roots; few fine pores; common distinct clay films on faces of peds; strongly acid; clear wavy boundary.

Bt3—20 to 32 inches; strong brown (7.5YR 5/6) clay; many coarse prominent red (2.5YR 4/6) mottles; moderate medium angular blocky structure; very firm, sticky and plastic; few fine roots; many fine pores; few faint clay films on faces of peds; few pockets of saprolite; very strongly acid; gradual irregular boundary.

BC—32 to 37 inches; reddish yellow (7.5Y 6/8) clay loam; common fine distinct brownish yellow (10YR 6/6) mottles; weak fine subangular blocky structure; friable, slightly sticky and slightly plastic; few fine pores; common pockets of saprolite; very strongly acid; gradual irregular boundary.

C—37 to 60 inches; mottled brown (7.5YR 5/4), reddish yellow (7.5YR 6/8), and white (10YR 8/2) saprolite that has a loam texture; massive; friable; very strongly acid.

Vance soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 20 to 35 inches. The solum is 24 to 40 inches thick. Depth to bedrock is more than 6 feet. Vance soils are strongly acid or medium acid in the A horizon and strongly acid or very strongly acid in the Bt, BC, and C horizons unless lime has been added.

The A or Ap horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. Some pedons have an E horizon that has hue of 2.5Y to 7.5YR, value of 5 to 7, and chroma of 3 to 6.

The Bt horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 4 to 8. Mottles in shades of red, brown, and yellow are in most pedons. The Bt horizon is clay, clay loam, or sandy clay. The BC horizon is similar in color to the Bt horizon and is sandy clay loam, clay loam, or loam. Some pedons do not have a BC horizon.

The C horizon is multicolored saprolite weathered from felsic igneous and metamorphic rock. The texture is variable but typically is loamy.

Wedowee Series

The Wedowee series consists of well drained, moderately permeable soils on uplands. They formed in residuum weathered from felsic igneous and metamorphic rock, such as gneiss and granite. Slope ranges from 6 to 15 percent. These soils are clayey, kaolinitic, thermic Typic Hapludults.

Wedowee soils are commonly adjacent to Appling, Cecil, and Pacolet soils. Appling and Cecil soils have thicker subsoils. Cecil and Pacolet soils have hue redder than 5YR in the Bt horizon.

Typical pedon of Wedowee sandy loam, 6 to 15 percent slopes; 6 miles southeast of Gastonia on North Carolina Highway 274, 1,800 feet east of intersection with State Road 2439:

A—0 to 2 inches; grayish brown (10YR 5/2) sandy loam; weak fine granular structure; very friable; few medium and many fine roots; strongly acid; clear smooth boundary.

E—2 to 7 inches; brownish yellow (10YR 6/6) sandy loam; weak fine granular structure; very friable; common fine roots; strongly acid; gradual smooth boundary.

BE—7 to 10 inches; brownish yellow (10YR 6/6) sandy clay loam; weak fine subangular blocky structure; friable; few fine roots; common fine and medium pores; very strongly acid; clear wavy boundary.

Bt—10 to 24 inches; strong brown (7.5YR 5/8) sandy clay; few medium distinct yellowish red (5YR 5/8) mottles and few fine distinct very pale brown (10YR 7/3) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; common faint clay films on faces of peds; few fine roots; few fine pores; few fine flakes of mica; strongly acid; gradual wavy boundary.

BC—24 to 33 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct brown (7.5YR 5/4) and yellowish red (5YR 5/8) mottles and few medium distinct brownish yellow (10YR 6/8) mottles; weak medium subangular blocky structure; friable; few fine roots; common pockets of sandy clay; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—33 to 62 inches; mottled strong brown (7.5YR 5/8), yellowish red (5YR 5/8), and brown (7.5YR 5/4) saprolite that has sandy clay loam texture; massive; friable; common fine flakes of mica; very strongly acid.

Wedowee soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 20 to 30 inches. The solum is 20 to 40 inches thick. Depth to bedrock is more than 5 feet. Content of mica flakes ranges from few to common in most pedons. Wedowee soils are strongly acid or very strongly acid unless lime has been added.

The A or Ap horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. The E horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 6. Some pedons do not have an E horizon.

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. Mottles in shades of red, yellow, and brown range from few to many. The BC horizon is similar in color to the Bt horizon. It is sandy clay loam, clay loam, or loam.

The C horizon is multicolored saprolite weathered from felsic igneous and metamorphic rock. The texture is variable but typically is loamy.

Wilkes Series

The Wilkes series consists of well drained, moderately slowly permeable soils on uplands. They formed in residuum weathered from intermediate and mafic igneous and metamorphic rock, such as diorite and gabbro. Slope ranges from 6 to 30 percent. These soils are loamy, mixed, thermic, shallow Typic Hapludalfs.

Wilkes soils are commonly adjacent to Winnsboro and Gaston soils. These soils are deeper to bedrock. Winnsboro soils have a thicker subsoil, and Gaston soils have hue redder than 5YR and a more permeable subsoil.

Typical pedon of Wilkes loam, 15 to 30 percent slopes; 2 miles southeast of Stanley on State Road 1918, 5.2 miles southeast on State Road 1923, 250 feet northeast of road in wooded area:

Oi—2 to 1 inches; undecomposed, mixed hardwood and pine forest litter.

Oe—1 to 0 inches; partly decomposed forest litter.

A—0 to 6 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; very friable; common fine and medium roots; common fine manganese concretions; medium acid; abrupt wavy boundary.

Bt—6 to 11 inches; strong brown (7.5YR 5/6) clay; strong medium angular blocky structure; firm, sticky and plastic; common fine and few medium roots; common faint clay films on faces of peds and sides of root channels; common streaks and bodies of black, green, and yellowish brown partly weathered primary minerals; old root channels have material from the A horizon; slightly acid; clear wavy boundary.

B/C—11 to 15 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; firm, slightly sticky and slightly plastic; common medium prominent black, yellowish brown, and green pockets of saprolite and weathered primary minerals with a sandy loam texture; few fine roots; slightly acid; clear wavy boundary.

Cr—15 to 60 inches; multicolored weathered diorite bedrock; partly consolidated but can be dug with difficulty with a spade; few pockets of clay loam filling seams; common hard diorite fragments.

Wilkes soils have loamy and clayey horizons 10 to 20 inches thick underlain by a Cr horizon of weathered bedrock. Depth to hard bedrock is more than 40 inches. Manganese concretions range from few to common in most pedons. The soil is strongly acid to slightly acid in the upper horizons and slightly acid to mildly alkaline in the lower horizons.

The A or Ap horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 to 4. Some pedons have an E horizon that has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4.

The B horizon has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Mottles, bodies, or streaks of black, greenish, grayish, or white saprolite or primary minerals are few to common in most pedons. The B horizon is clay, clay loam, sandy clay loam, or loam.

The B/C horizon has a matrix similar in color and texture to the B horizon. Pockets of less weathered material similar in color and texture to the C horizon make up 5 to 20 percent of the volume.

Some pedons have a C horizon. It is multicolored saprolite weathered from intermediate and mafic igneous and metamorphic rock. It is variable 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.

Winnsboro Series

The Winnsboro series consists of well drained, slowly permeable soils on uplands. They formed in residuum weathered from intermediate and mafic igneous and metamorphic rocks, such as diorite and gabbro. Slope ranges from 2 to 15 percent. These soils are fine, mixed, thermic Typic Hapludalfs.

Winnsboro soils are commonly adjacent to Gaston, Cecil, and Wilkes soils. Gaston and Cecil soils have a dark red or red subsoil and are more permeable. Wilkes soils have weathered bedrock within 20 inches of the surface.

Typical pedon of Winnsboro loam, 2 to 8 percent slopes; 2.2 miles southeast of Stanley on North Carolina Highway 27, 0.25 mile north of highway:

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; very friable; common fine and medium roots; common fine and few medium manganese concretions; slightly acid; clear wavy boundary.

E—5 to 8 inches; yellowish brown (10YR 5/4) loam; weak medium granular structure; very friable; common fine and few medium roots; common fine manganese concretions and few quartz pebbles; medium acid; clear wavy boundary.

Bt1—8 to 20 inches; strong brown (7.5YR 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—20 to 28 inches; strong brown (7.5YR 5/6) clay; few medium distinct brownish yellow (10YR 6/6) mottles; moderate medium angular blocky structure; very firm, sticky and plastic; many distinct clay films on faces of peds; few fine root channels; few fine manganese concretions and streaks; slightly acid; gradual wavy boundary.

BC—28 to 36 inches; mottled brown (7.5R 5/4) and strong brown (7.5YR 5/6) clay loam; weak medium angular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; common faint clay films on faces of peds; few fine manganese concretions and common black streaks; common medium pockets of saprolite that have a loam texture; neutral; gradual wavy boundary.

C—36 to 60 inches; mottled brownish yellow (10YR 6/6), very pale brown (10YR 8/3), reddish yellow (7.5YR 6/8), and strong brown (7.5YR 5/6) saprolite that has a loam texture; massive; friable; common black specks and streaks; neutral.

Winnsboro soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 20 to 37 inches. The solum is 20 to 40 inches thick. Depth to bedrock is more than 5 feet. Manganese concretions range from few to common in most pedons. Winnsboro soils range from strongly acid to slightly acid in the A and E horizons and from slightly acid to mildly alkaline in the Bt, BC, and C horizons.

The Ap or A horizons have hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. The E horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 8. Some pedons do not have an E horizon.

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 is mottled in shades of brown, yellow, olive, or black. It is clay loam, loam, or sandy clay loam. Some pedons do not have a BC horizon.

The C horizon is multicolored saprolite weathered from intermediate and mafic rock. The texture is variable but typically is loamy.

Worsham Series

The Worsham series consists of poorly drained, very slowly permeable soils on uplands. They formed in a mixture of colluvium and local alluvium or residuum derived from felsic igneous and metamorphic rock, such as granite and gneiss. Slope ranges from 0 to 2 percent. These soils are clayey, mixed, thermic Typic Ochraquults.

Worsham soils are commonly adjacent to Helena soils. Helena soils are moderately well drained and are in slightly higher positions.

Typical pedon of Worsham loam, 0 to 2 percent slopes; 3.5 miles northwest of Cherryville on State Road 1651, 0.9 mile north on State Road 1649, 0.4 mile west on State Road 1650, 500 feet southeast of road:

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam;

weak fine granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

BAg—6 to 16 inches; gray (10YR 5/1) 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—16 to 40 inches; gray (10YR 5/1) clay; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, sticky and plastic; few fine roots; common distinct continuous clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

Btg2—40 to 45 inches; light gray (10YR 6/1) clay; common medium distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; very firm, sticky and very plastic; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; very strongly acid; gradual wavy boundary.

BCg—45 to 60 inches; light gray (10YR 6/1) clay loam; few medium distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; firm, slightly sticky and slightly plastic; few fine roots; few fine flakes of mica; very strongly acid.

Worsham soils have a loamy A horizon and a predominantly clayey Bt horizon that extend to a depth of 30 to 50 inches. The solum is 40 to 80 inches thick. Depth to bedrock is more than 5 feet. Content of mica flakes ranges from few to common in most pedons. Worsham soils are very strongly acid or strongly acid unless lime has been added.

The Ap or A horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 0 to 2.

The Btg horizon has hue of 10YR to 5Y, value of 5 or 6, and chroma of 0 to 2. It is clay, sandy clay, or clay loam. The BCg horizon is similar in color to the Btg horizon and is sandy clay loam or clay loam.

Some pedons have a Cg horizon that is typically gray loamy colluvium and alluvium or saprolite weathered from felsic igneous and metamorphic rock. The texture is variable but typically is loamy.

Formation of the Soils

Soils are formed by processes of the environment acting upon geologic agents, such as metamorphic, igneous, and sedimentary rocks, and fluvial stream sediments. The characteristics of a soil are determined by the combined influence of parent material, climate, plant and animal life, relief, and time. These five factors of soil formation are responsible for the profile development and chemical properties that make soils different *(9)*.

Parent Material

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 development. In Gaston County, the parent material is a major factor in determining what kind of soil forms, and it can be correlated to some degree to geologic formations. The general soil map is an approximate guide to the geology of the county.

The general soil map associations and the major rock types from which the soil's parent material weathered are the:

- Cecil-Pacolet, Cecil-Urban land, and Appling-Wedowee-Pacolet associations—felsic igneous and metamorphic rocks (granite, biotite gneiss, biotite-muscovite schist, augen gneiss, and pegmatite).
- Tatum association—sericite phyllite or sericite schist.
- Gaston-Winnsboro-Cecil association—intermingled areas of intermediate, mafic, and felsic igneous and metamorphic rocks (diorite, gabbro, amphibolite, and granite).
- Madison association—mica gneiss and mica schist.
- Chewacla-Congaree association—recent alluvium.

Parent material is largely responsible for the chemical and mineralogical composition of soils and for the major differences among the soils of 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

Climatic factors, particularly precipitation and temperature, affect the physical, chemical, and biological relationships in the soil. They influence the rates at which rocks weather and organic matter decomposes. The amount of leaching in a soil is also related to the amount of rainfall and its movement through the soil. The effects of climate also control the kinds of plants and animals that can thrive in a region. Temperature influences the kind and growth of organisms and the speed of chemical and physical reactions in the soil.

Gaston County has a warm, humid climate and ranges in elevation from 587 to 1,705 feet. Mountains to the west of the county have a modifying effect on both temperature changes and precipitation; therefore, changes are gradual. The climate favors rapid chemical processes, resulting in decomposition of organic matter and rock weathering. The mild temperature and abundant rainfall cause intense leaching and oxidizing.

The effects of climate are reflected in the soils of Gaston County. Mild temperatures throughout the year and abundant rainfall have depleted the organic matter and considerably leached the soluble bases. Because variations are small, climate probably has not caused major local differences among soils. The most important effect of climate on the formation of Gaston County soils is in the alteration of parent material through changes in temperature and the amount of precipitation and through influences on plant and animal life.

Plant and Animal life

Plant and animal life influences the formation and differentiation of soil horizons. The kind and number of organisms in and on the soil are determined partly by climate and partly by the nature of the soil material, the relief, and the age of the soil. Bacteria, fungi, and other micro-organisms aid in the weathering of rocks and in the decomposition of organic matter. The plants and animals that live on a soil are the primary source of organic material.

Plants generally determine the kinds and amounts of organic matter that enter a soil under normal conditions, as well as how the organic matter is added. Plants also have an important part in the changes of base status and in the leaching process of a soil through the nutrient cycle.

Animals convert complex compounds into simpler forms and add their own bodies to the organic matter. In addition, organisms modify certain chemical and physical properties. In Gaston County, most of the organic material accumulates on the surface where it is acted upon by micro-organisms, fungi, earthworms, and other forms of life, and by direct chemical reaction. The material is then 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 this county, plants do not bring enough base material to the surface to counteract the effects of leaching. In general, the soils developed under a hardwood forest. The trees took up elements from the subsoil. Their leaves, roots, twigs, and eventually the whole tree, added organic matter to the surface. The material was then acted upon by organisms and underwent chemical reaction.

Organic material decomposes rapidly in the soils of Gaston County because of the moderate temperatures, the abundant moisture, and the character of the organic material. Organic matter decays so rapidly that little accumulates in the soil.

Relief

Relief influences free drainage, surface runoff, soil temperature, and the extent of geologic erosion. In Gaston County, relief is generally determined by the kind of underlying bedrock, the geology of the area, and the amount of landscape dissected by streams.

Relief affects percolation of water through the profile. Water movement is important in soil development because it aids chemical reactions and is necessary for leaching.

Slopes in the county range from 0 to 45 percent. On uplands where slopes are less than 10 percent, such soils as the Appling, Cecil, and Gaston soils generally have deeper, better defined profiles than the soils on steeper slopes. Relief can also affect the depth of soils. Geologic erosion removes soil material almost as fast as it forms from some soils having slopes of more than 15 percent. As a result, most of the strongly sloping to steep soils have a thinner solum. Examples are Pacolet and Wilkes soils, which are not as deep nor so well developed as the less sloping soils.

Relief can also affect drainage. A high water table, for example, generally is related to nearly level relief. The Helena and Worsham soils on uplands are imperfectly drained because they are nearly level and internal movement of water is slow.

Soils at the lower elevations are less sloping and receive runoff from adjacent high areas. This water accumulates in the nearly level to depressional areas. Examples are the somewhat poorly drained Chewacla soils on the flood plains and Worsham soils in upland depressions.

Time

The length of time that soil material has been exposed to the soil-forming processes accounts for some differences in soils. The formation of a well defined soil profile, however, depends on other factors. Less time is required for a soil profile to develop in a coarse-textured material than in material that is similar, but finer-textured, even though the environment is the same for both. Less time is required for a soil profile to develop in a warm, humid area where the plant cover is dense, as in Gaston County, than in a cold, dry area where the plant cover is sparse.

Soils vary considerably in age, and the length of time that a soil has been developing is reflected in the profile. Old soils generally have better defined horizons than young soils. In Gaston County, the effects of time as a soil-forming factor is more apparent in the older soils, such as Cecil and Appling soils, which are in the broader parts of the uplands. These soils have more distinct horizons than Chewacla soils, which formed in alluvium.

Chewacla and Congaree soils have not been in place long enough to have developed distinct horizons and are considered young soils. Other soils in the county are considered young because of their topographic position. Wilkes soils, for example, are not well developed because they are on steep landscapes and geologic erosion has kept pace with soil development. The rate of geologic erosion also partly accounts for the shallowness over bedrock.

Geology and Mineral Resources

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

Gaston County is on the boundary between three geologic belts—the Inner Piedmont belt, the Kings Mountain belt, and the Charlotte belt. Rocks in these belts include felsic (light-colored), intermediate, and mafic (dark-colored) igneous intrusive rocks and metamorphosed intrusive, volcanic, and sedimentary rocks. The metamorphic rocks have been altered by intense heat and pressure to form gneisses, schists, and phyllites. Most of the rocks are deeply weathered, leaving decomposed rocks and thick soil profiles at the land surface. Some rock types are more resistant to weathering than others and form the higher elevations, such as Crowders Mountain, Kings Mountain Pinnacle, and Pasour Mountain *(12)*. A variety of rocks and minerals have been mined and quarried in Gaston County.

The most important mineral resource in the county is lithium, which is mined from tin- and lithium-bearing pegmatites (coarse-grained granitic rocks). The pegmatites occur in what is referred to as the "Tin-spodumene belt," a zone of rocks along the Inner Piedmont-Kings Mountain belt boundary. This belt contains the western world's largest lithium reserves. A lithium mine near Bessemer City produces by-product feldspar and scrap mica in addition to lithium. Lithium is used principally by the aluminum, glass, and ceramic industries, in lithium greases, and in storage batteries. Feldspar is used in the glass and ceramic industries, and scrap mica is used in roofing, paints, rubber, joint cement, and as a filler in structural clay products. Other mines in the county quarry sand and crushed stone for use in the construction industry.

Other minerals which have been of interest in the area but are not currently mined include barite, gold, iron, kyanite, and pyrite. Barite, a barium sulphate used in well-drilling muds and chemicals, was prospected and mined at four sites in southwestern Gaston County. The barite occurs in veins enclosed by sericite schist. Gold was mined and prospected at over twenty sites, the most productive of which was the Kings Mountain mine. This mine operated intermittently from about 1820 until 1895, producing between three quarters and one million dollars in gold.

Iron was mined in the Kings Mountain belt prior to the Revolutionary War, and these deposits made a major contribution to the Confederacy during the Civil War. Bessemer City was one of the main centers of the iron industry with major production from the Ormond Mine one mile west of Bessemer City. By the late 1890's the iron industry had ended, primarily because of the depletion of the shallow ores and because of competition from the Lake Superior deposits.

Kyanite-bearing quartzites occur on the Pinnacle and Crowders Mountain in southwestern Gaston County. These deposits contain significant amounts of kyanite, an aluminum silicate used in high-temperature ceramics, but have not been mined. These deposits may never be mined because of their location on the two most prominent topographic features in the area.

Pyrite, an iron sulphide, was first mined on Pasour Mountain during the Civil War and again from 1886 until 1902. The deposits consist of pyrite veins in sericite phyllite, and they were mined for their sulphur content *(8, 12, 20)*.

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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 geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

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.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels, i.e., clay coating, clay skin.

Clayey (general: soil textural class). A general textural term that includes sandy clay, silty clay, and clay.

Clayey (taxonomic: family level criteria). A specific textural name referring to fine earth (particles less than 2mm in size) within the control section, containing 35 percent or more clay by weight; rock fragments are less than 35 percent, by volume (Soil Taxonomy, p. 385).

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.

Complex, soil. A map unit of two or more kinds of soil 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 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.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Depth class. Refers to the depth to a root restricting layer. Unless otherwise stated, it is understood to be consolidated bedrock. The depth classes in this county are as follows:

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.
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, 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, 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, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

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 classes. Classes that estimate past erosion based on the following:

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. (Soil map units having class 1 erosion typically are not designated in the map unit description.

Class 2.—Soils that have lost on the average 25 to 75 percent of the original A horizon or 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 on the average 75 percent or more of the original A horizon or the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most areas of class 3 erosion, material below the original A horizon is exposed at the surface in cultivated areas. The plow layer consists entirely or largely of material that was below the original A horizon.

Class 4.—Soils that have lost all of the A horizon or 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 indentified 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, if inadequately protected. The following definitions are based on estimated annual soil loss in metric 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 t/ac	none
Less than 1 t/ac	slight
1 to 5 t/ac	moderate
5 to 10 t/ac	severe
More than 10 t/ac	very severe

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

Felsic. A general term for light color igneous and metamorphic rocks.

Fill slope. A sloping surface made by excavating soil material from the road cut. It is generally on the downhill side of the road.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless artificially protected.

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.

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

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

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

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 upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

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, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock 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.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Intermediate rock. Rock that is transitional between felsic and mafic rock.

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 (general: soil textural class). 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.

Loamy (taxonomic: family level criteria). A specific textural name referring to fine earth (particles less than 2mm in size) within the control section, of loamy very fine sand or finer that contains less than 35 percent clay by weight; rock fragments are less than 35 percent by volume.

Mafic rock. A rock in which ferromagnesian minerals exceed 50 percent. A general term for dark color igneous and metamorphic rock.

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.

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 between 6.6 and 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.

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. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

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 of 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.

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 3.6
Extremely acid	3.6 to 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

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.

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). There is a shallow root zone. The soil is shallow over a layer that greatly restricts 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 run-on escapes as runoff, and free water stands on the surface for significant periods. The amount of water that must be 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 to nearly level soils in depressions, and 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 slowly enough 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 fast enough 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 fast enough 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 to slow rates of absorption.

Very rapid.—Surface water flows away so fast 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 (general: soil textural class). 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 (Soil Taxonomy, p. 470).

Sandy (taxonomic: family level criteria). A specific textural name referring to fine earth (particles less than 2mm in size) within the control section, of sand or loamy sand that contains less than 50 percent very fine sand by weight; rock fragments are less than 35 percent by volume (Soil Taxonomy, p. 385).

Saprolite (soil science). Unconsolidated, residual material underlying the soil and grading to hard bedrock below.

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. 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.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 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

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.

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 wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

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.

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 on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

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."

Sand.—Soil material that contains 85 percent or more sand; the percentage of silt plus 1½ times the percentage of clay does not exceed 15.

Loamy sand.—Soil material that contains at the upper limit 85 to 90 percent sand, and the percentage of silt plus 1½ times the percentage of clay is not less than 15; at the lower limit it contains not less than 70 to 85 percent sand, and the percentage of silt plus twice the percentage of clay does not exceed 30.

Sandy loam.—Soil material that contains either 20 percent clay or less and the percentage of silt plus twice the percentage of clay exceeds 30, and 52 percent or more sand; or less than 7 percent clay, less than 50 percent silt, and between 43 and 52 percent sand.

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 percent or more 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 percent or more 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 percent or more 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 percent or more clay and 45 percent or more sand.

Silty clay.—Soil material that contains 40 percent or more clay and 40 percent or more silt.

Clay.—Soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Thin layer (in tables). An 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.

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.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

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.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Data recorded in the period 1951-81 at Gastonia, North Carolina]

Month	Temperature					Precipitation				
	Average daily maximum	Average daily minimum	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	Units	In	In	In		In
January----	52.1	30.9	73	8	41	4.05	2.31	5.58	7	1.2
February---	55.7	32.2	76	12	43	4.08	2.01	5.87	7	.6
March------	63.9	39.1	85	19	138	5.12	3.23	6.82	8	.7
April------	74.5	48.1	91	31	339	3.49	1.71	5.02	6	.0
May--------	81.0	56.4	94	36	580	4.07	2.13	5.76	7	.0
June-------	86.8	63.8	99	49	759	4.12	2.07	5.90	7	.0
July-------	89.7	67.8	100	57	893	4.17	2.05	6.00	8	.0
August-----	88.8	67.1	99	55	868	4.34	2.24	6.16	7	.0
September--	83.2	61.0	95	44	663	3.99	1.48	6.08	5	.0
October----	73.2	48.8	88	29	346	2.87	.85	4.52	5	.0
November---	63.3	39.2	82	18	109	2.80	1.35	4.05	5	.0
December---	54.3	32.7	74	12	30	3.89	1.95	5.57	7	.1
Average--	72.2	48.9	---	---	---	---	---	---	---	---
Extreme--	---	---	100	5	---	---	---	---	---	---
Total----	---	---	---	---	4,809	46.99	41.39	52.37	79	2.6

* 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

[Data recorded in the period 1951-81 at Gastonia, 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. 28	Apr. 5	Apr. 22
2 years in 10 later than--	Mar. 19	Mar. 30	Apr. 16
5 years in 10 later than--	Mar. 2	Mar. 18	Apr. 5
First freezing temperature in fall:			
1 year in 10 earlier than--	Nov. 9	Oct. 26	Oct. 14
2 years in 10 earlier than--	Nov. 14	Oct. 31	Oct. 20
5 years in 10 earlier than--	Nov. 24	Nov. 10	Oct. 31

TABLE 3.--GROWING SEASON

[Data recorded in the period 1951-81 at Gastonia, 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	235	211	182
8 years in 10	246	219	191
5 years in 10	267	236	208
2 years in 10	287	253	226
1 year in 10	298	262	235

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

Map symbol	Soil name	Acres	Percent
AmB	Alamance Variant gravelly loam, 2 to 8 percent slopes	799	0.3
AmD	Alamance Variant gravelly loam, 8 to 15 percent slopes	505	0.2
ApB	Appling sandy loam, 1 to 6 percent slopes	9,018	3.9
CeB2	Cecil sandy clay loam, 2 to 8 percent slopes, eroded	32,449	14.2
CeD2	Cecil sandy clay loam, 8 to 15 percent slopes, eroded	8,938	3.9
CfB	Cecil-Urban land complex, 2 to 8 percent slopes	20,525	9.0
CfD	Cecil-Urban land complex, 8 to 15 percent slopes	3,694	1.6
CH	Chewacla loam, frequently flooded	14,755	6.5
Co	Congaree loam, occasionally flooded	3,449	1.5
GaB2	Gaston sandy clay loam, 2 to 8 percent slopes, eroded	18,321	8.0
GaD2	Gaston sandy clay loam, 8 to 15 percent slopes, eroded	8,316	3.6
GaE	Gaston loam, 15 to 25 percent slopes	2,377	1.0
HeB	Helena sandy loam, 1 to 6 percent slopes	2,422	1.1
HuB	Helena-Urban land complex, 1 to 6 percent slopes	568	0.3
LgB	Lignum silt loam, 1 to 6 percent slopes	283	0.1
MaB2	Madison sandy clay loam, 2 to 8 percent slopes, eroded	9,071	4.0
MaD2	Madison sandy clay loam, 8 to 15 percent slopes, eroded	6,251	2.7
MaE	Madison sandy loam, 15 to 25 percent slopes	3,859	1.7
PaD2	Pacolet sandy clay loam, 8 to 15 percent slopes, eroded	6,395	2.8
PaE	Pacolet sandy loam, 15 to 25 percent slopes	13,525	5.9
PaF	Pacolet sandy loam, 25 to 45 percent slopes	1,153	0.5
Pt	Pits	222	0.1
Ro	Rock outcrop	214	0.1
TaB	Tatum gravelly loam, 2 to 8 percent slopes	13,620	6.0
TaD	Tatum gravelly loam, 8 to 15 percent slopes	10,996	4.8
TaE	Tatum gravelly loam, 15 to 25 percent slopes	9,071	4.0
Ud	Udorthents, loamy	2,267	1.0
Ur	Urban land	4,149	1.8
UwF	Uwharrie stony loam, 25 to 45 percent slopes, very bouldery	1,969	0.9
VaB	Vance sandy loam, 2 to 8 percent slopes	2,150	0.9
VaD	Vance sandy loam, 8 to 15 percent slopes	834	0.4
WeD	Wedowee sandy loam, 6 to 15 percent slopes	4,007	1.8
WkD	Wilkes loam, 6 to 15 percent slopes	1,887	0.8
WkF	Wilkes loam, 15 to 30 percent slopes	3,992	1.7
WnB	Winnsboro loam, 2 to 8 percent slopes	2,519	1.1
WnD	Winnsboro loam, 8 to 15 percent slopes	921	0.4
WoA	Worsham loam, 0 to 2 percent slopes	1,325	0.6
	Water areas less than 40 acres	1,850	0.8
	Total	228,666	100.0

TABLE 5.--SOIL ADAPTATION BY VEGETABLE AND FRUIT CROPS

[The number 1 means well adapted with above average yields; 2 means adapted with average yields; and 3 means poorly adapted or not adapted with very low yields. Latest information and suggestions for growing vegetable and fruit crops are available from the local Soil Conservation Service office or the North Carolina Cooperative Extension Service]

Map symbol and soil name	Sweet corn	Straw-berries	Tomatoes and peppers	Potatoes Irish and sweet	Green beans	Cucumbers	Apples and peaches	Grapes
AmB, AmD: Alamance Variant	2	3	2	3	2	3	3	2
ApB: Appling	1	1	1	1	1	1	1	1
CeB2, CeD2: Cecil	2	2	2	2	2	2	1	2
CH: Chewacla	1	3	3	2	1	2	3	3
Co: Congaree	1	3	1	1	1	1	3	3
GaB2, GaD2, GaE: Gaston	1	1	2	2	2	2	1	1
HeB: Helena	2	2	2	2	2	2	3	2
LgB: Lignum	2	2	2	2	2	2	3	2
MaB2, MaD2, MaE: Madison	2	2	2	2	2	2	2	2
PaD2, PaE, PaF: Pacolet	2	2	2	2	2	2	2	2
TaB, TaD, TaE: Tatum	2	3	2	3	2	3	3	2
UwF: Uwharrie	3	3	3	3	3	3	3	3
VaB, VaD: Vance	2	2	2	2	2	2	2	2
WeD: Wedowee	2	2	2	2	2	2	2	2
WkD, WkE: Wilkes	2	2	2	2	2	2	3	2
WnB, WnD: Winnsboro	2	2	2	2	2	2	3	2
WoA: Worsham	3	3	3	3	3	3	3	3

TABLE 6.--LAND CAPABILITY CLASSES 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]

Map symbol and soil name	Land capability	Soybeans	Corn	Corn silage	Wheat	Oats	Grass-legume hay	Pasture
		Bu	Bu	Tons	Bu	Bu	Tons	AUM*
AmB------------- Alamance Variant	IIe	30	85	18	45	65	3.9	6.5
AmD------------- Alamance Variant	IVe	20	65	17	35	55	2.5	6.0
ApB------------- Appling	IIe	35	95	17	45	80	4.8	8.0
CeB2------------ Cecil	IIIe	30	70	15	40	70	2.4	6.0
CeD2------------ Cecil	IVe	20	60	12	35	60	1.8	5.0
CfB------------- Cecil-Urban land	---	---	---	---	---	---	---	---
CfD------------- Cecil-Urban land	---	---	---	---	---	---	---	---
CH-------------- Chewacla	IVw	30	80	20	30	40	4.5	9.0
Co-------------- Congaree	IIw	45	160	30	75	80	5.4	10.0
GaB2------------ Gaston	IIIe	35	90	22	45	65	2.8	8.3
GaD2------------ Gaston	IVe	25	80	16	35	50	2.2	7.6
GaE------------- Gaston	VIe	---	---	---	---	---	3.0	8.0
HeB------------- Helena	IIe	30	80	15	40	65	3.5	5.8
HuB------------- Helena-Urban land	---	---	---	---	---	---	---	---
LgB------------- Lignum	IIe	35	90	20	45	50	2.5	7.0
MaB2------------ Madison	IIIe	35	70	14	45	70	3.6	5.5
MaD2------------ Madison	IVe	25	55	12	40	50	2.7	4.5

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Soybeans	Corn	Corn silage	Wheat	Oats	Grass-legume hay	Pasture
		Bu	Bu	Tons	Bu	Bu	Tons	AUM*
MaE------------- Madison	VIe	---	---	---	---	---	---	4.5
PaD2------------ Pacolet	IVe	20	60	12	35	60	1.8	4.5
PaE------------- Pacolet	VIe	---	---	---	---	---	---	5.0
PaF------------- Pacolet	VIIe	---	---	---	---	---	---	---
Pt. Pits								
Ro. Rock outcrop								
TaB------------- Tatum	IIe	30	90	18	50	70	3.0	8.0
TaD------------- Tatum	IIIe	30	85	17	45	65	2.5	7.5
TaE------------- Tatum	IVe	---	65	13	35	60	2.0	7.0
Ud. Udorthents								
Ur. Urban land								
UwF------------- Uwharrie	VIIs	---	---	---	---	---	---	---
VaB------------- Vance	IIIe	35	80	17	45	60	4.8	8.0
VaD------------- Vance	IVe	---	70	14	40	55	4.2	7.0
WeD------------- Wedowee	IVe	---	60	13	35	70	2.5	4.0
WkD------------- Wilkes	VIe	20	50	12	30	---	3.7	7.0
WkF------------- Wilkes	VIIe	---	---	---	---	---	3.4	6.5
WnB------------- Winnsboro	IIe	35	85	17	45	75	4.8	7.0
WnD------------- Winnsboro	IVe	25	65	13	25	65	4.2	6.0
WoA------------- Worsham	Vw	---	70	15	---	---	2.7	5.5

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

TABLE 7.--COMMON AND SCIENTIFIC NAMES OF WOODLAND PLANTS OF GASTON COUNTY

Common plant name	Scientific plant name	Common plant name	Scientific plant name
Alder	Alnus	Mountain laurel	Kalmia latifolia
American beech	Fagus grandifolia	Muscadine grape	Vitis rotundifolia
American holly	Ilex opaca	Northern red oak	Quercus rubra
American hornbeam (ironwood)	Carpinus caroliniana	Poison ivy	Rhus radicans
American sycamore	Platanus occidentalis	Post oak	Quercus stellata
Arrowhead	Sagittaria	Red maple	Acer rubrum
Autumn olive	Elaeagnus umbellata	Red mulberry	Morus rubra
Blackberry	Rubus	River birch	Betula nigra
Black cherry	Prunus serotina	Running cedar	Lycopodium clavatum
Black oak	Quercus velutina	Sassafras	Sassafras albidum
Blackjack oak	Quercus marilandica	Scarlet oak	Quercus coccinea
Black locust	Robinia pseudoacacia	Sedge	Carex
Black walnut	Juglans nigra	Shortleaf pine	Pinus echinata
Blueberry	Vaccinium	Sourwood	Oxydendrum arboreum
Boxelder	Acer negundo	Southern red oak	Quercus falcata
Brackenfern	Pteridium aquilinum	Sumac	Rhus
Chestnut oak	Quercus prinus	Summer grape	Vitis aestivalis
Christmas fern	Polystichum acrostichoide	Sweetgum	Liquidambar styraciflua
Common greenbrier	Smilax rotundifolia	Virginia creeper	Parthenocissus quinquefolia
Crabapple	Malus	Virginia pine	Pinus virginiana
Eastern cottonwood	Populus deltoides	Water oak	Quercus nigra
Eastern hophornbeam	Ostrya virginiana	White oak	Quercus alba
Eastern redbud	Cercis canadensis	Willow	Salix
Eastern redcedar	Juniperus virginiana	Willow oak	Quercus phellos
Eastern white pine	Pinus strobus	Winged elm	Ulmus alata
Flowering dogwood	Cornus florida	Witchhazel	Hamamelis virginiana
Green ash	Fraxinus pennsylvanica	Yellow poplar	Liriodendron tulipifera
Hawthorn	Crataegus		
Hickory	Carya		
Honeysuckle	Lonicera		
Loblolly pine	Pinus taeda		

TABLE 8.--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]

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
AmB, AmD: Alamance Variant	7A	Slight	Slight	Slight	Loblolly pine	77	7	Loblolly pine.
					Shortleaf pine	66	7	
					Southern red oak	69	4	
					White oak	71	4	
					Chestnut oak	---	--	
					Red maple	---	--	
					Hickory	---	--	
					Northern red oak	---	--	
ApB: Appling	8A	Slight	Slight	Slight	Loblolly pine	83	8	Loblolly pine.
					Shortleaf pine	65	7	
					Southern red oak	76	4	
					Virginia pine	74	8	
					White oak	64	4	
					Yellow poplar	90	6	
					Sweetgum	---	--	
					Hickory	---	--	
CeB2, CeD2: Cecil	7C	Moderate	Moderate	Moderate	Loblolly pine	72	7	Loblolly pine.
					Shortleaf pine	66	7	
					Virginia pine	65	7	
					Yellow poplar	87	6	
					Southern red oak	74	4	
					Northern red oak	77	4	
					White oak	---	--	
					Hickory	---	--	
CH: Chewacla	9W	Slight	Moderate	Slight	Sweetgum	97	9	Sweetgum, hardwoods.**
					Yellow poplar	100	8	
					American sycamore	---	--	
					Water oak	86	6	
					Loblolly pine	96	10	
					Eastern cottonwood	---	--	
					Green ash	---	--	
					Southern red oak	---	--	
					Blackgum	---	--	
Co: Congaree	10A	Slight	Slight	Slight	Sweetgum	100	10	Loblolly pine, hardwoods.**
					Yellow poplar	107	8	
					Loblolly pine	90	9	
					Eastern cottonwood	107	10	
					American sycamore	89	--	
					Willow oak	95	6	
					Water oak	---	--	
GaB2, GaD2: Gaston	8C	Moderate	Moderate	Moderate	Loblolly pine	85	8	Loblolly pine.
					Shortleaf pine	70	8	
					Yellow poplar	---	--	
					White oak	---	--	
					Southern red oak	---	--	
					Sweetgum	---	--	
					Virginia pine	---	--	
					Northern red oak	---	--	
					Hickory	---	--	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
GaE: Gaston	9R	Moderate	Moderate	Slight	Loblolly pine	90	9	Loblolly pine, hardwoods.**
					Shortleaf pine	75	8	
					Virginia pine	---	--	
					Yellow poplar	---	--	
					White oak	---	--	
					Southern red oak	---	--	
					Sweetgum	---	--	
					Hickory	---	--	
					Northern red oak	---	--	
HeB: Helena	8W	Slight	Moderate	Slight	Loblolly pine	80	8	Loblolly pine.
					Shortleaf pine	63	7	
					White oak	---	--	
					Yellow poplar	---	--	
					Sweetgum	---	--	
					Northern red oak	---	--	
					Southern red oak	---	--	
					Black oak	---	--	
					Hickory	---	--	
LgB: Lignum	7W	Slight	Moderate	Slight	Loblolly pine	76	7	Loblolly pine.
					Northern red oak	68	4	
					Virginia pine	74	8	
					Shortleaf pine	66	7	
					Chestnut oak	---	--	
					Southern red oak	---	--	
					Hickory	---	--	
					Sweetgum	---	--	
					White oak	---	--	
					Yellow poplar	---	--	
MaB2, MaD2: Madison	7C	Moderate	Moderate	Moderate	Loblolly pine	72	7	Loblolly pine.
					Shortleaf pine	61	7	
					Virginia pine	66	7	
					Hickory	---	--	
					Northern red oak	83	5	
					Southern red oak	76	4	
					White oak	81	4	
					Yellow poplar	91	6	
MaE: Madison	8R	Moderate	Moderate	Slight	Loblolly pine	79	8	Loblolly pine.
					Shortleaf pine	66	7	
					Southern red oak	81	4	
					Yellow poplar	96	7	
					Hickory	---	--	
					Virginia pine	71	8	
					Sweetgum	---	--	
					Northern red oak	88	5	
					White oak	80	4	
PaD2: Pacolet	6C	Moderate	Moderate	Moderate	Loblolly pine	70	6	Loblolly pine.
					Shortleaf pine	60	6	
					Yellow poplar	80	5	
					Virginia pine	---	--	
					Northern red oak	---	--	
					White oak	---	--	
					Southern red oak	---	--	
					Sweetgum	---	--	
					Hickory	---	--	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
PaE, PaF: Pacolet	8R	Moderate	Moderate	Slight	Loblolly pine	78	8	Loblolly pine.
					Shortleaf pine	70	8	
					Yellow poplar	90	6	
					Virginia pine	---	--	
					Southern red oak	---	--	
					Northern red oak	---	--	
					Hickory	---	--	
TaB, TaD: Tatum	8A	Slight	Slight	Slight	Loblolly pine	78	8	Loblolly pine.
					Virginia pine	68	7	
					Shortleaf pine	68	7	
					Northern red oak	72	4	
					Yellow poplar	83	5	
					Chestnut oak	---	--	
					White oak	---	--	
					Hickory	---	--	
					Red maple	---	--	
					Post oak	---	--	
TaE: Tatum	8R	Moderate	Moderate	Slight	Loblolly pine	78	8	Loblolly pine.
					Virginia pine	68	7	
					Shortleaf pine	68	7	
					Northern red oak	72	4	
					Yellow poplar	83	5	
					Chestnut oak	---	--	
					White oak	---	--	
					Hickory	---	--	
					Red maple	---	--	
					Post oak	---	--	
UwF: Uwharrie	5R	Moderate	Moderate	Slight	Black oak	84	5	Loblolly pine, hardwoods.**
					White oak	---	--	
					Southern red oak	---	--	
					Chestnut oak	---	--	
					Yellow poplar	96	7	
					Hickory	---	--	
					Post oak	---	--	
VaB, VaD: Vance	7A	Slight	Slight	Slight	Loblolly pine	76	7	Loblolly pine.
					Northern red oak	72	4	
					Shortleaf pine	68	7	
					White oak	76	4	
					Hickory	---	--	
					Yellow poplar	---	--	
					Southern red oak	---	--	
					Sweetgum	---	--	
WeD: Wedowee	8A	Slight	Slight	Slight	Loblolly pine	80	8	Loblolly pine.
					Virginia pine	70	8	
					Shortleaf pine	69	8	
					Southern red oak	70	4	
					Northern red oak	68	4	
					White oak	65	3	
					Post oak	---	--	
					Yellow poplar	---	--	
					Sweetgum	---	--	
					Hickory	---	--	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
WkD---------------- Wilkes	7D	Slight	Slight	Moderate	Loblolly pine--------	75	7	Loblolly pine.
					Post oak-------------	79	4	
					Shortleaf pine-------	63	7	
					Southern red oak-----	---	--	
					Northern red oak-----	---	--	
					White oak------------	60	3	
					Hickory--------------	---	--	
					Virginia pine--------	---	--	
					Yellow poplar--------	---	--	
WkF---------------- Wilkes	7R	Moderate	Moderate	Moderate	Loblolly pine--------	75	7	Loblolly pine.
					Post oak-------------	79	4	
					Shortleaf pine-------	63	7	
					Southern red oak-----	---	--	
					Northern red oak-----	---	--	
					White oak------------	60	3	
					Hickory--------------	---	--	
					Virginia pine--------	---	--	
					Yellow poplar--------	---	--	
WnB, WnD----------- Winnsboro	7A	Slight	Slight	Slight	Loblolly pine--------	73	7	Loblolly pine.
					Shortleaf pine-------	63	7	
					Virginia pine--------	63	7	
					Post oak-------------	55	3	
					Red maple------------	70	3	
					Southern red oak-----	84	4	
					Sweetgum-------------	78	5	
					White oak------------	69	4	
					Yellow poplar--------	88	6	
					Northern red oak-----	---	--	
WoA---------------- Worsham	6W	Slight	Severe	Severe	Yellow poplar--------	91	6	Loblolly pine, hardwoods.**
					Northern red oak-----	80	4	
					Virginia pine--------	80	8	
					Loblolly pine--------	88	9	
					Sweetgum-------------	---	--	
					Willow oak-----------	---	--	
					Red maple------------	---	--	

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** To establish hardwoods on a forested site, rely on natural reproduction (seeds and sprouts) of acceptable species. Special site preparation techniques may be required. Planting of hardwoods on a specific site should be done upon recommendations of a forester.

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]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AmB------------------ Alamance Variant	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
AmD------------------ Alamance Variant	Moderate: small stones, slope.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
ApB------------------ Appling	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
CeB2----------------- Cecil	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
CeD2----------------- Cecil	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
CfB:					
Cecil----------------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
Urban land.					
CfD:					
Cecil----------------	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
Urban land.					
CH------------------- Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Co------------------- Congaree	Severe: flooding.	Slight----------	Moderate: flooding, slope.	Slight----------	Moderate: flooding.
GaB2----------------- Gaston	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
GaD2----------------- Gaston	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
GaE------------------ Gaston	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
HeB------------------ Helena	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, slope, percs slowly.	Moderate: wetness.	Moderate: wetness.
HuB:					
Helena---------------	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness.	Moderate: wetness.
Urban land.					

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LgB------------------- Lignum	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness.
MaB2------------------ Madison	Slight----------	Slight----------	Moderate: slope, small stones.	Slight----------	Slight.
MaD2------------------ Madison	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
MaE------------------- Madison	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PaD2------------------ Pacolet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
PaE------------------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
PaF------------------- Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pt. Pits					
Ro. Rock outcrop					
TaB------------------- Tatum	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
TaD------------------- Tatum	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
TaE------------------- Tatum	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Ud. Udorthents					
Ur. Urban land					
UwF------------------- Uwharrie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, large stones.
VaB------------------- Vance	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
VaD------------------- Vance	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WeD------------------- Wedowee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
WkD------------------- Wilkes	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight----------	Severe: depth to rock.
WkF------------------- Wilkes	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Moderate: slope.	Severe: slope, depth to rock.
WnB------------------- Winnsboro	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
WnD------------------- Winnsboro	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.
WoA------------------- Worsham	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.

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]

Map symbol and soil name	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
AmB: Alamance Variant	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
AmD: Alamance Variant	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ApB: Appling	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CeB2: Cecil	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CeD2: Cecil	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CfB:										
Cecil	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
CfD:										
Cecil	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Urban land.										
CH: Chewacla	Very poor.	Poor	Poor	Good	Good	Fair	Fair	Poor	Good	Fair.
Co: Congaree	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
GaB2: Gaston	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
GaD2: Gaston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GaE: Gaston	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
HeB: Helena	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HuB:										
Helena	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
LgB: Lignum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
MaB2: Madison	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.

TABLE 10.--WILDLIFE HABITAT--Continued

Map symbol and soil name	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
MaD2 Madison	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
MaE Madison	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
PaD2 Pacolet	Very poor.	Poor	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
PaE, PaF Pacolet	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Pt. Pits										
Ro. Rock outcrop										
TaB Tatum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TaD Tatum	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TaE Tatum	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ud. Udorthents										
Ur. Urban land										
UwF Uwharrie	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
VaB Vance	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
VaD Vance	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
WeD Wedowee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WkD, WkF Wilkes	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
WnB Winnsboro	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
WnD Winnsboro	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
WoA Worsham	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

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; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AmB: Alamance Variant	Slight	Slight	Slight	Moderate: slope.	Severe: low strength.	Moderate: small stones.
AmD: Alamance Variant	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
ApB: Appling	Moderate: too clayey.	Slight	Slight	Slight	Moderate: low strength.	Slight.
CeB2: Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
CeD2: Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
CfB:						
Cecil	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength.	Slight.
Urban land.						
CfD:						
Cecil	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.	Moderate: slope.
Urban land.						
CH: Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
Co: Congaree	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
GaB2: Gaston	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
GaD2: Gaston	Moderate: too clayey, slope.	Moderate: slope, shrink-swell.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
GaE: Gaston	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
HeB: Helena	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
HuB:						
Helena	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: wetness.
Urban land.						
LgB Lignum	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.	Moderate: wetness.
MaB2 Madison	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
MaD2 Madison	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
MaE Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
PaD2 Pacolet	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength, slope.	Moderate: slope.
PaE, PaF Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pt. Pits						
Ro. Rock outcrop						
TaB Tatum	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
TaD Tatum	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
TaE Tatum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
Ud. Udorthents						
Ur. Urban land						
UwF Uwharrie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope, large stones.
VaB Vance	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
VaD--------------- Vance	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
WeD--------------- Wedowee	Moderate: too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Moderate: shrink-swell, low strength, slope.	Moderate: slope.
WkD--------------- Wilkes	Severe: depth to rock.	Moderate: shrink-swell, slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, shrink-swell, slope.	Severe: depth to rock.
WkF--------------- Wilkes	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.
WnB--------------- Winnsboro	Slight---------	Severe: shrink-swell.	Slight---------	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
WnD--------------- Winnsboro	Moderate: slope.	Severe: shrink-swell.	Moderate: slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: slope.
WoA--------------- Worsham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, low strength.	Severe: wetness.

TABLE 12.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AmB: Alamance Variant	Moderate: percs slowly, depth to rock.	Moderate: seepage, depth to rock, slope.	Severe: depth to rock.	Moderate: depth to rock.	Fair: depth to rock, thin layer.
AmD: Alamance Variant	Moderate: percs slowly, slope, depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope, depth to rock.	Fair: depth to rock, thin layer.
ApB: Appling	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
CeB2: Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
CeD2: Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, hard to pack.
CfB:					
Cecil	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.
Urban land.					
CfD:					
Cecil	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope, hard to pack.
Urban land.					
CH: Chewacla	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack, wetness.
Co: Congaree	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Fair: wetness.
GaB2: Gaston	Moderate: percs slowly.	Moderate: seepage, slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
GaD2: Gaston	Moderate: percs slowly, slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
GaE: Gaston	Severe: slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: 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.
HuB:					
Helena	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Moderate: wetness.	Poor: too clayey, hard to pack.
Urban land.					
LgB: Lignum	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
MaB2: Madison	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: too clayey.
MaD2: Madison	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey.
MaE: Madison	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
PaD2: Pacolet	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: too clayey, slope.
PaE, PaF: Pacolet	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Pt. Pits					
Ro. Rock outcrop					
TaB: Tatum	Moderate: depth to rock, percs slowly.	Moderate: seepage, depth to rock, slope.	Severe: too clayey, depth to rock.	Moderate: depth to rock.	Poor: too clayey, hard to pack, small stones.
TaD: Tatum	Moderate: depth to rock, percs slowly, slope.	Severe: slope.	Severe: too clayey, depth to rock.	Moderate: slope, depth to rock.	Poor: too clayey, hard to pack, small stones.
TaE: Tatum	Severe: slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: too clayey, hard to pack, small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas*	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ud. Udorthents					
Ur. Urban land					
UwF----------------- Uwharrie	Severe: slope.	Severe: large stones, slope.	Severe: too clayey, slope.	Severe: slope.	Poor: too clayey, slope, hard to pack.
VaB----------------- Vance	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
VaD----------------- Vance	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
WeD----------------- Wedowee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
WkD----------------- Wilkes	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: thin layer, depth to rock.
WkF----------------- Wilkes	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: thin layer, depth to rock, slope.
WnB----------------- Winnsboro	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight-----------	Poor: too clayey, hard to pack.
WnD----------------- Winnsboro	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Poor: too clayey, hard to pack.
WoA----------------- Worsham	Severe: percs slowly, wetness.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.

* Ratings are for lagoons that are 2 to 5 feet deep (aerobic type).

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; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AmB------------------- Alamance Variant	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, too clayey.
AmD------------------- Alamance Variant	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope, too clayey.
ApB------------------- Appling	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CeB2, CeD2------------ Cecil	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CfB, CfD:				
Cecil-----------------	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
CH-------------------- Chewacla	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Co-------------------- Congaree	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
GaB2, GaD2------------ Gaston	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
GaE------------------- Gaston	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
HeB------------------- Helena	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
HuB:				
Helena----------------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
Urban land.				
LgB------------------- Lignum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
MaB2, MaD2------------ Madison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
MaE: Madison	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
PaD2: Pacolet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
PaE: Pacolet	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
PaF: Pacolet	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Pt. Pits				
Ro. Rock outcrop				
TaB, TaD: Tatum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
TaE: Tatum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too clayey.
Ud. Udorthents				
Ur. Urban land				
UwF: Uwharrie	Severe: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope, large stones.
VaB, VaD: Vance	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
WeD: Wedowee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
WkD: Wilkes	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, depth to rock.
WkF: Wilkes	Poor: depth to rock, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer, depth to rock.
WnB, WnD: Winnsboro	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.
WoA: Worsham	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.

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; it does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
AmB: Alamance Variant	Moderate: slope, depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
AmD: Alamance Variant	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
ApB: Appling	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
CeB2: Cecil	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
CeD2: Cecil	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
CfB:						
Cecil	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
Urban land.						
CfD:						
Cecil	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
Urban land.						
CH: Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Moderate: slow refill.	Flooding	Wetness	Wetness.
Co: Congaree	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Flooding	Erodes easily, wetness.	Erodes easily.
GaB2: Gaston	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
GaD2, GaE: Gaston	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
HeB: Helena	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Wetness, percs slowly.	Percs slowly.
HuB:						
Helena	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Percs slowly, slope.	Wetness, percs slowly.	Percs slowly.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
HuB: Urban land.						
LgB: Lignum	Moderate: slope.	Moderate: hard to pack, wetness.	Severe: no water.	Slope, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
MaB2: Madison	Moderate: seepage, slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
MaD2, MaE: Madison	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
PaD2: Pacolet	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope.
PaE, PaF: Pacolet	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope.
Pt. Pits						
Ro. Rock outcrop						
TaB: Tatum	Moderate: seepage, depth to rock, slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Favorable	Favorable.
TaD, TaE: Tatum	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Slope.
Ud. Udorthents						
Ur. Urban land						
UwF: Uwharrie	Severe: slope.	Severe: hard to pack, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope.
VaB: Vance	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly	Percs slowly.
VaD: Vance	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.
WeD: Wedowee	Severe: slope.	Moderate: piping.	Severe: no water.	Deep to water	Slope	Slope.
WkD, WkF: Wilkes	Severe: slope, depth to rock.	Severe: thin layer.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, depth to rock.
WnB: Winnsboro	Moderate: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Percs slowly	Percs slowly.

TABLE 14.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
WnD: Winnsboro	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope, percs slowly.	Slope, percs slowly.
WoA: Worsham	Slight	Severe: wetness.	Severe: slow refill.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.

TABLE 15.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils have Unified classification and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown]

Map symbol and soil name	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	
AmB, AmD--------- Alamance Variant	0-8	Gravelly loam----	ML	A-4	0-5	80-95	70-80	60-80	55-75	<30	NP-5
	8-27	Clay loam, silty clay loam, silt loam.	CL, ML	A-4, A-6, A-7	0	95-100	90-100	90-100	80-100	30-45	7-20
	27-45	Loam, silt loam, very fine sandy loam.	CL, ML, CL-ML	A-4, A-6, A-7	0	95-100	85-100	80-100	70-98	25-41	5-15
	45-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
ApB-------------- Appling	0-10	Sandy loam-------	SM	A-2	0-5	86-100	80-100	55-91	15-35	<27	NP-5
	10-41	Sandy clay, clay loam, clay.	MH, ML, CL	A-7	0-5	95-100	90-100	70-95	51-80	41-74	15-30
	41-48	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
	48-60	Variable---------	---	---	---	---	---	---	---	---	---
CeB2, CeD2------- Cecil	0-6	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0-5	74-100	72-100	68-95	38-81	21-35	3-15
	6-58	Clay, clay loam	MH, ML	A-7, A-5	0-5	97-100	92-100	72-99	55-95	41-80	9-37
	58-80	Variable---------	---	---	---	---	---	---	---	---	---
CfB, CfD: Cecil-----------	0-6	Sandy clay loam	SM, SC, CL, ML	A-4, A-6	0-5	74-100	72-100	68-95	38-81	21-35	3-15
	6-58	Clay, clay loam	MH, ML	A-7, A-5	0-5	97-100	92-100	72-99	55-95	41-80	9-37
	58-80	Variable---------	---	---	---	---	---	---	---	---	---
Urban land.											
CH--------------- 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
	6-45	Sandy clay loam, clay loam, fine sandy loam.	SM, SM-SC, ML, CL	A-4, A-7-6, A-6	0	96-100	95-100	60-100	36-70	20-45	NP-15
	45-60	Variable---------	---	---	---	---	---	---	---	---	---
Co--------------- Congaree	0-8	Loam-------------	CL-ML, ML, CL	A-4	0	95-100	95-100	70-100	51-90	20-35	3-10
	8-42	Silty clay loam, fine sandy loam, loam.	SC, ML, CL, SM	A-4, A-6, A-7	0	95-100	95-100	70-100	40-90	25-50	3-22
	42-62	Variable---------	---	---	---	---	---	---	---	---	---
GaB2, GaD2------- Gaston	0-6	Sandy clay loam	CL, SC, CL-ML, SM-SC	A-4, A-6	0-5	90-100	84-100	75-95	36-75	25-40	5-20
	6-47	Clay, clay loam	CL, CH, ML, MH	A-7	0-5	95-100	90-100	80-99	65-90	40-75	12-37
	47-57	Clay loam, sandy clay loam, loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	84-100	75-95	36-75	25-50	7-23
	57-72	Variable---------	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	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	
GaE-------------- Gaston	0-6	Loam------------	SM, ML, CL-ML	A-2, A-4	0-5	90-100	84-100	80-95	30-75	<30	NP-7
	6-47	Clay, clay loam	CL, CH, ML, MH	A-7	0-5	95-100	90-100	80-99	65-90	40-75	12-37
	47-57	Clay loam, sandy clay loam, loam.	CL, SC	A-4, A-6, A-7	0-5	90-100	84-100	75-95	36-75	25-50	7-23
	57-72	Variable---------	---	---	---	---	---	---	---	---	---
HeB-------------- Helena	0-8	Sandy loam-------	SM, SM-SC, SC	A-2, A-4	0-5	95-100	90-100	51-90	26-46	<30	NP-9
	8-13	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
	13-39	Clay loam, sandy clay, clay.	CH	A-7	0-5	95-100	95-100	73-97	56-86	50-85	24-50
	39-60	Variable---------	---	---	---	---	---	---	---	---	---
HuB:											
Helena----------	0-8	Sandy loam-------	SM, SM-SC, SC	A-2, A-4	0-5	95-100	90-100	51-90	26-46	<30	NP-9
	8-13	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
	13-39	Clay loam, sandy clay, clay.	CH	A-7	0-5	95-100	95-100	73-97	56-86	50-85	24-50
	39-60	Variable---------	---	---	---	---	---	---	---	---	---
Urban land.											
LgB-------------- Lignum	0-4	Silt loam--------	CL	A-4, A-6	0	95-100	95-100	80-100	55-90	20-35	9-19
	4-36	Silty clay loam, silty clay, clay.	CH, CL	A-7	0-5	80-100	75-95	70-85	55-85	45-65	22-36
	36-60	Variable---------	---	---	---	---	---	---	---	---	---
MaB2, MaD2------- Madison	0-4	Sandy clay loam	CL, ML	A-4, A-6	0-3	90-100	85-100	70-95	50-80	20-40	7-20
	4-28	Clay, clay loam, sandy clay.	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-75	12-35
	28-36	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
	36-60	Variable---------	---	---	---	---	---	---	---	---	---
MaE-------------- Madison	0-5	Sandy loam-------	SM	A-2, A-4	0-3	85-100	80-100	60-90	26-49	<35	NP-8
	5-31	Clay, clay loam, sandy clay.	MH, ML	A-7	0-3	90-100	85-100	75-97	57-85	43-75	12-35
	31-38	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
	38-60	Variable---------	---	---	---	---	---	---	---	---	---
PaD2------------- Pacolet	0-4	Sandy clay loam	SM-SC, SC	A-4, A-6	0-1	95-100	90-100	65-85	36-50	20-40	4-17
	4-28	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
	28-36	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
	36-60	Variable---------	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	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	
PaE, PaF: Pacolet	0-5	Sandy loam	SM, SM-SC	A-2, A-1-b,	0-2	85-100	80-100	42-80	16-35	<28	NP-7
	5-27	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
	27-39	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
	39-60	Variable	---	---	---	---	---	---	---	---	---
Pt. Pits											
Ro. Rock outcrop											
TaB, TaD, TaE: Tatum	0-6	Gravelly loam	GM, ML, SM	A-4	0-10	60-80	55-75	45-75	40-70	22-36	2-10
	6-48	Clay loam, silty clay, clay.	MH, CH	A-7	5	75-100	75-98	60-96	55-90	50-80	10-36
	48-58	Variable	---	---	---	---	---	---	---	---	---
	58-62	Weathered bedrock	---	---	---	---	---	---	---	---	---
Ud. Udorthents											
Ur. Urban land											
UwF: Uwharrie	0-4	Stony loam	ML, CL, CL-ML	A-4	15-35	90-100	85-100	65-100	51-98	<40	NP-10
	4-30	Silty clay, clay loam, clay.	MH, ML, CL	A-4, A-6 A-7	0-10	95-100	90-100	70-100	60-95	35-70	20-40
	30-40	Clay loam, silt loam, silty clay loam.	CL, ML, CL-ML	A-4, A-6, A-7	0-10	95-100	85-100	70-95	60-95	25-48	6-20
	40-50	Variable	---	---	---	---	---	---	---	---	---
	50-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
VaB, VaD: Vance	0-5	Sandy loam	SM, SM-SC	A-2, A-4	0-5	90-100	80-100	55-80	15-40	<27	NP-7
	5-37	Clay loam, sandy clay, clay.	CH	A-7	0-5	95-100	90-100	75-95	65-80	51-80	25-48
	37-60	Variable	---	---	---	---	---	---	---	---	---
WeD: Wedowee	0-7	Sandy loam	SM, SM-SC	A-4, A-2-4	0	95-100	90-100	60-99	23-50	<30	NP-6
	7-10	Loam, sandy clay loam.	SM, SC, CL, ML	A-4, A-6	0	90-100	90-100	80-97	40-75	<32	NP-15
	10-24	Sandy clay, clay loam, clay.	SC, ML, CL, MH	A-6, A-7	0	95-100	95-100	65-97	45-75	30-58	10-25
	24-33	Sandy clay loam, clay loam, loam.	SC, CL, ML	A-4, A-6	0	90-100	90-100	80-95	40-75	<32	5-15
	33-62	Variable	---	---	---	---	---	---	---	---	---
WkD, WkF: Wilkes	0-6	Loam	ML, SM	A-2, A-4	0-10	90-100	80-100	60-92	25-55	<35	NP-7
	6-15	Clay loam, clay, sandy clay loam.	CL, CH	A-6, A-7	0-10	80-100	80-100	75-96	50-85	30-60	11-35
	15-60	Weathered bedrock	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	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	
WnB, WnD--------- Winnsboro	0-8	Loam-------------	ML, CL-ML, CL	A-4, A-6	0-1	95-100	90-100	75-95	51-80	20-40	3-20
	8-28	Clay, clay loam	CH	A-7	0-5	90-100	85-100	75-95	65-95	51-92	25-55
	28-36	Clay loam, sandy clay loam, loam.	CL, SC, ML, MH	A-4, A-6, A-7	0-5	90-100	85-100	60-90	36-80	25-50	3-20
	36-60	Variable---------	---	---	---	---	---	---	---	---	---
WoA-------------- Worsham	0-6	Loam-------------	CL, CL-ML	A-4, A-6	0-5	90-100	85-100	70-100	50-90	20-35	4-12
	6-45	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
	45-60	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

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less 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]

Map symbol and soil name	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
AmB, AmD--------- Alamance Variant	0-8	5-20	1.10-1.40	0.6-2.0	0.10-0.13	4.5-7.3	Low----------	0.28	4	.5-2
	8-27	18-35	1.20-1.40	0.6-2.0	0.15-0.20	4.5-5.5	Low----------	0.43		
	27-45	5-20	1.20-1.40	0.6-2.0	0.15-0.18	4.5-5.5	Low----------	0.43		
	45-60	---	---	---	---	---	-------------	----		
ApB-------------- Appling	0-10	5-20	1.40-1.65	2.0-6.0	0.10-0.15	4.5-5.5	Low----------	0.24	4	.5-2
	10-41	35-60	1.25-1.45	0.6-2.0	0.15-0.17	4.5-5.5	Low----------	0.20		
	41-48	20-50	1.25-1.45	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.24		
	48-60	---	---	---	---	---	-------------	----		
CeB2, CeD2------- Cecil	0-6	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.0	Low----------	0.28	4	.5-1
	6-58	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low----------	0.28		
	58-80	---	---	---	---	---	-------------	----		
CfB, CfD: Cecil-----------	0-6	20-35	1.30-1.50	0.6-2.0	0.13-0.15	4.5-6.0	Low----------	0.28	4	.5-1
	6-58	35-70	1.30-1.50	0.6-2.0	0.13-0.15	4.5-5.5	Low----------	0.28		
	58-80	---	---	---	---	---	-------------	----		
Urban land.										
CH--------------- 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
	6-45	18-35	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.5	Low----------	0.28		
	45-60	---	---	---	---	---	-------------	----		
Co--------------- Congaree	0-8	10-25	1.20-1.40	0.6-2.0	0.12-0.20	4.5-7.3	Low----------	0.37	5	<4
	8-42	18-35	1.20-1.50	0.6-2.0	0.12-0.20	4.5-7.3	Low----------	0.37		
	42-62	---	---	---	---	---	-------------	----		
GaB2, GaD2------- Gaston	0-6	20-40	1.30-1.60	0.6-2.0	0.12-0.16	5.1-6.5	Low----------	0.28	4	.5-3
	6-47	35-70	1.30-1.60	0.6-2.0	0.12-0.16	5.1-6.5	Moderate-----	0.24		
	47-57	20-40	1.30-1.60	0.6-2.0	0.10-0.15	5.1-6.5	Low----------	0.28		
	57-72	---	---	---	---	---	-------------	----		
GaE-------------- 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
	6-47	35-70	1.30-1.60	0.6-2.0	0.12-0.16	5.1-6.5	Moderate-----	0.24		
	47-57	20-40	1.30-1.60	0.6-2.0	0.10-0.15	5.1-6.5	Low----------	0.28		
	57-72	---	---	---	---	---	-------------	----		
HeB-------------- Helena	0-8	5-20	1.58-1.62	2.0-6.0	0.10-0.12	4.5-6.5	Low----------	0.20	3	.5-2
	8-13	20-35	1.46-1.56	0.2-0.6	0.13-0.15	4.5-6.5	Moderate-----	0.28		
	13-39	35-60	1.44-1.55	0.06-0.2	0.13-0.15	4.5-5.5	High---------	0.28		
	39-60	---	---	---	---	---	-------------	----		
HuB: Helena----------	0-8	5-20	1.58-1.62	2.0-6.0	0.10-0.12	4.5-6.5	Low----------	0.20	3	.5-2
	8-13	20-35	1.46-1.56	0.2-0.6	0.13-0.15	4.5-6.5	Moderate-----	0.28		
	13-39	35-60	1.44-1.55	0.06-0.2	0.13-0.15	4.5-5.5	High---------	0.28		
	39-60	---	---	---	---	---	-------------	----		
Urban land.										
LgB-------------- Lignum	0-4	10-25	1.20-1.50	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.43	3	.5-2
	4-36	35-55	1.25-1.55	<0.06	0.10-0.18	4.5-5.5	Moderate-----	0.28		
	36-60	---	---	---	---	---	-------------	----		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
MaB2, MaD2-------- Madison	0-4	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.28	4	.5-2
	4-28	30-50	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.32		
	28-36	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-5.5	Low----------	0.28		
	36-60	---	---	---	---	---	-------------	----		
MaE-------------- Madison	0-5	5-15	1.45-1.65	2.0-6.0	0.11-0.15	4.5-6.0	Low----------	0.24	4	.5-2
	5-31	30-50	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low----------	0.32		
	31-38	25-35	1.30-1.40	0.6-2.0	0.12-0.16	4.5-6.0	Low----------	0.28		
	38-60	---	---	---	---	---	-------------	----		
PaD2------------- Pacolet	0-4	20-35	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.5	Low----------	0.24	2	.5-1
	4-28	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28		
	28-36	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
	36-60	---	---	---	---	---	-------------	----		
PaE, PaF--------- 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
	5-27	35-65	1.30-1.50	0.6-2.0	0.12-0.15	4.5-6.0	Low----------	0.28		
	27-39	15-30	1.20-1.50	0.6-2.0	0.08-0.15	4.5-6.0	Low----------	0.28		
	39-60	---	---	---	---	---	-------------	----		
Pt. Pits										
Ro. Rock outcrop										
TaB, TaD, TaE---- Tatum	0-6	12-27	1.10-1.40	0.6-2.0	0.10-0.17	4.5-5.5	Low----------	0.24	4	.5-2
	6-48	35-60	1.40-1.60	0.6-2.0	0.10-0.19	4.5-5.5	Moderate-----	0.28		
	48-58	---	---	---	---	---	-------------	----		
	58-62	---	---	---	---	---	-------------	----		
Ud. Udorthents										
Ur. Urban land										
UwF-------------- Uwharrie	0-4	10-27	1.20-1.50	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.20	4	.2-5
	4-30	35-75	1.25-1.55	0.6-2.0	0.12-0.16	4.5-6.0	Moderate-----	0.28		
	30-40	15-60	1.30-1.60	0.6-2.0	0.12-0.16	4.5-6.0	Moderate-----	0.28		
	40-50	---	---	---	---	---	-------------	----		
VaB, VaD--------- Vance	0-5	8-20	1.45-1.70	2.0-6.0	0.10-0.14	4.5-7.3	Low----------	0.24	4	.5-2
	5-37	35-60	1.25-1.40	0.06-0.2	0.12-0.15	4.5-5.5	Moderate-----	0.28		
	37-60	---	---	---	---	---	-------------	----		
WeD-------------- Wedowee	0-7	6-20	1.25-1.60	2.0-6.0	0.10-0.18	4.5-5.5	Low----------	0.24	3	<1
	7-10	14-30	1.30-1.55	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.28		
	10-24	35-45	1.30-1.50	0.6-2.0	0.12-0.18	4.5-5.5	Moderate-----	0.28		
	24-33	15-35	1.30-1.55	0.6-2.0	0.12-0.18	4.5-5.5	Low----------	0.28		
	33-62	---	---	---	---	---	-------------	----		
WkD, WkF--------- Wilkes	0-6	5-20	1.30-1.50	2.0-6.0	0.11-0.15	5.1-6.5	Low----------	0.24	1	.5-2
	6-15	20-40	1.40-1.60	0.2-0.6	0.15-0.20	6.1-7.8	Moderate-----	0.32		
	15-60	---	---	---	---	---	-------------	----		

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	g/cc	In/hr	In/in	pH				Pct
WnB, WnD--------- Winnsboro	0-8	10-25	1.20-1.40	0.6-2.0	0.15-0.20	5.1-6.5	Low----------	0.32	3	.5-2
	8-28	35-60	1.20-1.50	0.06-0.2	0.15-0.20	6.1-7.8	High---------	0.20		
	28-36	15-35	1.30-1.60	0.2-0.6	0.15-0.20	6.1-7.8	Moderate-----	0.28		
	36-60	---	---	---	---	---	-------------	----		
WoA-------------- Worsham	0-6	10-25	1.25-1.55	0.6-2.0	0.14-0.20	4.5-5.5	Low----------	0.37	4	1-3
	6-45	30-55	1.35-1.65	<0.06	0.10-0.16	4.5-5.5	Moderate-----	0.28		
	45-60	10-40	1.20-1.50	0.2-0.6	0.08-0.19	4.5-5.5	Moderate-----	0.28		

TABLE 17.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "frequent," "brief," "apparent," and "perched" are explained in the text. The symbol > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	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			
AmB, AmD Alamance Variant	B	None	---	---	>6.0	---	---	40-60	Soft	Moderate	High.
ApB Appling	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CeB2, CeD2 Cecil	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
CfB, CfD: Cecil	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Urban land.											
CH Chewacla	C	Frequent	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High	Moderate.
Co Congaree	B	Occasional	Brief	Nov-Apr	2.5-4.0	Apparent	Nov-Apr	>60	---	Moderate	Moderate.
GaB2, GaD2, GaE Gaston	C	None	---	---	>6.0	---	---	>60	---	High	Moderate.
HeB Helena	C	None	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High	High.
HuB: Helena	C	None	---	---	1.5-2.5	Perched	Jan-Apr	>60	---	High	High.
Urban land.											
LgB Lignum	C	None	---	---	1.0-2.5	Perched	Dec-May	>60	Hard	High	High.
MaB2, MaD2, MaE Madison	B	None	---	---	>6.0	---	---	>60	---	High	Moderate.
PaD2, PaE, PaF Pacolet	B	None	---	---	>6.0	---	---	>60	---	High	High.
Pt. Pits											
Ro. Rock outcrop											
TaB, TaD, TaE Tatum	B	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Ud. Udorthents											
Ur. Urban land											

TABLE 17.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	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			
UwF: Uwharrie	B	None	---	---	>6.0	---	---	40-60	Soft	Moderate	Moderate.
VaB, VaD: Vance	C	None	---	---	>6.0	---	---	>60	---	High	High.
WeD: Wedowee	B	None	---	---	>6.0	---	---	>60	---	Moderate	High.
WkD, WkF: Wilkes	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	Moderate.
WnB, WnD: Winnsboro	D	None	---	---	>6.0	---	---	>60	---	High	Low.
WoA: Worsham	D	None	---	---	0-1.0	Apparent	Nov-Apr	>60	---	High	Moderate.

TABLE 18.--ENGINEERING INDEX TEST DATA

[Dashes indicate data were not available. NP means nonplastic. Soils sampled are the typical pedons for the soil series. See the section "Soil Series and Their Morphology" for location of pedon sample]

Soil name, report number, horizon, and depth in inches	Classification		Grain-size distribution							Liquid limit	Plasticity index	Moisture density	
			Percentage passing sieve--				Percentage smaller than--						
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			Maximum density	Optimoisture
										Pct		Lb/ft^3	Pct
Cecil sandy clay loam: (S80NC-071-001)													
Ap --------- 0 to 6	A-4(3)	SC	96	95	86	48	34	23	20	25	10	116.9	13.5
Bt1--------- 6 to 26	A-7-5(19)	MH	99	98	95	76	65	55	47	62	28	91.0	27.3
C --------- 58 to 80	A-7-5(8)	ML	100	100	97	65	48	29	21	50	12	96.9	23.4
Gaston sandy clay loam: (S81NC-071-002)													
Ap --------- 0 to 6	A-6(4)	SC	100	100	79	49	40	30	24	33	12	113.0	14.1
Bt2--------- 14 to 47	A-7-5(20)	MH	100	100	89	75	71	61	55	73	37	96.4	25.0
C --------- 57 to 72	A-5(7)	ML	100	100	91	65	37	16	9	47	10	98.5	20.2
Madison sandy clay loam: (S80NC-071-003)													
Ap --------- 0 to 4	A-4(5)	ML	98	98	95	57	39	27	21	37	11	100.0	18.8
Bt1--------- 4 to 20	A-7-5(20)	MH	100	100	95	76	67	59	52	74	35	87.5	28.9
C --------- 36 to 60	A-7-5(7)	MH	100	100	93	60	48	32	26	52	11	96.0	22.5
Tatum gravelly loam: (S81NC-071-004)													
A --------- 0 to 3	A-4(2)	SM	77	68	60	47	26	14	10	32	5	111.2	14.2
Bt2--------- 15 to 30	A-7-5(20)	MH	99	98	96	90	75	59	52	70	35	93.0	25.1
C --------- 48 to 58	A-4(8)	ML	99	94	94	80	40	20	16	39	8	106.3	18.2

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Alamance Variant	Fine-silty, siliceous, thermic Typic Hapludults
Appling	Clayey, kaolinitic, thermic Typic Kanhapludults
Cecil	Clayey, kaolinitic, thermic Typic Kanhapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Congaree	Fine-loamy, mixed, nonacid, thermic Typic Udifluvents
Gaston	Clayey, mixed, thermic Humic Hapludults
Helena	Clayey, mixed, thermic Aquic Hapludults
Lignum	Clayey, mixed, thermic Aquic Hapludults
Madison	Clayey, kaolinitic, thermic Typic Kanhapludults
Pacolet	Clayey, kaolinitic, thermic Typic Kanhapludults
Tatum	Clayey, mixed, thermic Typic Hapludults
Udorthents	Udorthents
*Uwharrie	Clayey, mixed, thermic Typic Hapludults
Vance	Clayey, mixed, thermic Typic Hapludults
Wedowee	Clayey, kaolinitic, thermic Typic Hapludults
Wilkes	Loamy, mixed, thermic, shallow Typic Hapludalfs
Winnsboro	Fine, mixed, thermic Typic Hapludalfs
Worsham	Clayey, mixed, thermic Typic Ochraquults

* 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.

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