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, and Stanly
County Board of
Commissioners

Soil Survey of Stanly County, North Carolina

How To Use This Soil Survey

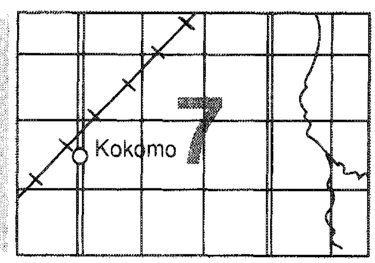
General Soil Map

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

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

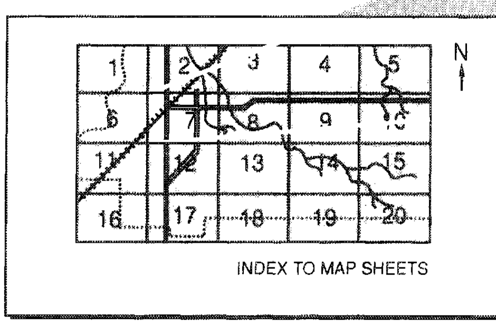
Detailed Soil Maps

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



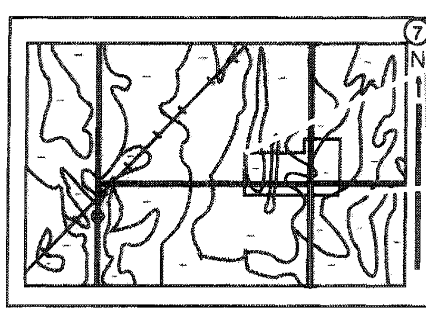
MAP SHEET

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

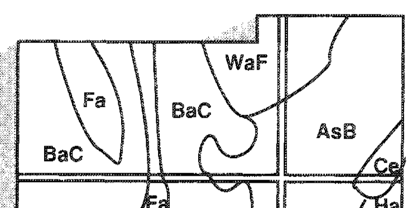


INDEX TO MAP SHEETS

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 Agricultural Experiment Stations, 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 1982. Soil names and descriptions were approved in 1984. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1982. This soil survey was made cooperatively by the Soil Conservation Service, the North Carolina Department of Natural Resources and Community Development, North Carolina Agricultural Research Service, North Carolina Agricultural Extension Service, and and the Stanly County Board of Commissioners. It is part of the technical assistance furnished to the Stanly County Soil and Water Conservation District.

This survey supersedes the soil survey of Stanly County published in 1916 and provides updated and additional information.

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.

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: Milo is a major crop on Georgeville silt loam, 2 to 8 percent slopes, a prime farmland soil in Stanly County.

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Issued September 1989

Index to Map Units

Summary of Tables

Foreword

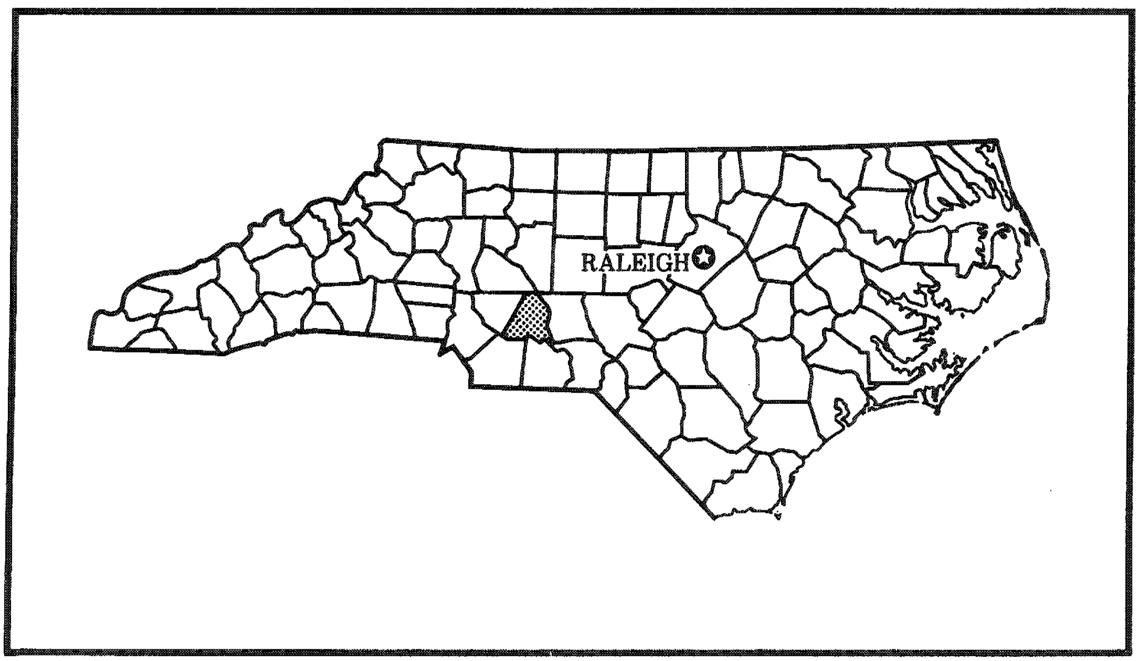
This soil survey contains information that can be used in land-planning programs in Stanly County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact 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 too unstable to be used as a foundation for buildings or roads. Clayey or wet 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 Cooperative Extension Service.

Bobbye Jack Jones
State Conservationist
Soil Conservation Service



Location of Stanly County in North Carolina.

Soil Survey of Stanly County, North Carolina

By Ronald B. Stephens, Soil Conservation Service

Soils surveyed by Ronald B. Stephens, Roy L. Mathis, Jr., Douglas J. Thomas, and Moulton A. Bailey, Soil Conservation Service, and Eugene Mellette, North Carolina Department of Natural Resources and Community Development

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, and the Stanly County Board of Commissioners

STANLY COUNTY is in south-central North Carolina, and it is bounded by Cabarrus, Rowan, Montgomery, Anson, and Union Counties. It is a major agricultural county and also has considerable industrial development. In 1980, the population of Stanly County was 48,517 and the population of Albemarle, the county seat, was 15,110 *(12)*.

The county has a total area of 259,187 acres or 398 square miles. The land is gently rolling hills and steep slopes along the main drainageways and streams.

In Stanly County, farming is a 35 million dollar per year industry. Poultry, commercial eggs, beef cattle, dairying, corn, soybeans, and small grains are the main agricultural enterprises. The county leads the state in egg production *(12)*.

General Nature of the County

This section gives general information concerning the county. It describes history, industry and transportation facilities, water supply, and climate.

History

Stanly County was formed in 1841 from Montgomery County *(12)*. It was named for John Stanly, a member of the General Assembly and Speaker of the House of Commons.

In the mid-1700's, Dutch, Scotch-Irish, and German settlers came into the area, mostly into the northern part. Settlers of English origin came into the southern part from Virginia and the Cape Fear River Basin.

The city of Albemarle was named for George Monk, Duke of Albemarle, and was incorporated February 2, 1857. The first courthouse was built in 1842 and was used for 50 years. Stanly County was the site of a gold rush in the 1860's.

The county's first textile plant was organized in Albemarle in 1896. It was followed in 1899 by another major textile company. The first passenger train appeared in the county around 1897.

Industry and Transportation Facilities

Stanly County is on the edge of the industrial Piedmont Crescent. Industry in the county is primarily textile-oriented, but it is becoming more diversified. Knit garments, bedspreads, draperies, primary aluminum, cotton and synthetic yarns, solite, mobile homes, and brick are produced in the county.

The county is served by U.S. Highway 52 and North Carolina Highways 24, 27, 49, 73, 200, and 205, as well as rail service, a national bus line, and a county airport. Stanly County is served by thirty-six trucking companies.

Figure 1.—Recreation and irrigation are among the uses for ponds in Stanly County.

Water Supply

Stanly County has an abundant water supply from lakes, surface streams, and ground water. Numerous manmade ponds are used for livestock water supply, fire protection, flood prevention, recreation, and irrigation (fig. 1). Badin Lake and Lake Tillery, two large lakes on the Yadkin River, are an important source of water and power. In addition to the Yadkin River, another major stream is the Rocky River.

Drilled wells and bored wells are used in Stanly County. Drilled wells are the most common because they are safer and more reliable. Bored wells generally are less than 40 feet deep. The drilled wells extend much deeper into the bedrock.

Albemarle supplies water to all parts of the city and most outside areas through the county-wide water system. The water comes from the Yadkin River and is processed by a filter plant.

Climate

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

Table 1 gives data on temperature and precipitation for the survey area as recorded at Albemarle in the period 1951 to 1973. 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 31 degrees. The lowest temperature on record, which occurred at Albemarle on December 12, 1958, is 0 degrees. In summer the average temperature is 76 degrees, and the average daily maximum temperature is 88 degrees. The highest recorded temperature, which occurred at Albemarle on July 12, 1952, 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, 26 inches, or 55 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 21 inches. The heaviest 1-day rainfall during the period of record was 5.47 inches at Albemarle on July 9, 1959. Thunderstorms occur on about 40 days each year. Every few years in late summer or fall, a tropical storm moving inland from the Atlantic Ocean causes extremely heavy rainfall for 2 to 3 days.

The average seasonal snowfall is 4 inches. The greatest snow depth at any one time during the period of record was 8 inches. On an average of 1 day, at least 1 inch of snow is on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 85 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 in which the soil formed. 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, 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 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 or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

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

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, 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.

1. Badin-Goldston

Undulating to steep, well drained soils that have a loamy surface layer and a loamy to clayey subsoil; formed in residuum from Carolina slates; on uplands

This map unit makes up 52.2 percent of the county and is the largest association. Badin soils make up 41 percent of the map unit; Goldston soils, 38 percent; and soils of minor extent, 21 percent (fig. 2). Most of the map unit is in a triangle from the southwest corner of the county to Palmerville, to Rocky River below Norwood, and west along Rocky River. Smaller areas are along the northwest boundary of the county. The terrain is highly dissected by intermittent streams. Ridgetops have undulating, gentle slopes. Side slopes are rolling to steep.

Badin soils are on undulating to rolling terrain, generally on the ridgetops, but also are on side slopes where the terrain is less broken. The surface layer is channery silt loam, and the subsoil is silty clay. Fractured slate is at a depth of 40 inches.

Goldston soils are on narrow ridgetops and steep side slopes. The surface layer and subsoil are very channery silt loam. Hard fractured slate is at a depth of 36 inches.

The minor soils in this map unit are the Oakboro, Chewacla, Kirksey, Misenheimer, Tatum, and Enon soils. Oakboro soils are on narrow flood plains throughout this map unit. Chewacla soils are on flood plains mainly along the Rocky River. Kirksey and Misenheimer soils are in depressional areas and at the head of and along drainageways. Tatum soils are on the broader, less broken ridgetops. Enon soils are stony and cobbly. They are in small areas widely scattered in a wide band from Badin to Cottonville.

About half of this map unit is used as woodland. The rest is used about equally as cropland, hayland, or pasture. Most of the woodland is on the Goldston soils. Most of the cropland is on the Badin soils that are undulating or gently rolling. The main limitations to the use of these soils are steepness of slope, surface runoff, the hazard of erosion, and depth to bedrock. Droughtiness is an additional limitation for Goldston soil.

Where the soils of this map unit are used for urban development, the main limitations are steepness of slope and depth to bedrock.

2. Tatum-Badin-Georgeville

Gently sloping to rolling, well drained soils that have a loamy surface layer and a clayey subsoil; formed in residuum from Carolina slates; on uplands

This map unit makes up 25.8 percent of the county. Tatum soils make up about 45 percent of the map unit; Badin soils, 24 percent; Georgeville soils, 10 percent; and soils of minor extent, 21 percent (fig. 3). This map unit is in a band that extends from the southwestern part of the county around Stanfield northeast to Badin Lake. The terrain varies from wide ridges with upland depressions, such as in the Millingport-Plyler area, to narrow ridges and side slopes along major streams, such as Long and Big Bear creeks.

Tatum soils are on broad ridges and side slopes. The surface layer is channery silt loam, and the subsoil is dominantly silty clay. Hard bedrock of graywacke

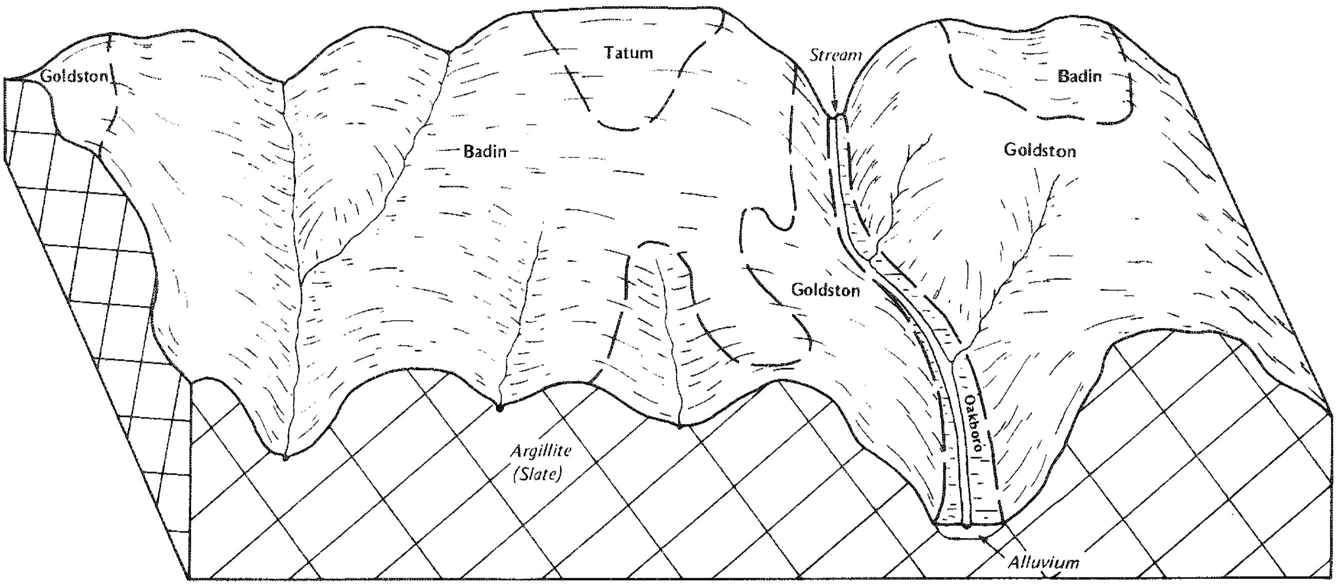


Figure 2.—Relationship of the soils in the Badin-Goldston general soil map unit.

sandstone is at a depth of about 60 inches.

Badin soils are mainly on narrow ridges and side slopes where the land is more dissected and rolling. The surface layer is channery silt loam, and the subsoil is silty clay. Fractured slate is at a depth of 40 inches.

Georgeville soils are mainly in the Millingport-Plyer area on broad, gently sloping ridgetops. The surface layer is silt loam, and the subsoil is silty clay.

The minor soils in this map unit include Kirksey, Chewacla, Oakboro, Hiwassee, Goldston, and Enon soils. Kirksey soils are in upland depressions and at the head of and along drainageways. Chewacla soils are on flood plains of the larger streams, and Oakboro soils are on flood plains of the smaller feeder streams. Hiwassee soils are mainly in the vicinity of New London. Goldston soils are in areas of the more broken topography. Enon soils generally are on the higher ridges of the map unit.

About half of this map unit is used as cropland. The rest is used about equally as woodland, hayland, or pasture. The cropland is mainly on the broad ridgetops. Most of the woodland is on the steeper side slopes. Hayland and pasture are intermingled in areas of the more strongly sloping soils. The main limitations to the use of these soils are steepness of slope, surface runoff, and the hazard of erosion.

The moderate permeability, clayey texture, and low strength for roads and streets are additional limitations that affect urban uses.

3. Misenheimer-Kirksey-Badin

Nearly level to gently sloping, somewhat poorly drained to well drained soils that have a loamy surface layer and a loamy to clayey subsoil; in depressional areas, at the head of and along drainageways, and on knolls and ridges

This map unit makes up 9.1 percent of the county. Misenheimer soils make up about 40 percent of the map unit; Kirksey soils, 30 percent; Badin soils, 10 percent; and soils of minor extent, 20 percent (fig. 4). This map unit is mainly in the Richfield-Misenheimer area, the flatwoods area, and an area near Oakboro. Misenheimer soils are dominant in the Richfield-Misenheimer area. Kirksey soils are dominant soils in the flatwoods area.

Misenheimer soils are somewhat poorly drained. They are on broad, nearly level to gently sloping upland ridges and in depressions or on flats around the head of intermittent drainageways. The surface layer and subsoil are channery silt loam. Fractured slate is at a depth of 25 inches.

Kirksey soils are moderately well drained. They are on broad, nearly level flats and on gently sloping ridges. Kirksey soils are also around the head of intermittent drainageways. The surface layer is silt loam, and the subsoil is silty clay loam. Hard, rippable bedrock is at a depth of 46 inches.

Badin soils are well drained. They are on knolls. The

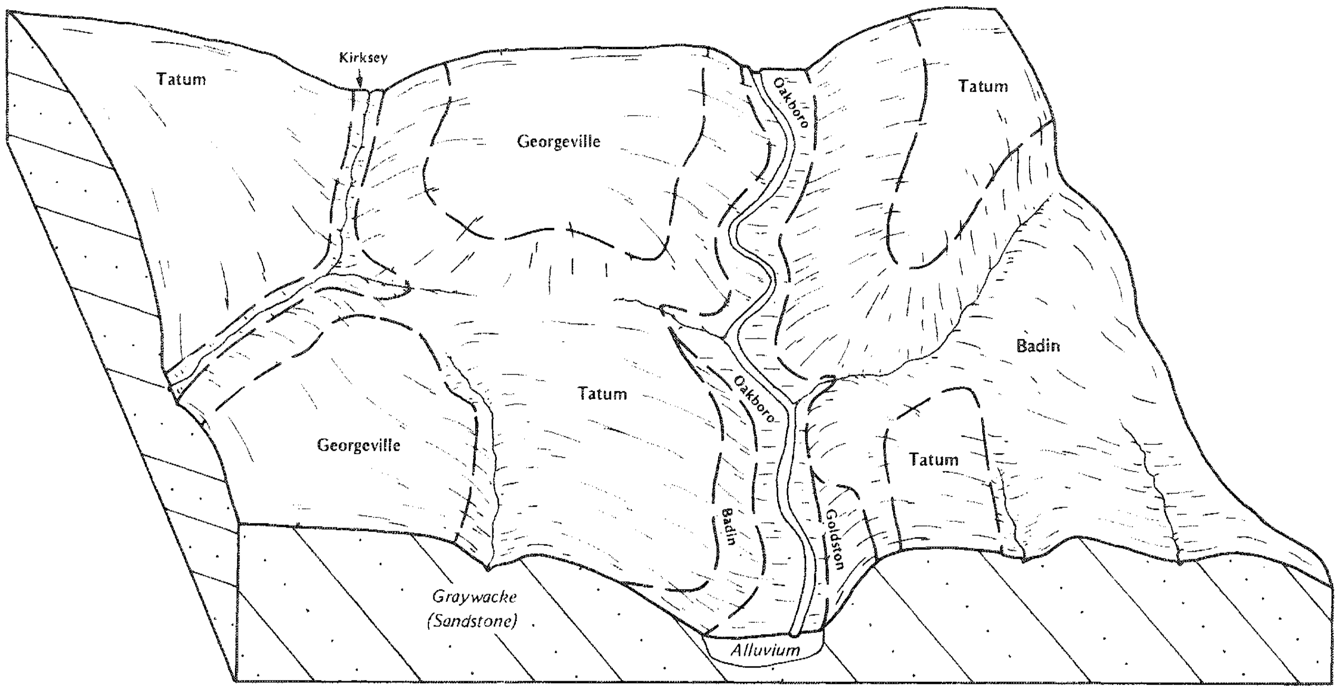


Figure 3.—Relationship of the soils in the Tatum-Badin-Georgeville general soil map unit.

surface layer is channery silt loam, and the subsoil is silty clay. Fractured slate is at a depth of 40 inches.

The minor soils in this map unit include Goldston, Oakboro, and Tatum soils. Goldston and Tatum soils are on the higher, well drained ridges and on side slopes along streams. Oakboro soils are on flood plains.

About half of this map unit is used as woodland. The rest is used mainly as cropland or pasture. Depth to bedrock and seasonal wetness and droughtiness are the main limitations to the use and management of these soils.

4. Tatum (Eroded)-Badin-Georgeville (Eroded)

Gently sloping to steep, well drained, dominantly eroded soils that have a loamy surface layer and a clayey subsoil; formed in residuum from Carolina slates; on uplands

This map unit makes up 5.5 percent of the county. Tatum soils make up about 50 percent of the map unit; Badin soils, 20 percent; Georgeville soils, 12 percent; and soils of minor extent, 18 percent. This map unit is in the southeastern part of the county along Lake Tillery and extends south to the forks of the Pee Dee and Rocky Rivers. The terrain, highly dissected by intermittent streams, is gently sloping or undulating ridgetops and hilly to steep slopes along the streams. These dominantly eroded soils formed in residuum of thinly bedded slate.

Tatum soils are on ridgetops and on the smoother side slopes. The surface layer is channery silty clay loam, and the subsoil is silty clay. Hard bedrock is at a depth of 60 inches.

Badin soils generally are on hilly to steep side slopes. The steeper slopes are mostly along the Pee Dee and Rocky Rivers. The surface layer is channery silt loam, and the subsoil is silty clay. Fractured slate is at a depth of 40 inches.

Georgeville soils are on the broader, smoother parts of the ridgetops. The surface layer is silty clay loam, and the subsoil is silty clay.

The minor soils in this map unit include Goldston, Kirksey, Oakboro, Chewacla, Congaree, and Hiwassee soils. Goldston soils are on steep side slopes. Kirksey soils are in upland depressions and at the head of and along drainageways. Oakboro soils are on flood plains of the smaller streams. Chewacla and Congaree soils are on the flood plains of the rivers. Hiwassee soils are on high terraces above the flood plains.

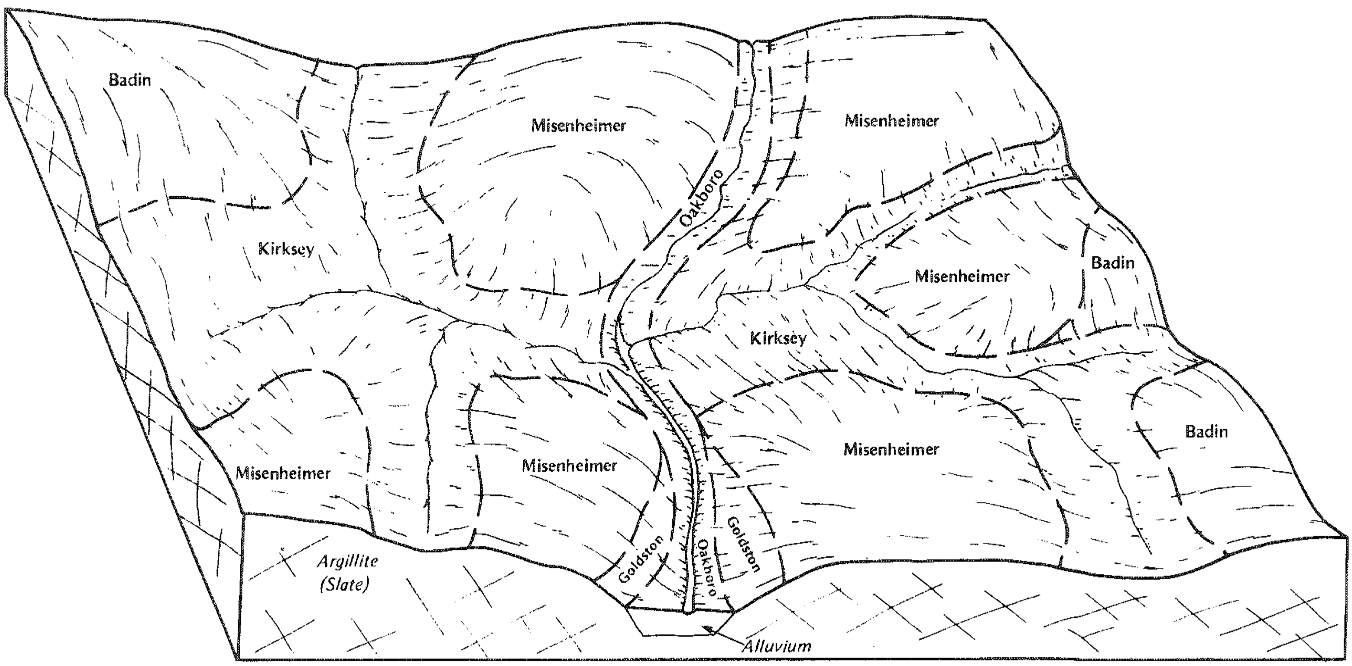


Figure 4.—Relationship of the soils in the Misenheimer-Kirksey-Badin general soil map unit.

About half of this map unit is used as woodland. The rest is used mainly as cropland or pasture. Most of the woodland is on steep side slopes, and the cropland is on the broader ridges. The main limitations to the use and management of these soils are the eroded surface layer and steepness of slope.

Moderate permeability, the clayey texture, and low strength for roads and streets are the main limitations for urban uses.

5. Enon

Undulating to hilly, well drained soils that have a very stony loam or cobbly loam surface layer and a plastic clayey subsoil; formed in residuum from mixed acid and basic rocks; on uplands

This map unit makes up 3.8 percent of the county. It is about 70 percent Enon soils and 30 percent soils of minor extent. About 90 percent of this map unit is on high hills, such as Stony Mountain, in the eastern part of the county. A small area is near Stanly Technical College.

Enon soils have a stony or cobbly loam surface layer. The subsoil is very firm clay. Moderately hard bedrock is at a depth of 65 inches.

The minor soils in this map unit include Badin, Goldston, Kirksey, and Oakboro soils. Goldston and Badin soils are on lower slopes where the bedrock is slate and there are fewer surface stones. Kirksey soils are at the head of and along drainageways. Oakboro soils are on narrow flood plains.

Most of this map unit is used as woodland. The rest is mostly in pasture. Stones, cobbles, steepness of slope, slow permeability, high shrink-swell potential, low strength for roads and streets, and the clayey texture are the main limitations to the use of the Enon soils.

6. Uwharrie-Hiwassee-Tatum

Gently sloping to very steep, well drained soils that have a stony loam or gravelly loam surface layer and a clayey subsoil; on uplands

This map unit make up 3.6 percent of the county. It is about 40 percent Uwharrie soils, 28 percent Hiwassee soils, 22 percent Tatum soils, and 10 percent soils of minor extent (fig. 5). The largest area extends from New London northeast to the Yadkin River. A smaller area is just north of Morrow Mountain. These soils developed from Carolina slate material, such as tuff, and also from mixed acidic and basic crystalline rock.

Uwharrie soils are on undulating ridges and steep side slopes. The surface layer is loam, and the subsoil

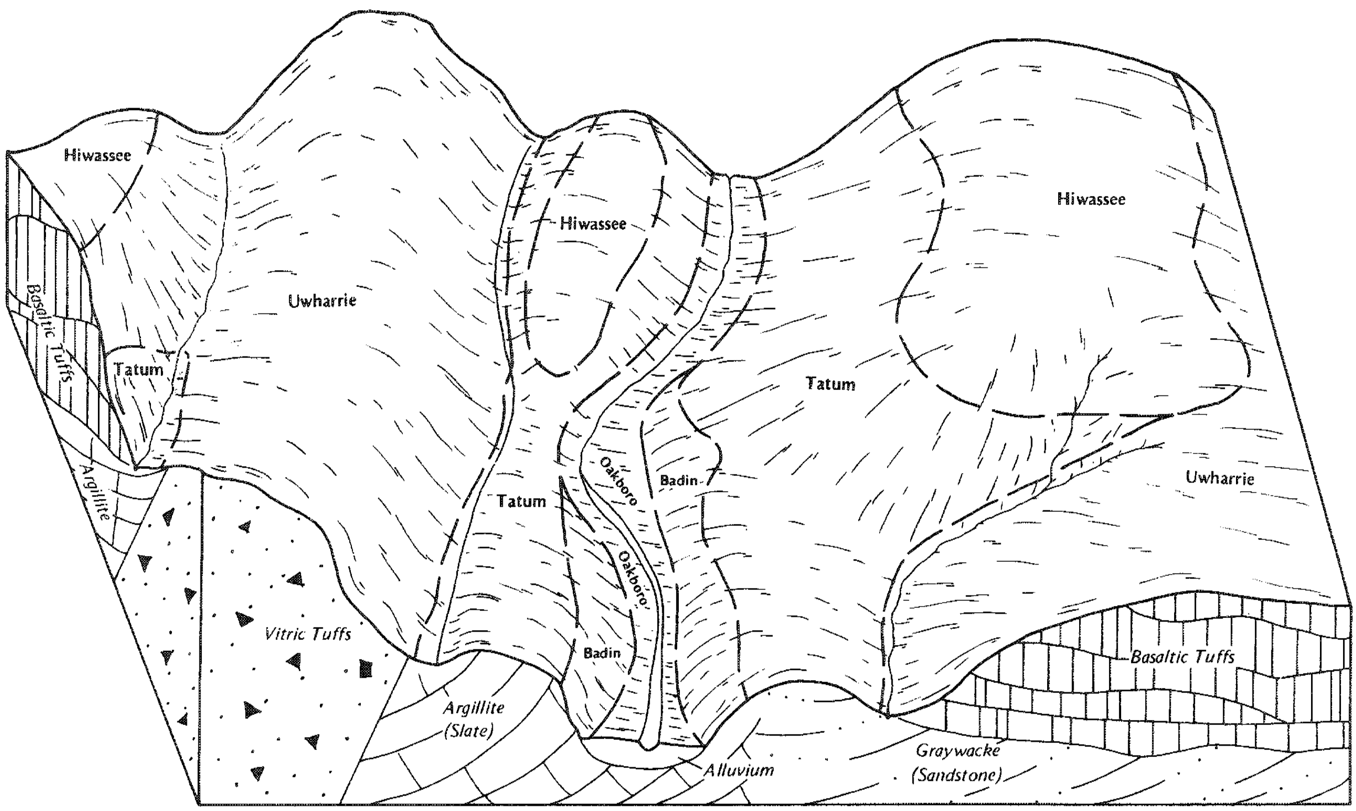


Figure 5.—Relationship of the soils in the Uwharrie-Hiwassee-Tatum general soil map unit.

is firm clay. Moderately hard bedrock is at a depth of 74 inches.

Hiwassee soils are on gently sloping ridgetops and strongly sloping side slopes. The surface layer is gravelly loam, and the subsoil is clay.

Tatum soils are on steep side slopes along the main drainageways and streams. The surface layer is channery or gravelly silt loam, and the subsoil is silty clay. Hard bedrock is at a depth of 60 inches.

The minor soils in this map unit include Badin, Goldston, Kirksey, and Oakboro soils. Goldston and Badin soils are on lower slopes where the bedrock is slate and there are fewer surface stones. Kirksey soils are at the head of and along drainageways. Oakboro soils are on narrow flood plains.

Most of this map unit is in woodland. Small acreages are in pasture or cropland. Surface stones severely limit the use of Uwharrie soils for most uses. The gravelly or slaty surface layer, steepness of slope, and clayey subsoil are the main limitations to the use of the Hiwassee and Tatum soils.

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 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. Key physical and chemical properties are mentioned in the map units. Additional properties information is provided in tables 14, 15, 16, and 17.

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

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

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils, or of one or more soils and a miscellaneous area, 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. Badin-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. Urban land is an example. Miscellaneous areas are shown 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.

BaB—Badin channery silt loam, 2 to 8 percent slopes. This soil is well drained. It is on narrow, undulating upland ridges that are highly dissected by intermittent drainageways. This soil is mainly on slate formations throughout the county. The areas are irregular in shape and are mostly 5 to 35 acres; however, some areas are as much as 100 acres.

Typically, this Badin soil has a brown channery silt loam surface layer 6 inches thick. The subsoil extends to a depth of 25 inches. The upper part is strong brown channery silty clay loam, the middle part is yellowish red silty clay, and the lower part is mottled red, yellowish red, and strong brown channery silty clay loam. Weathered bedrock extends to a depth of 40 inches and is highly fractured slate. Silt loam is in cracks and seams. Unweathered fractured slate is at a depth of 40 inches.

This soil will erode where areas are bare and unprotected. In these areas, surface runoff is medium, and susceptibility to erosion is severe. The flat slate channers on the surface provide a mulch effect, however, and help to hold water and reduce erosion. The permeability and shrink-swell potential of the subsoil are moderate. The available water capacity is low to moderate. Depth to bedrock is 20 to 40 inches.

Included with this soil in mapping are small areas of Enon, Goldston, Misenheimer, Kirksey, and Tatum soils. The Enon soils have a cobbly surface layer. The Goldston soils are in areas where the topography is most broken, typically on knolls and short side slopes. The Misenheimer and Kirksey soils are in depressions and along the intermittent drainageways. The Tatum soils have smoother, less variable slopes and are near the center of ridges. Also included are small eroded areas of Badin soils that have a channery silty clay loam surface layer. The included soils make up 15 to 30 percent of this map unit.

This Badin soil is used mainly for crops or pasture. The rest is used as woodland or for urban development.

The main crops are corn, soybeans, and small grains. Steepness of slope, the available water capacity, surface runoff, and the hazard of erosion are the main limitations for crop production. Conservation practices are needed to control erosion and runoff and to maintain soil tilth.

Where this soil is used for hay or pasture, proper management is needed, including maintaining a protective plant cover to control runoff and erosion.

Where this soil is used as woodland, the dominant trees are red oak, white oak, post oak, chestnut oak, yellow poplar, hickory, loblolly pine, shortleaf pine, and Virginia pine. The main understory plants are dogwood, sweetgum, blackgum, sourwood, American holly, cedar, black cherry, redbud, and red maple. There are no major limitations for woodland use and management.

Depth to bedrock, the clayey subsoil, the moderate shrink-swell potential, and low strength for roads and streets are the main limitations for building site development. Erosion is a hazard at construction sites, and conservation practices are needed. For most recreational uses, the main limitations are small stones on the surface and dustiness.

This Badin soil is in capability subclass IIIe. The woodland ordination symbol is 8A.

BaD—Badin channery silt loam, 8 to 15 percent slopes. This soil is well drained. It is on side slopes along intermittent drainageways on highly dissected, rolling uplands. This soil is mainly on slate formations throughout most of the county but is also on sandstone formations between Locust and New London. The overall surface contour of this soil is convex; however, slopes are complex and can change shape or length within short distances. The areas are irregular in shape and range from 4 to more than 50 acres.

Typically, this Badin soil has a brown channery silt loam surface layer 6 inches thick. The subsoil extends to a depth of 25 inches. The upper part is strong brown channery silty clay loam. The middle part is yellowish red silty clay. The lower part is mottled red, yellowish red, and strong brown channery silty clay loam. Weathered bedrock extends to a depth of 40 inches and is highly fractured slate. Silt loam is in cracks and seams. Unweathered fractured slate is at a depth of 40 inches.

This soil will erode where areas are bare and unprotected. In these areas, surface runoff is very rapid and susceptibility to erosion is very severe. Surface channers provide a mulch effect, however, and help to hold water and control erosion. The permeability and shrink-swell potential of the subsoil are moderate. The available water capacity is low to moderate. Depth to bedrock is 20 to 40 inches.

Included with this soil in mapping are some small areas of Goldston, Misenheimer, Kirksey, and Tatum soils. The Goldston soils are in areas where the topography is most broken, typically on knolls and short side slopes where ledges of bedrock are near the surface. The Misenheimer and Kirksey soils are along the intermittent drainageways. The Tatum soils have smoother, wider slopes. In places are a few small eroded areas of Badin soils that have a channery silty clay loam surface layer. The included soils make up 20 to 30 percent of this map unit.

Badin soil is used mainly as woodland. In some areas, it is used for crops, hay, or pasture.

In woodland areas, the dominant trees are red oak, white oak, post oak, chestnut oak, yellow poplar, hickory, loblolly pine, shortleaf pine, and Virginia pine. The main understory plants are dogwood, sweetgum, blackgum, sourwood, American holly, cedar, black cherry, redbud, and red maple. The depth to fractured bedrock and the windthrow hazard are the main limitations for woodland use and management.

Corn, soybeans, small grains, and milo are the main crops. Steepness of slope, surface runoff, and the hazard of erosion are the main limitations for crop production. Conservation practices are needed to control erosion and runoff and to maintain soil tilth.

Where this soil is used for hay or pasture, proper management is needed, including maintaining a protective plant cover to control runoff and erosion.

The clayey subsoil, depth to bedrock, steepness of slope, and the moderate shrink-swell potential are the main limitations for building site development. Erosion is a hazard at construction sites, and conservation practices are needed. Steepness of slope, small stones on the surface, and dustiness are the main limitations for most recreational uses.

This Badin soil is in capability subclass IVe. The woodland ordination symbol is 8A.

BaF—Badin channery silt loam, 15 to 45 percent slopes. This soil is well drained and is hilly to steep. It is on upland side slopes adjacent to major drainageways. This soil is mainly on slate formations throughout most of the county but is also on sandstone formations between Locust and New London. Upper slopes are convex, and lower slopes are concave. The areas are broken by many intermediate drainageways; they are elongated, and most range from 3 to 35 acres.

Typically, this Badin soil has a brown channery silt loam surface layer 6 inches thick. The subsoil extends to a depth of 25 inches. The upper part is strong brown channery silty clay loam. The middle part is yellowish red silty clay. The lower part is mottled red, yellowish red, and strong brown channery silty clay loam. Weathered bedrock extends to a depth of 40 inches and is highly fractured slate. Silt loam is in cracks and seams. Unweathered fractured slate is at a depth of 40 inches.

This soil will erode where areas are bare and unprotected. In these areas, surface runoff is very rapid and susceptibility to erosion is very severe. The permeability and shrink-swell potential of the subsoil are moderate. The available water capacity is low to moderate. Depth to bedrock is 20 to 40 inches.

Included with this soil in mapping are some small areas of Enon, Goldston, Misenheimer, Kirksey, and Tatum soils. The Enon soils are intermingled in areas that are underlain by less acid rock that generally runs from northeast to southwest. The Goldston soils are in areas where the topography is most broken, especially on knolls and short side slopes where ledges of bedrock are near the surface. The Misenheimer and Kirksey soils are along intermittent drainageways. The Tatum soils have smoother, longer slopes and are adjacent to ridges of Badin soils. In places are a few small eroded areas of Badin soils that have a channery silty clay loam surface layer. Bedrock outcrops are in some areas, especially where the landscape breaks sharply. The included soils make up 15 to 25 percent of this map unit.

Most of this Badin soil is used as woodland. The rest is used mainly for pasture or hay.

In woodland areas, the dominant trees are red oak, white oak, post oak, chestnut oak, yellow poplar, hickory, loblolly pine, shortleaf pine, and Virginia pine. The main understory plants are dogwood, sweetgum, blackgum, sourwood, holly, cedar, black cherry, and red maple. Steepness of slope, depth to bedrock, and the windthrow hazard are the main limitations for woodland use and management.

Where this soil is used for pasture and hay, steepness of slope, surface runoff, and the hazard of erosion are the main limitations. Proper management includes maintaining a protective plant cover to control runoff and erosion.

Steepness of slope and depth to bedrock are severe limitations for building site development and recreational uses. Additional limitations are the moderate shrink-swell potential and the clayey texture of the subsoil. The hazard of erosion is very severe at construction sites.

This Badin soil is in capability subclass VIIe. The woodland ordination symbol is 8R.

BbB—Badin-Urban land complex, 2 to 8 percent slopes. This map unit consists of intermingled areas of Badin soil and Urban land mainly in the vicinity of Albemarle. Badin soil is well drained and undulating. An area typically consists of about 50 to 70 percent Badin soil and 15 to 35 percent Urban land.

Typically, this Badin soil has a brown channery silt loam surface layer 6 inches thick. The subsoil extends to a depth of 25 inches. The upper part is strong brown channery silty clay loam. The middle part is yellowish red silty clay. The lower part is mottled red, yellowish red, and strong brown channery silty clay loam. Weathered bedrock extends to a depth of 40 inches and is highly fractured slate. Silt loam is in cracks and seams. Unweathered fractured slate is at at a depth of 40 inches.

This soil will erode where areas are bare and unprotected. In these areas, surface runoff is rapid and the susceptibility to erosion is severe. The permeability and shrink-swell potential of the subsoil are moderate. The available water capacity is low to moderate. Depth to bedrock is 20 to 40 inches.

Urban land consists of areas that are covered with buildings, streets, parking lots, and driveways.

Included in mapping are small areas of Kirksey, Goldston, Misenheimer, and Tatum soils. The Goldston soils are in areas where the topography is most broken, typically on knolls and short side slopes. The Misenheimer and Kirksey soils are in depressional areas and around intermittent drainageways. The Tatum soils have smoother slopes and are near the center of ridges. In places are small cut and fill areas where the natural soil has been altered or covered. These areas commonly are adjacent to Urban land. The included soils make up 20 to 30 percent of this map unit.

On Badin soil, the hazard of erosion is severe, and conservation practices are needed to control erosion and surface runoff. Runoff from rooftops and paved surfaces increases the hazard of flooding in low-lying areas along streams. The clayey texture and moderate shrink-swell potential of the subsoil are additional limitations. Onsite investigation is needed before planning the use and management of this map unit.

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

BbD—Badin-Urban land complex, 8 to 25 percent slopes. This map unit consists of intermingled areas of Badin soil and Urban land mainly in the vicinity of Albemarle. Badin soil is well drained and rolling to hilly. An area typically consists of about 50 to 70 percent Badin soil and 15 to 35 percent Urban land.

Typically, this Badin soil has a brown channery silt loam surface layer 6 inches thick. The subsoil extends to a depth of 25 inches. The upper part is strong brown channery silty clay loam. The middle part is yellowish red silty clay. The lower part is mottled red, yellowish red, and strong brown channery silty clay loam. Weathered bedrock extends to a depth of 40 inches and is highly fractured slate. Silt loam is in cracks and seams. Unweathered fractured slate is at a depth of 40 inches.

This soil will erode where areas are bare and unprotected. Runoff is very rapid, and the susceptibility to erosion is very severe. The permeability and shrink-swell potential of the subsoil are moderate. Depth to bedrock is 20 to 40 inches.

Urban land consists of areas that are covered with buildings, streets, parking lots, and driveways.

Included with this soil in mapping are a few small areas of Kirksey, Misenheimer, Goldston, and Tatum soils. Goldston soils are in areas where the topography is most broken. Misenheimer and Kirksey soils are along intermittent drainageways. Tatum soils have smoother, wider slopes. In places are small cut and fill areas where the natural soil has been altered or covered. These areas commonly are adjacent to Urban land. The included soils make up 20 to 30 percent of this map unit.

For Badin soil, the hazard of erosion is very severe, and conservation practices are needed to reduce erosion and control surface runoff. Runoff from rooftops and paved surfaces increases the hazard of flooding in low-lying areas along streams. The moderately steep slopes and the clayey texture and moderate shrink-swell potential of the subsoil are additional limitations. Onsite investigation is needed before planning the use and management of this map unit.

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

Ch—Chewacla loam, occasionally flooded. This soil is nearly level and somewhat poorly drained. It is on flood plains along the Pee Dee River below Lake Tillery Dam. The areas are long, broad, and flat. They generally are more than 500 feet in width and range from 100 to more than 500 feet in length. They are 10 to more than 200 acres.

Typically, this Chewacla soil has a dark brown loam surface layer 7 inches thick. The subsoil extends to a depth of 64 inches. The upper part is yellowish brown loam that has light brownish gray mottles. The middle part is brownish yellow loam that has light brownish gray mottles, and the lower part is light brownish gray sandy clay loam that has light yellowish brown mottles. The underlying material to a depth of 80 inches is light brownish gray stratified sand and gravel.

The permeability is moderate, and the available water capacity is high. Depth to the seasonal high water table is 0.5 foot to 1.5 feet late in winter and early in spring. The Lake Tillery Dam has reduced flooding, but this soil is still subject to occasional flooding for very brief periods.

Included with this soil in mapping are small areas of Congaree soils on slightly higher natural levees adjacent to the streams. In places are some small areas of poorly drained soils in depressions. The included soils make up about 20 percent of this map unit.

Most of this Chewacla soil is used as cropland. Small acreages are pasture, hayland, or woodland.

The main crops are corn and soybeans. Seasonal wetness is the main limitation, and occasional flooding is a hazard. Ditches or subsurface tile can be used to improve drainage.

In woodland areas, the dominant trees are loblolly pine, yellow poplar, sweetgum, and willow oak. The main understory plants are cottonwood, American hornbeam, alder, and red maple. Wetness is the main limitation for woodland use and management.

This soil generally is not used for building sites or recreational uses because of wetness and flooding.

This Chewacla soil is in capability subclass IIIw. The woodland ordination symbol is 9W.

Ck—Chewacla silt loam, frequently flooded. This soil is nearly level and somewhat poorly drained. It is on flood plains adjacent to major streams, typically those that drain areas that are underlain by siltstone and sandstone formations. The areas are long and narrow and range from 4 to 100 acres.

Typically, this Chewacla soil has a dark brown silt loam surface layer 6 inches thick. The subsoil extends to a depth of 60 inches. The upper part is pale brown silt loam that has light brownish gray mottles. The middle part is pale brown silty clay loam that has light brownish gray mottles. The lower part is light brownish yellow and light brownish gray silty clay loam. The underlying material to a depth of 80 inches is light gray stratified sand and gravel.

The permeability is moderate, and the available water capacity is high. Depth to the seasonal high water table is 0.5 to 1.5 feet late in winter and early in spring. This soil is subject to frequent flooding for brief periods in winter and spring.

Included with this soil in mapping are a few small areas of Congaree soils. Congaree soils are well drained. They are in slightly higher, narrow bands adjacent to streams in some of the areas. Also included are small areas of Chewacla soils that have a fine sandy loam or loam surface layer, soils that have bedrock within 60 inches of the surface, and some areas of poorly drained soils in depressions. The included soils make up about 20 percent of this map unit.

Most of the acreage of this Chewacla soil is in unmanaged wetland hardwood forest. A small acreage is used as pasture or cropland on some of the larger flood plains.

In woodland areas, the dominant trees are yellow poplar, river birch, white oak, willow oak, sycamore, sweetgum, and ash. The main understory plants are cottonwood, dogwood, sourwood, American hornbeam, alder, and red maple. Wetness is the main limitation for woodland use and management.

In cleared areas, this soil is used for hay, pasture, or crops, such as corn and soybeans. However, wetness is a major limitation, and frequent flooding is a hazard. Drainage systems are needed, but suitable outlets are unavailable in most places.

This soil is not used for building sites and recreation development because of wetness and flooding.

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

Co—Congaree fine sandy loam, frequently flooded. This soil is nearly level to gently sloping and is well drained. It is on slightly raised natural levees adjacent to the Pee Dee River below the Lake Tillery Dam and along the Rocky River. The areas are long and narrow and range from about 4 to 50 acres.

Typically, this Congaree soil has a yellowish brown fine sandy loam surface layer 10 inches thick. The underlying material to a depth of 60 inches is dark yellowish brown loam in the upper part, yellowish brown loam in the middle part, and mottled yellowish brown and dark yellowish brown loamy fine sand in the lower part.

The permeability is moderate, and the available water capacity is high. The seasonal high water table is at a depth of 2.5 to 4 feet late in winter and early in spring. The Lake Tillery Dam greatly reduces the hazard of flooding in areas of this soil along the Pee Dee River. Areas along the Rocky River are less protected from flooding. In winter and early in spring the Rocky River frequently floods for brief periods.

Included with this soil in mapping are small areas of Chewacla and Oakboro soils in depressions and a few small areas of soils that are similar to Congaree soil except that they have a loamy sand or sandy loam surface layer. Also included in small, slightly higher areas are soils that are sandy throughout. The included soils make up about 20 percent of this map unit.

Most of this Congaree soil is used as cropland. In some areas, it is used as pasture or hayland. The rest is used mainly as woodland.

The main crops are corn, soybeans, and small grains. Some horticultural crops, such as cucumbers, cantaloupes, watermelons, and sweet corn, are also grown. Flooding is a hazard, and crops are damaged sometimes.

In woodland areas, the dominant trees are yellow poplar, river birch, sycamore, white oak, red oak, willow oak, ash, sweetgum, loblolly pine, and shortleaf pine. The main understory plants are cottonwood, dogwood, sourwood, American hornbeam, alder, and red maple. There are no major limitations for woodland use and management.

This soil generally is not used for building sites because of the hazard of flooding, which is also the main limitation for recreational uses.

This Congaree soil is in capability subclass IIIw. The woodland ordination symbol is 9A.

EcB—Enon cobbly loam, 2 to 8 percent slopes. This soil is well drained. It is on undulating, high, prominent ridges mostly in the central and eastern parts of the county. The underlying bedrock strata are associated mostly with tuff formations and gabbro sills.

The areas are irregular in shape and range from 4 to more than 100 acres.

Typically, this Enon soil has a dark grayish brown cobbly loam surface layer 2 inches thick. The subsurface layer to a depth of 6 inches is yellowish brown cobbly loam. The subsoil extends to a depth of 28 inches. It is yellowish brown clay in the upper part. The lower part is yellowish brown clay loam that has dark yellowish brown and yellow mottles. The underlying material to a depth of 65 inches is yellowish brown, dark yellowish brown, and yellow saprolite that crushes to loam and fine sandy loam. Weathered gabbro is at a depth of 65 inches.

This soil will erode where areas are bare and unprotected. The permeability of the subsoil is slow, and shrink-swell potential is high. The available water capacity is moderate. Depth to bedrock is more than 60 inches. The surface layer is 15 to 35 percent cobbles, by volume.

Included with this soil in mapping are small areas of Badin and Goldston soils on lower slopes. Badin soils are more permeable than Enon soil, and Goldston soils are very channery. Also included are a few small areas of soils that have a sandy loam surface layer and areas of soils that have a few stone-size fragments. Fine-grained tuff outcrops are in some areas at the crest of ridges. In places are some soils that have saprolite at a depth of less than 20 inches or have a subsoil with a very high shrink-swell potential and a perched water table during wet seasons. The included soils make up 15 to 25 percent of this map unit.

Most of this Enon soil is used as woodland. Small acreages are used for crops, hay, or pasture.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, white oak, hickory, blackjack oak, post oak, northern red oak, and sweetgum. The main understory plants are eastern redcedar, red maple, redbud, blackgum, and dogwood. The high content of gravel in this soil and wetness in the winter and spring are the main limitations for woodland use and management.

The main crops are corn, soybeans, small grains, and milo. Surface fragments are very hard and cause excessive wear on farm equipment. Steepness of slope, surface runoff, and the hazard of erosion are additional limitations. Conservation practices are needed to control erosion and improve the content of organic matter.

Where this soil is used for hay and pasture, proper management is needed, including maintaining a protective plant cover to reduce runoff and control erosion.

Slow permeability, the high shrink-swell potential, low strength for roads and streets, and the clayey subsoil are major limitations to using this soil for building site development. Corrective measures for shrinking and swelling include strengthening the footings and foundations and removing excess moisture. Slow permeability, cobbles, and steepness of slope are the main limitations for recreational uses.

This Enon soil is in capability subclass IIIe. The woodland ordination symbol is 7A.

EcD—Enon cobbly loam, 8 to 15 percent slopes. This soil is well drained. It is on rolling side slopes on high, prominent ridges, mostly in the central and eastern parts of the county. The underlying bedrock strata are associated mostly with tuff formations and gabbro sills. The landscape is cut to a moderate extent by intermittent streams. The areas are long, are irregular in width, and range from 4 to more than 100 acres.

Typically, this Enon soil has a dark grayish brown cobbly loam surface layer 2 inches thick. The subsurface layer to a depth of 6 inches is yellowish brown cobbly loam. The subsoil extends to a depth of 28 inches. It is yellowish brown clay in the upper part. The lower part is yellowish brown clay loam that has dark yellowish brown and yellow mottles. The underlying material to a depth of 65 inches is yellowish brown, dark yellowish brown, and yellow saprolite that crushes to loam and fine sandy loam. Weathered gabbro is at a depth of 65 inches.

This soil will erode where areas are bare and unprotected. The permeability of the subsoil is slow, and shrink-swell potential is high. The available water capacity is moderate. Depth to bedrock is more than 60 inches. The surface layer is 15 to 35 percent cobbles, by volume.

Included with this soil in mapping are small areas of Badin and Goldston soils on lower slopes. Badin soils are more permeable than Enon soil, and Goldston soils are very channery. Also included are small areas of soils that do not have cobbles on the surface and some areas of soils that are very stony. Fine-grained tuff outcrops are in some areas at the crest of ridges. In places are some soils that have saprolite at a depth of less than 20 inches. Other small areas of soils have a perched water table during wet seasons.

Most of this Enon soil is used as woodland. Small acreages are used for crops, hay, or pasture.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, white oak, hickory, blackjack oak, post oak, northern red oak, and sweetgum. The main understory plants are cedar, red maple, redbud, blackgum, and dogwood. The high content of gravel in this soil, wetness in the winter and spring, and steepness of slope are the main limitations for woodland use and management.

The main crops are corn, soybeans, small grains, and milo. Surface cobbles are very hard and cause excessive wear on farm equipment. Steepness of slope, surface runoff, and the hazard of erosion also limit this soil for crop production. Conservation practices are needed to control erosion and improve the content of organic matter.

Where this soil is used for hay or pasture, proper management is needed, including maintaining a protective plant cover to control runoff and erosion.

Slow permeability, the high shrink-swell potential, low strength, and the clayey subsoil are major limitations to the use of this soil for building site development. Corrective measures for shrinking and swelling include strengthing the footings and foundations. Slow permeability, cobbles, and steepness of slope are the main limitations for recreational uses.

This Enon soil is in capability subclass IVe. The woodland ordination symbol is 7A.

EnC—Enon very stony loam, 4 to 15 percent slopes. This soil is well drained. It is on gently undulating to rolling uplands. It is widely distributed in the eastern part of the county on small mountains and hills that are underlain by gabbro, basaltic tuff, and other basic rocks. Much of the surface is covered with stones and boulders. The volume of stones and depth of the soil vary greatly over short distances. The areas trend northeast to southwest, are irregular in shape, and range from 4 to more than 50 acres.

Typically, this Enon soil has a dark brown very stony loam surface layer 6 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish brown clay in the upper part, and the lower part is yellowish brown clay loam that has yellow mottles. The underlying material to a depth of 65 inches is yellowish brown and dark yellowish brown saprolite that crushes to fine sandy loam. Weathered gabbro is at a depth of 65 inches.

The permeability of the subsoil is slow, and the shrink-swell potential is high. Depth to bedrock is more than 60 inches. Rock fragments make up 35 to 60 percent of the surface layer.

Included with this soil in mapping are small areas of Badin, Goldston, and Hiwassee soils. Badin and Hiwassee soils are more permeable than Enon soil. Goldston soils are very channery. Badin and Goldston soils are on lower slopes where the bedrock is slate and there are fewer surface stones. Hiwassee soils are on knolls and narrow ridges. Also included are small areas of soils that have a perched water table during wet seasons. The included soils make up 20 to 30 percent of this map unit.

Almost all of this Enon soil is used as woodland. The dominant trees are white oak, post oak, blackjack oak, chestnut oak, red oak, hickory, shortleaf pine, and Virginia pine. The main understory plants are cedar, redbud, blackgum, sweetgum, and red maple. Stones are the main limitation for woodland use and management. This soil generally is not used as cropland because it is too stony.

Stones, slow permeability, high shrink-swell potential, low strength, and the clayey subsoil are major limitations for building sites and recreational uses.

This Enon soil is in capability subclass VIs. The woodland ordination symbol is 7R.

EnE—Enon very stony loam, 15 to 25 percent slopes. This soil is well drained. It is on hilly uplands and is widely distributed in the eastern part of the county on small mountains and hills that are underlain by gabbro, basaltic tuff, and other basic rocks. Much of the surface is covered with stones and boulders. The volume of stones and depth of soil vary greatly over short distances. The areas trend northeast-southwest and range from 4 to more than 50 acres.

Typically, this Enon soil has a dark brown very stony loam surface layer 6 inches thick. The subsoil extends to a depth of 26 inches. It is yellowish brown clay in the upper part. The lower part is yellowish brown clay loam that has yellow mottles. The underlying material to a depth of 65 inches is yellowish brown and dark yellowish brown saprolite that crushes to fine sandy loam. Weathered gabbro is at a depth of 65 inches.

Permeability of the subsoil is slow, and the shrink-swell potential is high. Depth to bedrock is more than 60 inches. Rock fragments make up 35 to 60 percent of the surface layer.

Included with this soil in mapping are small areas of Badin, Goldston, and Hiwassee soils. Badin and Hiwassee soils are more permeable than Enon soil. Goldston soils are very channery. Badin and Goldston soils are on lower slopes where the bedrock is slate and there are fewer surface stones. Hiwassee soils are on knolls and narrow ridges. Some areas of soils have slopes that are slightly steeper than 25 percent. The included soils make up 20 to 30 percent of this map unit.

Most of this Enon soil is used as woodland. A small acreage has been cleared for pasture. This soil is not used as cropland because it is too stony.

In woodland areas, the dominant trees are white oak, post oak, blackjack oak, chestnut oak, red oak, hickory, shortleaf pine, and Virginia pine. The main understory plants are cedar, redbud, blackgum, sweetgum, and red maple. Moderately steep slopes and stones are the main limitations for woodland use and management.

Stones, slow permeability, high shrink-swell potential, low strength for roads and streets, the clayey subsoil, and steepness of slope are the major limitations for building site development and recreational uses.

This Enon soil is in capability subclass VIIs. The woodland ordination symbol is 7R.

GeB—Georgeville silt loam, 2 to 8 percent slopes. This soil is well drained and gently sloping. It is on broad, smooth upland ridges that are dissected by intermittent drainageways. The underlying bedrock strata are mostly siltstone and sandstone. The larger areas of this soil are in the vicinity of Millingport and Bloomington. The areas are irregular in shape and range from 4 to more than 200 acres.

Typically, this Georgeville soil has a strong brown silt loam surface layer 8 inches thick. The subsoil extends to a depth of 59 inches. It is red silty clay in the upper and middle parts and silty clay loam in the lower part. The underlying material to a depth of 80 inches is weak red and yellowish brown saprolite that crushes to silt loam.

This soil will erode where areas are bare and unprotected. Surface runoff is medium. The surface layer is subject to crusting after hard rains, and clods form if this soil is worked when wet. The permeability of the subsoil is moderate, and the shrink-swell potential is low. The available water capacity is moderate. Depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Tatum, Badin, and Kirksey soils. The Tatum and Badin soils have moderate shrink-swell potential. They are on narrow ridgetops and knolls and have slopes that are slightly more than 8 percent. Kirksey soils are moderately well drained. They are along intermittent drainageways and in small depressions. Also included are some areas of eroded soils that have a silty clay loam surface layer. In places are small areas of similar soils that have a yellowish red or strong brown subsoil. The included soils make up 15 to 20 percent of this map unit.

Most of this Georgeville soil is used as cropland. The rest is used mainly as woodland, although some areas are used for hay or pasture.

The main crops are corn, soybeans, milo, and small grains; however, horticultural crops, such as tomatoes, cucumbers, sweet corn, and green beans, are also grown. Steepness of slope, surface runoff, and the hazard of erosion are the main limitations. Conservation practices are needed to control erosion and improve the content of organic matter.

Where this soil is used for hay or pasture, proper management is needed to maintain a protective plant cover to control runoff and erosion.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, hickory, white oak, red oak, and post oak. The main understory plants are dogwood, sourwood, American holly, cedar, black cherry, red maple, and sassafras. There are no major limitations for woodland use and management.

This soil has no major limitations for building site development and recreational uses. However, the clayey subsoil, moderate permeability, and steepness of slope are limitations that affect some uses. Erosion is a hazard on construction sites, and conservation practices are needed.

This Georgeville soil is in capability subclass IIe. The woodland ordination symbol is 8A.

GfB2—Georgeville silty clay loam, 2 to 8 percent slopes, eroded. This soil is well drained and gently sloping. It is on broad, smooth upland ridges that are dissected by intermittent drainageways. The underlying bedrock strata are mostly siltstone and sandstone. The larger areas of this soil are around Norwood. The areas are irregular in shape and range from 4 to more than 80 acres.

Typically, this Georgeville soil has a red silty clay loam surface layer 8 inches thick. The subsoil to a depth of 60 inches is red silty clay. The underlying material to a depth of 72 inches is light reddish brown saprolite that crushes to silt loam.

This soil will continue to erode where areas are bare and unprotected. Where this soil is cultivated, a crust will form after hard rains and will limit infiltration. Clods form if the soil is worked when wet. Surface runoff is rapid, and the susceptibility to additional erosion is severe. The permeability of the subsoil is moderate, and the shrink-swell potential is low. The available water capacity is moderate. Depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Badin, Kirksey, and Tatum soils. Badin and Tatum soils have moderate shrink-swell potential. They are on narrow ridgetops and knolls and slopes are slightly

Figure 6.—Planting soybeans in wheat stubble helps to control erosion and runoff. These soybeans are on Georgeville silty clay loam, 2 to 8 percent slopes, eroded.

more than 8 percent. Kirksey soils are moderately well drained. They are in areas around intermittent drainageways and in small depressions. In places are some less eroded areas of Georgeville soils that have a silt loam surface layer and small areas of soils that are similar to Georgeville soil except they have a yellowish red or strong brown subsoil. The included soils make up 15 to 20 percent of this map unit.

Most of this Georgeville soil is used as cropland. The rest is used mainly as woodland, although some areas are used for hay or pasture.

The main crops are corn, soybeans, milo, and small grains. Steepness of slope, surface runoff, crusting, and the hazard of erosion are the main limitations for crop production. The silty clay loam surface layer makes this soil difficult to keep in good tilth. The susceptibility of this soil to crusting and clodding makes seedbed preparation difficult and affects germination, which results in poor or uneven crop growth. Conservation practices are needed to control erosion and surface runoff and to improve organic matter content (fig. 6).

Where this soil is used for pasture or hay, proper management is needed including maintaining a protective plant cover to reduce runoff and control erosion.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, hickory, white oak, red oak, and post oak. The main understory plants are dogwood, redbud, sourwood, American holly, cedar, black cherry, red maple, and sassafras. The silty clay loam surface texture and the hazard of erosion are the main limitations for woodland use and management.

This soil has no major limitations for building site development and recreational uses. However, the clayey subsoil and steepness of slope are limitations that affect some uses. Erosion is a severe hazard at construction sites, and conservation practices are needed.

This Georgeville soil is in capability subclass IIIe. The woodland ordination symbol is 6C.

GoC—Goldston very channery silt loam, 4 to 15 percent slopes. This soil is well drained. It is undulating

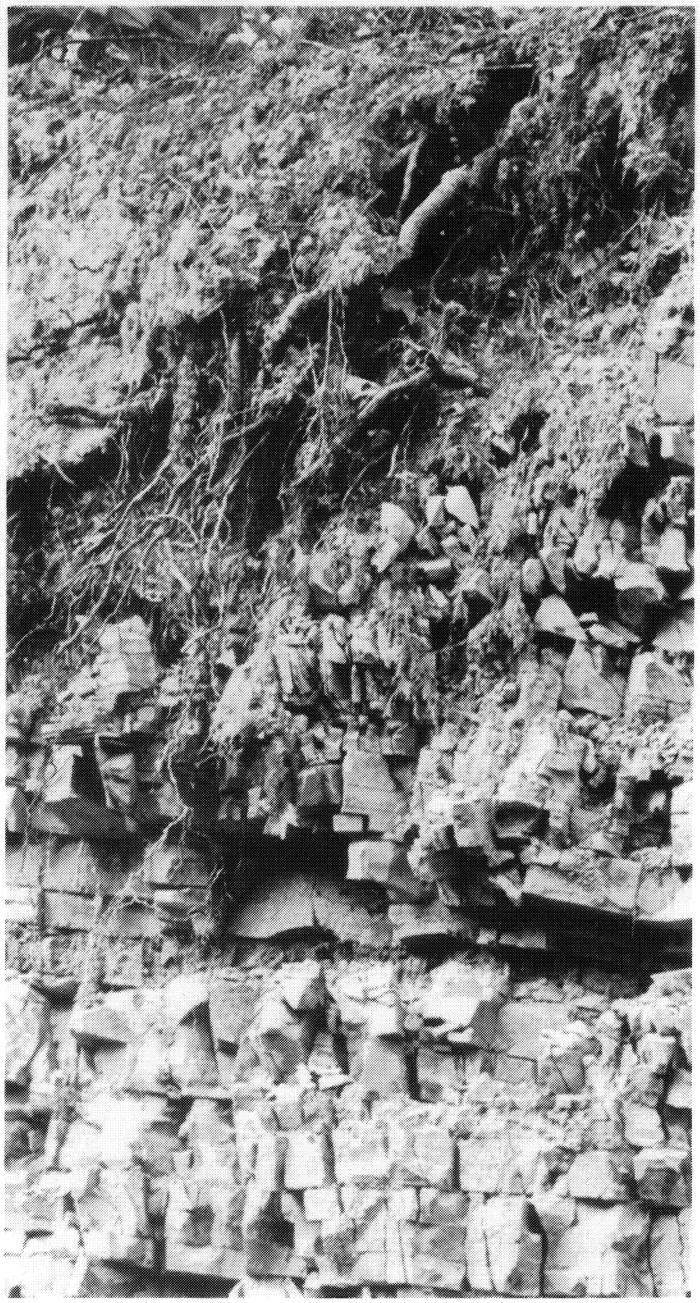


Figure 7.—Fractured bedrock is within a depth of 36 inches in this area of Goldston very channery silt loam, 4 to 15 percent slopes.

to rolling and is scattered throughout the slate belt area of the county on small oval knolls, short oblong side slopes, and dissected ridgetops. The topography is broken and highly dissected by intermittent drainageways. An uneven surface and complex slopes are common in the larger areas of this soil. The areas vary in size and shape and range from 4 to 150 acres or more.

Typically, this Goldston soil has a brown very channery silt loam surface layer 7 inches thick. The subsoil to a depth of 16 inches is yellowish brown very channery silt loam that is underlain by highly fractured slate. Hard fractured slate is at a depth of 36 inches (fig. 7).

Throughout this soil, the volume of slate channers ranges from 35 to 60 percent. Surface runoff is rapid. The permeability is moderately rapid, and the available water capacity is very low. Depth to bedrock is 10 to 20 inches.

Included with this soil in mapping are some small areas of Enon, Badin, Misenheimer, and Kirksey soils. Enon soils are deeper and less acid than Goldston soil. They are commonly at the highest point on the landscape and have a cobbly or very stony surface layer. Badin soils are deeper and more clayey. They are commonly on narrow summits and on toe slopes where the topography is less broken. The Misenheimer soils are somewhat poorly drained. They are in less sloping, nearly level areas and in depressions. Kirksey soils are deeper and moderately well drained. They generally are around the head of intermittent drainageways and have slopes that are less than 4 percent. Also included are a few small areas of slate rock outcrops. The included soils make up about 25 percent of this map unit.

Most of this Goldston soil is used as woodland, although some areas are used for hay or pasture. A small acreage is cropland.

In woodland areas, the dominant trees are white oak, northern red oak, chestnut oak, post oak, blackjack oak, hickory, shortleaf pine, and Virginia pine. The main understory plants are cedar, sweetgum, blackgum, red maple, and dogwood. Droughtiness, shallow depth to bedrock, and the windthrow hazard are the main limitations for woodland use and management.

This soil has severe limitations for most locally grown crops. Droughtiness, uneven slopes, shallow depth to bedrock, and the very channery surface layer are the major limitations for crop production. Some areas can be cropped successfully, however, with a well planned system of soil and water conservation practices.

Shallow depth to bedrock and the large volume of slate fragments are major limitations for building site development and recreational uses.

This Goldston soil is in capability subclass IVs. The woodland ordination symbol is 7D.

GoF—Goldston very channery silt loam, 15 to 45 percent slopes. This soil is well drained. It is on hilly to

Figure 8.—With proper management, some areas of Goldston very channery silt loam, 15 to 45 percent slopes, can be used for pasture.

steep highly dissected side slopes adjacent to the major drainageways throughout the slate belt area of the county. The areas commonly are long and narrow and range from 5 to more than 50 acres.

Typically, this Goldston soil has a brown very channery silt loam surface layer 7 inches thick. The subsoil to a depth of 16 inches is yellowish brown very channery silt loam that is underlain by highly fractured slate. Hard fractured slate is at a depth of 36 inches.

Throughout this soil, the volume of slate channers ranges from 35 to 60 percent. Surface runoff is rapid. Permeability is moderately rapid, and the available water capacity is very low. Depth to bedrock is 10 to 20 inches.

Included with this soil in mapping are some small areas of Badin and Kirksey soils. Badin soils are deeper and more clayey than Goldston soil. They are on smoother side slopes and toe slopes where the topography is less broken. Kirksey soils are moderately well drained. They are around the head of intermittent drainageways where slopes are less than 6 percent. Also included are a few small areas of slate rock outcrops. The included soils make up about 20 percent of this map unit.

Most of this Goldston soil is used as woodland. Small acreages are used for hay or pasture (fig. 8).

In woodland areas, the dominant trees are white oak, red oak, chestnut oak, post oak, blackjack oak, hickory, shortleaf pine, and Virginia pine. The main understory plants are cedar, sweetgum, blackgum, red maple, and dogwood. Shallow depth to bedrock, droughtiness, steepness of slope, and the windthrow hazard are the main limitations for woodland use and management.

This soil has severe limitations for crops, hay, and pasture because of steepness of slope, droughtiness, and the very slaty surface layer.

Shallow depth to bedrock, steepness of slope, and the large volume of slate fragments are major limitations for building site development and recreational uses.

This Goldston soil is in capability subclass VIIs. The woodland ordination symbol is 7D.

HeB—Hiwassee gravelly loam, 2 to 8 percent slopes. This soil is well drained and gently sloping. It is on broad uplands, mainly in the northeastern corner of the county in the vicinity of Isenhour. The larger areas of this soil commonly are oblong and irregular in width and range up to 275 acres. The smaller areas of less than 15 acres are mostly on ridge points and knolls.

Typically, this Hiwassee soil has a dark reddish brown gravelly loam surface layer 6 inches thick. The subsoil extends to a depth of 70 inches. It is dark red clay in the upper part. In the middle part, it is red clay loam that has reddish yellow mottles. In the lower part, it is red loam that has reddish yellow mottles.

The surface layer is 15 to 35 percent gravel, by volume. This soil will erode where areas are bare and unprotected; however, the gravel provides a mulching effect that controls erosion. Surface runoff is medium. The clayey subsoil is moderately permeable and has moderate shrink-swell potential. The available water capacity is moderate. Depth to bedrock is more than 60 inches.

Included in mapping are small areas of Enon, Georgeville, Kirksey, Tatum, and Uwharrie soils. Enon soils are more yellow and less acid. They are in areas that are underlain by less acid rock and commonly are cobbly. Georgeville and Tatum soils do not have a dark red subsoil. Tatum soils have bedrock at a depth of 40 to 60 inches and are in the smaller areas where the ridges are narrow. Kirksey soils are moderately well drained. They are at the head of and along the intermittent drainageways. The Uwharrie soils are in small areas where many stones are on the surface. Also included are some small eroded areas of soils that have a gravelly clay loam surface layer and some areas that are stony. The included soils make up 20 to 30 percent of this map unit.

This Hiwassee soil is used mainly as woodland. The rest is used for crops or pasture.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, hickory, white oak, red oak, and post oak. The main understory plants are dogwood, sourwood, American holly, cedar, black cherry, red maple, and sassafras. There are no major limitations for woodland use and management

In cultivated areas, corn, soybeans, grain sorghum, and small grains are the main crops. The gravelly surface layer, surface runoff, and hazard of erosion are the main limitations for crop production. Conservation practices are needed to control erosion and surface runoff and to improve the content of organic matter. Limitations for crops also apply to hay and pasture plants.

This soil has no major limitations for building site development and recreational uses. However, the clayey subsoil, moderate permeability, and steepness of slope are limitations that affect some uses. Erosion is a hazard at construction sites, and conservation practices are needed.

This Hiwassee soil is in capability subclass IIe. The woodland ordination symbol is 7A.

HeD—Hiwassee gravelly loam, 8 to 15 percent slopes. This soil is well drained and strongly sloping. It is mainly in the northeastern corner of the county in the vicinity of Isenhour, commonly on side slopes adjacent to Hiwassee soil that is gently sloping. Most areas are oblong and range from 10 to more than 50 acres.

Typically, this Hiwassee soil has a dark reddish brown gravelly loam surface layer 6 inches thick. The subsoil extends to a depth of 70 inches. It is dark red clay in the upper part. In the middle part it is red clay loam that has reddish yellow mottles. In the lower part it is red loam that has reddish yellow mottles.

This soil will erode where areas are bare and unprotected. The surface layer is 15 to 35 percent gravel, which provides a mulch effect and reduces the hazard of erosion. Surface runoff is rapid. The clayey subsoil is moderately permeable, and the shrink-swell potential is moderate. The available water capacity is moderate. Depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Enon, Kirksey, and Tatum soils. Enon soils are more yellow and less acid. They are in areas that are underlain by less acid rock and commonly are cobbly. Kirksey soils are moderately well drained. They are along the drainageways. Tatum soils have a channery surface layer and do not have a dark red subsoil. Also included are some small areas of eroded soils that have a gravelly clay loam surface layer and some areas that are stony. The included soils make up 20 to 30 percent of this map unit.

This Hiwassee soil is used mainly as woodland or pasture. It is used for crops in some areas.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, hickory, white oak, red oak, and post oak. The main understory plants are dogwood, sourwood, American holly, redbud, cedar, black cherry, red maple, and sassafras. There are no major limitations for woodland use and management.

The major pasture and crop plants are fescue and small grains. Steepness of slope, surface runoff, and the hazard of erosion are the main limitations. Conservation practices are needed that control erosion and surface runoff and improve the content of organic matter. The use of sod drainageways, terraces and diversions, stripcropping, and field borders also helps to conserve soil and water.

Where this soil is used for hay or pasture, proper management is needed, including maintaining a protective plant cover to reduce runoff and control erosion. Controlled grazing and proper fertilization and liming are essential.

Steepness of slope, moderate permeability, and the clayey texture are the main limitations for most urban uses. Low strength is a limitation for roads and streets. Erosion is a hazard at construction sites, and conservation practices are needed. Steepness of slope is the main limitation for recreational uses.

This Hiwassee soil is in capability subclass IVe. The woodland ordination symbol is 7A.

KkB—Kirksey silt loam, 0 to 6 percent slopes. This soil is moderately well drained and nearly level to gently sloping. It is on broad uplands in depressional areas and around the head of intermittent drainageways throughout the county. It is mostly on slate formations and, to a lesser extent, on sandstone. The largest areas, in the flatwoods, have extended width and commonly range up to 1,500 acres or more. Where this soil is at the head of drainageways and along intermittent streams, the areas are long and narrow and range from 4 to 20 acres.

Typically, this Kirksey soil has a grayish brown silt loam surface layer 6 inches thick. The subsurface layer is light yellowish brown silt loam to a depth of 10 inches. The subsoil extends to a depth of 34 inches. The upper part is olive yellow silty clay loam mottled with gray. The lower part is light brownish gray, light yellowish brown, and reddish yellow silty clay loam. The underlying material to a depth of 46 inches is brownish yellow and light brownish gray channery silt loam that is underlain by fractured slate.

Surface runoff is medium. The permeability is moderately slow, and the available water capacity is moderate to high. A seasonal high water table is at a depth of 1.5 to 3 feet during winter months and wet periods. Depth to fractured bedrock is 40 to 60 inches.

Included with this soil in mapping are small areas of Misenheimer, Badin, and Tatum soils. These soils have a channery surface layer. Misenheimer soils are in slightly elevated positions where ledges of bedrock are at or near the soil surface. Badin and Tatum soils are on knolls and ridges slightly higher than the surrounding area. Also included are some areas of soils that have a clayey subsoil. These soils are common in areas that lie along intermittent drainageways and in depressional areas. The included soils make up 15 to 25 percent of this map unit.

This Kirksey soil is used as cropland, pasture, or woodland. Seasonal wetness and depth to hard bedrock are the main concerns in the use and management of this soil.

The main crops are corn, soybeans (fig. 9), small grains, and milo. Horticultural crops, such as tomatoes, cucumbers, cantaloupes, watermelons, sweet corn, green beans, and peas, are also grown. In some parts of the county, this soil is in small, odd-shaped areas, and management generally differs from that of the adjacent larger areas. Where this soil is in large tracts, common management is applicable to the entire field. In years of low rainfall, this soil is among the most productive in the county. In years of above average rainfall, crops can drown out. Surface and subsurface drainage is necessary to remove excess water. Drainage channels must be kept open on this soil. Grassed waterways help maintain open drainage channels and allow safe removal of surface water. Conservation practices that control erosion and add organic matter are also needed.

This soil is suited to hay and pasture plants. Proper pasture management includes a controlled grazing system and fertilization according to the needs of the soil.

In woodland areas, the dominant trees are white oak, red oak, willow oak, blackjack oak, post oak, hickory, shortleaf pine, Virginia pine, and yellow poplar. The main understory plants are blackgum, sweetgum, cedar, and red maple. Wetness is the main limitation for woodland use and management.

Wetness and moderately slow permeability are the main limitations for building site development and recreational uses.

This Kirksey soil is in capability subclass IIe. The woodland ordination symbol is 6W.

Figure 9.—Kirksey silt loam, 0 to 6 percent slopes, is a very productive soil. This area is planted to corn and soybeans, the major crops in the county.

MhB—Misenheimer channery silt loam, 0 to 4 percent slopes. This soil is shallow and somewhat poorly drained. It is on broad, nearly level to gently sloping uplands in depressions and around the head of intermittent drainageways. Widely scattered areas of this soil are throughout the slate belt part of the county and large areas are in the Richfield-Misenheimer vicinity. The areas of this soil typically are irregular in shape and range from 3 to 800 acres.

Typically, this Misenheimer soil has a dark grayish brown channery silt loam surface layer 2 inches thick. The subsurface layer to a depth of 7 inches is pale yellow channery silt loam, and the subsoil to a depth of 14 inches is light yellowish brown channery silt loam. The underlying material to a depth of 25 inches is mottled brown, gray, and yellow extremely channery saprolite that crushes to silt loam. Moderately hard fractured slate is below that.

Surface runoff is slow. The permeability is moderately rapid, and the available water capacity is very low. The seasonal perched high water table is at a depth of 1 to 1.5 feet late in winter and early in spring and during wet periods. This soil is droughty when rainfall is limited. Depth to bedrock is 10 to 20 inches.

Included with this soil in mapping are small areas of Goldston, Badin, and Kirksey soils. Goldston soils are well drained and are on knolls and short side slopes that are more than 4 percent. Badin soils are well drained and are on knolls and in higher positions on the landscape. Kirksey soils are slightly deeper to bedrock and are moderately well drained. Also included are a few small areas where bedrock is at or near the soil surface. The included soils make up about 20 percent of this map unit.

Most of this Misenheimer soil is used as woodland. In some areas, it is used as cropland. The rest is used for hay or pasture.

In woodland areas, the dominant trees are white oak, red oak, post oak, blackjack oak, willow oak, hickory, sweetgum, Virginia pine, and shortleaf pine. The main understory plants are cedar, blackgum, red maple, and dogwood. Depth to bedrock, the windthrow hazard, and summer droughtiness are the main limitations for woodland use and management.

Seasonal wetness, the very low available water capacity, and shallow depth to bedrock severely limit the use of this soil for crop production. Some areas can be cropped successfully, however, with a well planned system of soil and water conservation practices.

This soil is suited to hay and pasture plants. Proper pasture management includes controlled grazing and fertilization according to the needs of the soil.

Shallow depth to bedrock, wetness, and slate fragments are major limitations to the use of this soil for building site development and recreational uses.

This Misenheimer soil is in capability subclass IIIw. The woodland ordination symbol is 6D.

Oa—Oakboro silt loam, frequently flooded. This soil is nearly level and moderately well drained. It is on long, narrow flood plains typically at the upper headwaters of creeks; however, it is also at the lower reaches of some larger streams where flood plains are narrow and valley walls are steep. The streams commonly flow over bedrock. The areas are long, narrow, and generally less than 300 feet wide and range from 4 to 100 acres or more.

Typically, this Oakboro soil has a yellowish brown silt loam surface layer 4 inches thick. The subsurface layer to a depth of 10 inches is light yellowish brown silt loam. The subsoil extends to a depth of 46 inches. The upper part is brownish yellow silty clay loam that has light yellowish brown mottles. The lower part is mottled brownish yellow, light gray, and light yellowish brown silty clay loam. Hard fractured slate is at a depth of 46 inches.

The permeability is moderate, and the available water capacity is high. Depth to the seasonal high water table is about 1.5 to 2 feet late in winter and early in spring. This soil is subject to frequent flooding for brief periods. Bedrock is at a depth of 40 to 60 inches.

Included in mapping are small areas of well drained Congaree soils that are on the natural levees adjacent to the stream channels. Also included are some small areas of soils that have a gravelly or cobbly surface. In some areas the slate rock is within 20 to 40 inches of the surface and small wet areas are in depressions. Areas of urban land within the city limits of Albemarle are also included. The included soils make up about 20 percent of the map unit.

This soil is mostly in unmanaged hardwood forests. In cleared areas, small acreages are used for crops, such as corn (fig. 10) and soybeans, and for hay or pasture.

In woodland areas, the dominant trees are loblolly pine, yellow poplar, sweetgum, and willow oak. The main understory plants are cottonwood, hornbeam, alder, and red maple. Wetness is the main limitation for woodland use and management.

Wetness and frequent flooding are the main concerns in pasture management. Drainage systems are needed for crops sensitive to wetness, but suitable outlets are not available in most places.

This soil is not used for building sites and recreational uses because of wetness and flooding.

This Oakboro soil is in capability subclass IVw. The woodland ordination symbol is 8A.

Qu—Quarries. This map unit consists of areas where the soil has been removed and part of the underlying bedrock has been excavated. Most of the quarrying is for gravel or crushed stone that is used in road building or other paving. In some areas, fine-grained shale-like rock has been quarried for use in the manufacturing of bricks. Most areas are 4 to 25 acres or more.

These quarries are 10 to more than 100 feet deep and side slopes are mostly steep to vertical. Water is at the deepest levels where quarrying is no longer active. These water areas are identified on the maps at the back of this publication.

Included in mapping are areas of spoil embankment and areas that have been graded or filled to facilitate the quarrying operations. Small areas of undisturbed soils can be in a few places.

These areas have little vegetation and low potential for reclamation and development of any kind.

Recommendation for use and management of areas in this map unit require onsite investigation.

TaF—Tatum gravelly loam, 15 to 35 percent slopes. This soil is well drained. It is on steep side slopes adjacent to streams mainly in the northeastern corner of the county in the vicinity of Isenhour. The slopes are smooth, slightly convex, long, and variable in width. The areas range from 5 to 60 acres or more.

Typically, this Tatum soil has a brown gravelly loam surface layer 3 inches thick. The subsurface layer to a depth of 6 inches is light yellowish brown silt loam. The subsoil extends to a depth of 42 inches. It is yellowish red silty clay loam in the upper part, red silty clay in the middle part, and red silty clay loam in the lower part. Weathered bedrock is at a depth of 42 to 60 inches. Hard sandstone bedrock is at a depth of 60 inches.

This soil will erode where areas are bare and unprotected. Surface runoff is very rapid, and the susceptibility to erosion is very severe. Permeability and

Figure 10.—Corn damaged by swift flowing floodwater in an area of Oakboro silt loam, frequently flooded.

the shrink-swell potential of the subsoil are moderate. The available water capacity is moderate. Depth to soft bedrock is 40 to 60 inches.

Included with this soil in mapping are small areas of Enon, Kirksey, and Hiwassee soils. The Enon soils are in areas underlain by less acid rock and that trend northeast to southwest. The Kirksey soils are along the drainageways. The Hiwassee soils are on the broader side slopes. Also included are some small eroded areas of Tatum soils that have a gravelly silty clay loam surface layer and some areas of soils that have as much as 15 percent stones on the surface. The included soils make up 25 to 30 percent of this map unit.

The Tatum soil is used mainly as woodland. A few cleared areas are in pasture.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, hickory, white oak, red oak, and post oak. The main understory plants are dogwood, sourwood, holly, cedar, black cherry, red maple, and sassafras. Steepness of slope and the hazard of erosion are the main limitations for woodland use and management.

Steepness of slope and the hazard of erosion severely limit this soil for crop production. In areas where this soil is used for pasture or hay, steepness of slope, surface runoff, and the hazard of erosion are the main limitations. Proper management is needed to maintain a protective plant cover to control runoff and erosion.

This soil has severe limitations for most urban uses. Steepness of slope and low strength for road and streets are the main limitations for building sites and recreational uses. The moderate shrink-swell potential and the clayey texture of this soil are additional limitations. The hazard of erosion is very severe at construction sites, and conservation practices are needed.

This Tatum soil is in capability subclass VIe. The woodland ordination symbol is 8R.

TbB—Tatum channery silt loam, 2 to 8 percent slopes. This soil is well drained and is on gently sloping uplands. Most of the larger areas, in the vicinity of Plyler, are on broad, smooth ridges and range from 4 to more than 200 acres. Other areas, in the vicinity of Norwood, are on narrower, slightly more dissected ridges. These areas are irregular in shape and generally are less than 100 acres.

Typically, this Tatum soil has a brown channery silt loam surface layer 7 inches thick. The subsoil extends to a depth of 44 inches. The upper part is strong brown silty clay loam, and the middle part is red silty clay. The lower part is red channery silty clay loam that has yellow mottles. Weathered bedrock is at a depth of 44 to 60 inches. Hard sandstone bedrock is at a depth of 60 inches.

This soil will erode where areas are bare and unprotected; however, the channers on the surface provide a mulch effect that controls erosion. Surface runoff is medium. The permeability and shrink-swell potential of the subsoil are moderate. The available water capacity is moderate. Depth to soft bedrock is 40 to 60 inches.

Included with this soil in mapping are some small areas of Georgeville, Badin, and Kirksey soils. The Georgeville soils are on the broader, smoother parts of the landscape. The Badin soils are on narrow ridges and knolls. The Kirksey soils are along the intermittent drainageways and in small depressions. Also included are small areas of soils that have a cobbly surface layer, soils that do not have channers on the surface, and small eroded areas of soils that have a channery silty clay loam surface layer. In places are small areas of soils similar to the Tatum soil except they have a yellowish red or strong brown subsoil. The included soils make up 20 to 25 percent of this map unit.

Most of this Tatum soil is used as cropland. The rest is used mainly as woodland, although some is used for hay or pasture.

The main crops are corn, soybeans, grain sorghum, and small grains; however, tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas are also grown. Steepness of slope, surface runoff, and the hazard of erosion are the main limitations for crop production. This soil is easy to keep in good tilth and can be worked throughout a fairly wide range in moisture content. A crust forms on the surface after hard rains, however, and clods form if the soil is worked when wet. The clods and channers interfere with seed germination. Conservation practices are needed to control erosion and runoff and to maintain soil tilth.

This soil is suitable for hay and pasture grasses. Proper management, including maintaining a protective plant cover to control erosion, is needed.

Where this soil is used as woodland, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, sycamore, yellow poplar, hickory, white oak, red oak, and post oak. The main understory plants are dogwood, blackgum, sourwood, redbud, American holly, cedar, black cherry, red maple, and sassafras. There are no major limitations for woodland use and management.

The moderate permeability, clayey subsoil, and low strength for roads and streets are the main limitations for urban uses. Erosion is a hazard at construction sites, and conservation practices are needed. There are no significant limitations for recreational uses.

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

TbD—Tatum channery silt loam, 8 to 15 percent slopes. This soil is strongly sloping and well drained. It is on upland side slopes that are along intermittent drainageways. Most of the larger areas are in the vicinity of Plyler. Smaller areas are in the vicinity of Norwood. The areas generally are long, irregular in width, and 4 to more than 30 acres.

Typically, this Tatum soil has a brown channery silt loam surface layer 7 inches thick. The subsoil extends to a depth of 44 inches. The upper part is strong brown silty clay loam. The middle part is red silty clay. The lower part is red channery silty clay loam that has yellow mottles. Weathered bedrock is at a depth of 40 to 60 inches. Hard sandstone bedrock is at a depth of 60 inches.

This soil will erode where areas are bare and unprotected. Surface runoff is rapid. Permeability and the shrink-swell potential are moderate. The available water capacity is moderate. Depth to soft bedrock is 40 to 60 inches.

Included with this soil in mapping are some small areas of Badin and Kirksey soils. The Badin soils are on short side slopes, knolls, and slopes slightly more than 15 percent. The Kirksey soils are around the intermittent drainageways and in small depressions. Also included are a few small areas of soils that have a cobbly surface layer, eroded areas of soils that have a channery silty clay loam surface layer, and small areas of soils similar to the Tatum soil except they have a yellowish red or strong brown subsoil. The included soils make up 20 to 25 percent of this map unit.

Most of this Tatum soil is used as woodland, hayland, or pasture. The rest is mainly cropland.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, hickory, white oak, red oak, sycamore, and post oak. The main understory plants are dogwood, sourwood, American holly, cedar, redbud, black cherry, red maple, and sassafras. There are no significant limitations for woodland use and management.

The main crops are soybeans, grain sorghum, and small grains. Steepness of slope, surface runoff, and the hazard of erosion are the main limitations for crop production. Conservation practices are needed to control erosion and runoff and to maintain soil tilth.

Where this soil is used for hay or pasture, proper management is needed, including maintaining a protective plant cover to control runoff and erosion.

Steepness of slope, moderate permeability, the clayey texture, and low strength for roads and streets are the main limitations for most urban uses. Erosion is a hazard at construction sites, and conservation practices are needed. Steepness of slope is the main limitation for recreational uses.

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

TcB2—Tatum channery silty clay loam, 2 to 8 percent slopes, eroded. This soil is well drained. It is on uplands that are dissected by intermittent drainageways. The surface contour is slightly convex. This soil is mostly around Norwood; however, some of the smaller areas are in the vicinity of Plyler. The areas generally are oblong, irregular in width, and 4 to more than 50 acres.

Typically, this Tatum soil has a brown channery silty clay loam surface layer 7 inches thick. The subsoil extends to a depth of 44 inches. The upper part is strong brown silty clay loam, the middle part is red silty clay, and the lower part is red channery silty clay loam. Weathered bedrock is at a depth of 40 to 60 inches. Hard sandstone bedrock is at a depth of 60 inches.

This soil will continue to erode where areas are bare and unprotected. Where this soil is cultivated, a crust will form and will limit infiltration and increase runoff. The subsoil is clayey, and the permeability and the shrink-swell potential are moderate. The available water capacity is moderate. The subsoil is very strongly acid or strongly acid. Depth to soft bedrock is 40 to 60 inches.

Included in mapping are some small areas of Badin and Kirksey soils. The Badin soils are on narrow ridges and knolls. The Kirksey soils are in areas around the intermittent drainageways and in small depressions. Also included are many small areas of soils that have a channery silt loam or silt loam surface layer and small areas of soils similar to Tatum soil except they have a yellowish red or strong brown subsoil. The included soils make up 20 to 25 percent of this map unit.

Most of this Tatum soil is used as cropland. Some is used for hay or pasture. The rest is mainly in woodland.

The main crops are corn, soybeans, grain sorghum, and small grains. Such crops as tomatoes, cucumbers, cantaloupes, sweet corn, green beans, and peas are also grown. Steepness of slope, the clayey surface layer, surface runoff, and the hazard of erosion are the main limitations for crop production. This soil is difficult to keep in good tilth, and seed germination is reduced because of the clayey surface layer. Conservation tillage, returning crop residue to the soil, and using cover crops that include grasses and legumes can improve tilth, reduce runoff, and help to control erosion. Conservation practices, such as grassed waterways, diversions, field borders, and crop rotations that include close-growing crops, also help to conserve soil and water.

This soil is suited to hay and pasture grasses. Proper management is needed to maintain a protective plant cover to reduce runoff and control erosion. Proper pasture management includes controlled grazing and fertilization according to the needs of the soil.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, hickory, white oak, sycamore, red oak, and post oak. The main understory trees and shrubs are dogwood, sourwood, holly, cedar, red bud, black cherry, red maple, and sassafras. There are no significant limitations for woodland use and management.

Moderate permeability, the clayey texture, and low strength for roads and streets are the main limitations for most urban uses. Erosion is a hazard at construction sites, and conservation practices are needed. The clayey surface layer is the main limitation for recreational uses.

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

TcD2—Tatum channery silty clay loam, 8 to 15 percent slopes, eroded. This soil is well drained. It is on upland side slopes that are dissected by intermittent drainageways. The surface contour is slightly convex. This soil is mostly in the southeastern corner of the county south of Norwood. The areas generally are adjacent to small streams and are long, irregular in width, and 4 to more than 30 acres.

Typically, this Tatum soil has a brown channery silty clay loam surface layer 7 inches thick. The subsoil extends to a depth of 44 inches. The upper part is strong brown silty clay loam, the middle part is red silty clay, and the lower part is red silty clay loam. Weathered bedrock is at a depth of 40 to 60 inches. Hard sandstone bedrock is at a depth of 60 inches.

This soil will continue to erode where areas are bare and unprotected. Where this soil is cultivated, a crust will form and will limit infiltration and increase runoff. The subsoil is clayey, and the permeability and the shrink-swell potential are moderate. The available water capacity is moderate. The subsoil is very strongly acid or strongly acid. Depth to soft bedrock is 40 to 60 inches. This soil has limited use for some kinds of development.

Included in mapping are small areas of Badin and Kirksey soils. The Badin soils are on short side slopes and knolls and in some areas where slopes are slightly more than 15 percent. The Kirksey soils are around the intermittent drainageways and in small depressions. Also included are small areas of soils that have a channery silt loam or silt loam surface layer, soils that have a cobbly surface layer, and small areas of soils that have a yellowish red or strong brown subsoil. The included soils make up 20 to 25 percent of this map unit.

Most of this Tatum soil is used as woodland, although some is used for hay, pasture, or crops.

In woodland areas, the dominant trees are loblolly pine, shortleaf pine, Virginia pine, yellow poplar, hickory, white oak, red oak, sycamore, and post oak. The main understory trees and shrubs are dogwood, sourwood, holly, cedar, red bud, black cherry, red maple, and sassafras. There are no significant limitations for woodland use and management.

Soybeans, grain sorghum, and small grains are the main crops. Steepness of slope, the clayey surface layer, surface runoff, and the hazard of erosion are the main limitations for crop production. This soil is difficult to keep in good tilth, and seed germination is reduced because of the clayey surface layer. Conservation tillage, returning crop residue to the soil, and using cover crops that include grasses and legumes can improve tilth, reduce runoff, and help to control erosion. Conservation practices, such as grassed waterways, terraces and diversions, stripcropping, field borders, and crop rotations that include close-growing crops, also help to conserve soil and water.

This soil is suited to hay and pasture grasses. Proper management is needed to maintain a protective plant cover to reduce runoff and control erosion. Proper pasture management includes controlled grazing and fertilization according to the needs of the soil.

Steepness of slope, moderate permeability, the clayey texture, and low strength for roads and streets are the main limitations for most urban uses. Erosion is a hazard at construction sites, and conservation practices are needed. Steepness of slope is the main limitation for recreational uses.

This Tatum soil is in capability subclass IVe. The woodland ordination symbol is 8A.

TdB—Tatum-Urban land complex, 2 to 8 percent slopes. This map unit consists of areas of Tatum soil that are gently sloping and Urban land in the city of Albemarle and other towns throughout the county. An area typically consists of 50 to 70 percent Tatum soil and about 15 to 35 percent Urban land. Tatum soil is in the undisturbed open areas of the map unit.

Typically, this Tatum soil has a brown channery silt loam surface layer 7 inches thick. The subsoil extends to a depth of 44 inches. The upper part is strong brown silty clay loam, and the middle part is red silty clay. The lower part is red channery silty clay loam that has yellow mottles. Weathered bedrock is at a depth of 40 to 60 inches. Hard sandstone bedrock is at a depth of 60 inches.

This soil will erode where areas are bare and unprotected. Surface runoff is rapid. The permeability and shrink-swell potential of the subsoil are moderate. The available water capacity is moderate. Depth to soft bedrock is 40 to 60 inches.

Urban land consists of areas used for shopping centers, factories, municipal buildings, apartment complexes, parking lots, or other uses where buildings are closely spaced or the soil is covered with pavement. Slope generally is modified to fit the needs of the site. The extent of site modification varies greatly. Surface runoff is very rapid.

Included in mapping are some small areas of

Georgeville, Badin, Hiwassee, and Kirksey soils. Georgeville soils are intermingled with the Tatum soil in broad, smooth areas. Badin soils are on knolls and narrow, more sloping parts of the landscape. Kirksey soils are in depressional areas where surface water collects. Hiwassee soils are in the towns of New London and Badin and in areas where the soil formed from mixed acid and basic rocks. Also included are small cut and fill areas where the natural soil has been altered or covered. These areas are commonly adjacent to Urban land.

Recommendations for use and management of the areas of this map unit generally require onsite investigation.

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

Ud—Udorthents, loamy. This map unit consists of areas where natural soils have been altered by earth-moving operations. The remaining soil has a loamy surface layer and is variable in composition, depth, slope, and ability to grow plants. Borrow pits, leveled land, sanitary landfills, and gold mines make up this map unit. Small patches of undisturbed natural soils are in many places. The areas are 4 to more than 50 acres.

Borrow pits are areas where all the original soil and much of the underlying layers have been removed for use as fill material or construction aggregate. Cuts are 3 to 25 feet deep. These areas are low in natural fertility and have poor physical properties to support plant growth. The surface generally is uneven and many areas are shallow to bedrock. Steep side slopes are on one or more sides of most of these areas.

Most areas are naturally reseeded in wild grasses, weeds, shortleaf pine, and Virginia pine. Plant growth generally is poor quality, and major reclamation is necessary to prepare these areas for economic production of plants or development for most other purposes.

Leveled land is where the soil has been altered by grading to achieve a particular land conformation. In cut areas, more than two feet of soil has been removed, and in fill areas, more than two feet of fill has been placed over the natural soil. Most of these areas are in school yards with athletic fields, major highway interchanges, or industrial sites. Several areas are used for agricultural purposes. Most of these areas are reclaimed and seeded to grass or are used for crop production. Buildings and pavement cover up to 15 percent of some areas.

Landfills are areas where the natural soil has been altered by land fill operations. The excavated trenches are filled with alternate layers of solid refuse and soil material. A final cover of about 2 feet of soil is on the surface. After final cover is added, the surface ranges from nearly level to gently sloping. These areas are designated as landfill on the soil map.

Gold mines are areas where surface and subsurface digging has occurred. Shafts can be several feet deep. Very little of the original soil is left undisturbed and most areas have highly irregular surfaces. Abandoned mining areas may have partly stabilized under pine, cedar, and other vegetation. Active mining areas are bare and subject to accelerated erosion.

Included in mapping is a small acreage of undisturbed soil. This soil is suited to plant growth; however, natural fertility and the available water capacity generally are low. Permanent vegetative cover protects these areas from erosion.

The characteristics of the soil material within the mapped areas vary to such a degree that onsite examination of the individual areas is needed to determine use and management.

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 land is covered by streets, buildings, parking lots, and railroad yards. The soils around these facilities are used for parks, lawns, playgrounds, and drainageways. During urbanization, the natural soils have been greatly altered by cutting, filling, grading, and shaping. The original topography, landscape, and drainage pattern have been changed. Slopes generally are 0 to 10 percent.

Most of the acreage of this map unit is in the business districts of Albemarle, Norwood, and Badin.

The major concern in management is the excessive runoff from roofs, roads, and parking lots, which increases the hazard of flooding in low-lying areas. Waterways are subject to siltation from areas that are graded and not immediately stabilized.

The characteristics of the soil material within the mapped areas vary to such a degree that onsite examination of the individual areas is needed to determine use and management.

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

UwC—Uwharrie stony loam, 4 to 15 percent slopes, very bouldery. This soil is gently sloping to strongly sloping and is well drained. It is on high, prominent rolling hills. Some of the larger areas are in the vicinity of New London. To a moderate extent, the

Figure 11.—The boulders in this area of Uwharrie stony loam, 4 to 15 percent slopes, very bouldery, limit the use of this soil.

landscape is cut by intermittent streams. The areas are long and irregularly shaped and range from about 10 to more than 100 acres.

Typically, this Uwharrie soil has a yellowish red stony loam surface layer 4 inches thick. The subsoil extends to a depth of 46 inches. The upper part is yellowish red silty clay loam, the middle part is red clay, and the lower part is red silty clay that has strong brown mottles. The underlying material to a depth of 74 inches is yellowish brown, red, and white saprolite that crushes to silt loam.

The volume of stones and boulders ranges from 15 percent to as much as 35 percent in the surface layer (fig. 11). Permeability and the shrink-swell potential of the subsoil are moderate. The available water capacity is moderate. Depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Hiwassee, Tatum, Badin, and Kirksey soils. The Hiwassee and Tatum soils are intermingled with Uwharrie soil in places. The Badin soils are on short side slopes, knolls, and on slopes that are slightly more than 15 percent. The Kirksey soils are in areas around the intermittent drainageways and in small depressions. Also included are small areas of soils that have no stones in the surface layer or are very stony. The included soils make up 20 to 30 percent of this map unit.

Most areas of this Uwharrie soil are in woodland, hay, or pasture.

In woodland areas, the dominant trees are yellow poplar, post oak, white oak, red oak, hickory, Virginia pine, loblolly pine, and shortleaf pine. The main understory plants are dogwood, red maple, sourwood, American holly, cedar, black cherry, and red maple. The use of equipment is restricted because of stoniness.

This soil is suitable for pasture and hay; however, pasture management is difficult because of the stones and boulders on the surface. In addition, the surface layer is thin and the hazard of erosion is severe.

This soil has severe limitations for crops. The stones and boulders make the use of farm equipment impractical. In addition, the surface layer is thin and the hazard of erosion is severe.

This soil is suitable for most urban uses. Steepness of slope, moderate shrink-swell potential, and the volume of stones are the main limitations. In many places, the stones can be moved or worked around. Erosion is a hazard on construction sites, and conservation practices are needed. The volume of stones is the main limitation for recreational uses.

This Uwharrie soil is in capability subclass VIs. The woodland ordination symbol is 7X.

UwF—Uwharrie stony loam, 15 to 45 percent slopes, very bouldery. This soil is well drained. It is in high, prominent areas of hilly to steep slopes, such as Morrow Mountain. It is also common around New London and in other high-lying places. The areas are long and irregularly shaped and range from 3 to 100 acres or more.

Typically, this Uwharrie soil has a yellowish red stony loam surface layer 4 inches thick. The subsoil extends to a depth of 46 inches. The upper part is yellowish red silty clay loam, the middle part is red clay, and the lower part is red silty clay that has strong brown mottles. The underlying material to a depth of 74 inches is yellowish brown, red, and white saprolite that crushes to silt loam.

The volume of stones and boulders ranges from 15 to 35 percent in the surface layer. Permeability and the shrink-swell potential of the subsoil are moderate. The available water capacity is moderate. Depth to bedrock is more than 60 inches.

Included with this soil in mapping are small areas of Tatum and Badin soils. Tatum soils are intermingled with Uwharrie soil in places. Badin soils are on short side slopes and knolls. Also included are small areas of soils that have no stones in the surface layer or are very stony. The included soils make up 20 to 30 percent of this map unit.

Almost all of this Uwharrie soil is used as woodland. Small acreages are in hay or pasture.

In woodland areas, the dominant trees are yellow poplar, post oak, white oak, red oak, hickory, Virginia pine, loblolly pine, and shortleaf pine. The main understory plants are dogwood, red maple, sourwood, American holly, cedar, black cherry, and red maple. Equipment use limitations are severe because of stoniness and steepness of slope.

This soil is not suitable for cultivation because of steepness of slope and volume of stones.

This soil has severe limitations for most urban uses. Steepness of slope and volume of stones are the main limitations. In many places, these stones can be moved or worked around. Steepness of slope and volume of stones and boulders are the main limitations for recreational uses.

This Uwharrie soil is in capability subclass VIIs. The woodland ordination symbol is 7R.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Stanly 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 either 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 6 percent.

About 49,843 acres, or nearly 20 percent of the survey area is prime farmland. Areas are scattered throughout the county. The largest areas are in map units 2 and 3 on the general soil map. Many scattered areas of prime farmland are in the other map units.

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

GeB	Georgeville silt loam, 2 to 8 percent slopes
HeB	Hiwassee gravelly loam, 2 to 8 percent slopes
KkB	Kirksey silt loam, 0 to 6 percent slopes
TbB	Tatum channery silt 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 suitabilities 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 and pasture; as 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 suitabilities and 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 in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

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

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

Crops and Pasture

J. Richard Everhart, district conservationist, and Foy D. Hendrix, conservation 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, including some not commonly grown in the survey area, 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." Specific information can be obtained from the local office of the Soil Conservation Service or the North Carolina Agricultural Extension Service.

According to the most recent available figures, Stanly County has about 64,000 acres in crops and an additional 22,000 acres in pasture and hayland. Corn is grown on 18,600 acres, soybeans on 26,700 acres, sorghums on 6,500 acres, and small grains on 14,000 acres. A large percentage of the acreage planted to small grains is double-cropped in soybeans. A small acreage is also used for truck crops, such as vegetables, sweet corn, and melons.

Corn and soybeans are the primary crops in Stanly County. Georgeville, Tatum, and Badin soils are well suited to the production of these crops, and extensive acres are planted each year. These soils are also suited to milo, another important field crop. A fairly large acreage of Goldston soil, which is poorly suited to crops because of droughtiness, is also planted to corn, soybeans, and milo. Small grains, primarily wheat, are an important part of the crop rotation system in the county. Those soils well suited to the production of corn, soybeans, and milo are similarly well suited to the production of small grains.

The soils best suited to field crop production, mainly Georgeville and Tatum soils, are also well suited to the production of horticultural crops, such as tomatoes, strawberries, melons, sweet corn, green beans, and

Figure 12.—This area of fescue pasture is on Tatum channery silty clay loam, 2 to 8 percent slopes, eroded.

peas. The Agricultural Extension Service and the Soil Conservation Service can provide the latest information on the production of such crops.

Pasture and hayland in Stanly County consist mainly of fescue and clover (fig. 12), a cool-season forage combination generally well suited to this area. A small acreage is in hybrid bermudagrass hayland and pasture. This warm-season forage helps to fill the gap in the fescue-clover growth pattern. Varieties of alfalfa are also planted for hay production. This plant has good potential in the county. Alfalfa is becoming more popular, and more acres are planted each year. Many acres of rolling and hilly land in the county are best suited to perennial plant cover, which helps to control erosion and conserve soil and water resources.

Soil erosion is a major concern on about 95 percent of the cropland and pastureland in Stanly County because of moderate to steep slopes and the susceptibility of many of the soils to erosion. Erosion is costly to the farmer and damaging to the environment. Most of a soil's fertility is in the surface layer. As this layer erodes away, nutrients are lost and productivity declines. Erosion of the surface layer is especially damaging to soils that have a clayey subsoil, such as Georgeville and Tatum soils, and also to soils that are shallow to bedrock, such as Goldston soils.

As more and more subsoil is incorporated into the surface layer, the available water capacity declines. The increase in clay causes a need for more lime and fertilizer. Also, the surface layer develops poor tilth when clay is added, and it becomes sticky when wet and hard when dry; thus, preparing a good seedbed is difficult. Tatum and Georgeville soils also tend to crust on the surface, a problem that is worse in the most eroded areas. The crust limits infiltration, causing rapid surface runoff and increasing erosion.

Erosion is not only costly to agriculture. Related social and environmental costs increase when sediment accumulates downstream in rivers and reservoirs. Effective control of agricultural erosion benefits everyone by maintaining productivity as well as suitable water quality for municipal, recreational, and wildlife use.

Erosion control practices provide protective surface cover, reduce runoff, and increase infiltration. Plant cover that is on the soil for extended periods, such as crop residue and winter cover crops, holds erosion losses to amounts that will not reduce the productive capacity of the soil.

On livestock and dairy farms, well managed pastureland is protected from erosion by permanent plant cover (fig. 13). Legume and grass forage crops that these operations require can be incorporated into cropping systems to control erosion on sloping land. They also provide nitrogen and improve tilth for the crop that follows.

Many of the soils on the Tatum-Badin landscapes and Badin-Goldston landscapes have slopes so short and irregular that contour tillage and parallel terraces are not practical. On these soils, conservation cropping systems that utilize substantial plant and residue cover are needed to control erosion. Conservation tillage practices are very effective in controlling erosion on these soils. In addition, these practices conserve soil moisture by providing cover and maintaining good infiltration at the surface. Conservation tillage is suited

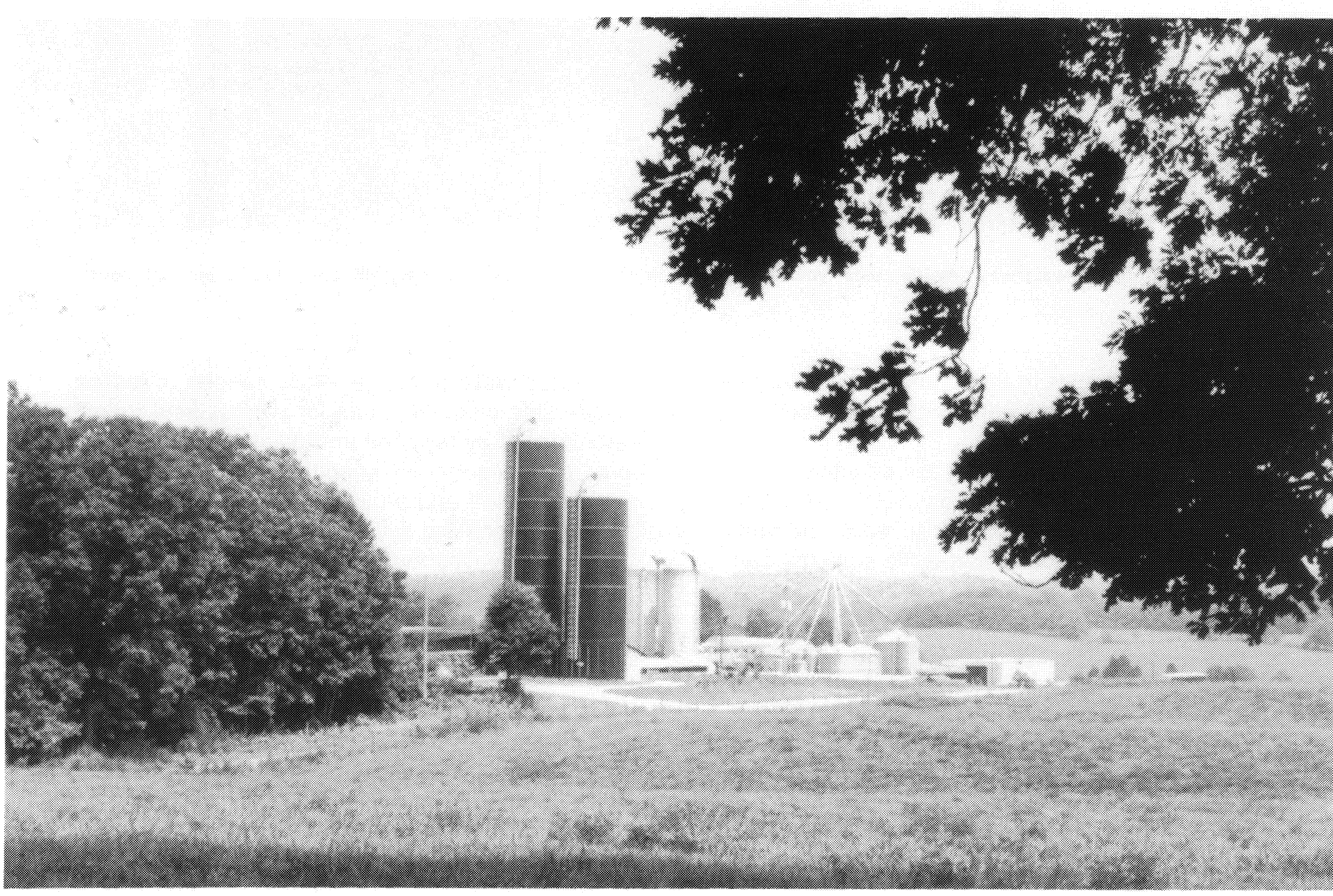


Figure 13.—A well managed pasture of fescue provides protective cover in an area of Badin channery silt loam, 2 to 8 percent slopes. A dairy operation is in the background.

Figure 14.—A grassed waterway provides safe removal of runoff in an area of Badin channery silt loam, 8 to 15 percent slopes.

to most of the upland soils in the county. Weed control problems should be a determining factor in conservation tillage decisions.

Contour tillage and stripcropping are effective conservation practices on many soils in Stanly County. These practices generally are better suited to the fairly uniform slopes of Tatum and Georgeville soils but can be adapted to a wide range of slope patterns. Where forage crops are required by the farming operation, a very strong erosion control system of forage and field crop rotation in field strips can be achieved. A cropping system that incorporates conservation tillage is also suited to field stripcropping. This system provides additional erosion control over conservation tillage alone.

Terraces and diversions reduce erosion by intercepting excess runoff and safely routing it to suitable outlets. These practices are highly effective, particularly in conjunction with conservation tillage, on soils of uniform slopes, such as Tatum and Georgeville soils.

Grassed waterways, generally seeded to fescue, provide safe disposal areas for surplus field runoff and water carried by terraces and diversions (fig. 14). Field borders, also generally seeded in fescue, filter sediment from field runoff and provide turning and access areas. These practices are suited to and highly effective on soils in Stanly County.

The local Soil Conservation Service office can provide information for the design and applicability of erosion control practices for each soil.

Poor soil drainage is a problem on about 12 percent of the pastureland and cropland in Stanly County. Misenheimer and Kirksey soils exhibit seasonal wetness problems. These soils are on the flatwoods just north of Locust. Tillage patterns can intensify the problem by creating low areas and also high areas that block surface drainage. Grassed waterways, along with surface shaping, can maintain surface drainage. Artificial drainage with tile is difficult on Misenheimer and Kirksey soils because of the lack of suitable outlets and the shallow depth to bedrock of Misenheimer soils.

Wet spots, seeps, and springs are in areas of many of the soils in the county. In such areas, tile drainage is useful in catching the water and routing it to a suitable outlet.

Various kinds of rock fragments are common on many soils in Stanly County. Common names are ironstone, blue slate rock, dirt rock, and flint rock. Some of the fragments from rocks, such as ironstone (basaltic tuffs and gabbro sills) and flint rock (milky quartz), are very hard and can cause excessive wear on farm equipment. Ironstone is in Enon soils. It is grayish, blackish, or greenish-blue rounded rock that ranges in size from gravel to boulders. Flint rock is white, hard, and appears glassy. It is associated with many different soils throughout the county.

Blue slate rock (forest unweathered argillites) is associated with Goldston and Misenheimer soils. Dirt rock (weathered sandstone, siltstone, or argillite) is associated with Badin and Tatum soils. These rocks are not so hard as ironstone or flint rock and, therefore, are not as damaging to farm implements.

Tilth is an important factor in crop production because it highly influences seed germination, water infiltration, and air exchange. Soils that have good tilth have a granular and porous surface layer.

Most of the soils in Stanly County have a silt loam surface layer. Eroded areas of Tatum and Georgeville soils have a silty clay loam surface layer and low fragment content and tend to crust. Addition of organic matter, such as crop residue and manure, reduces crusting on these soils and improves soil structure and tilth of all soils in Stanly County.

Soil Fertility

None of the soils in Stanly County have enough natural fertility to produce economic returns on crops. The soils are naturally acid and require lime to make them usable for most crop production.

Liming requirements are a major concern to the farmer because the acidity level in the soil affects the availability of many of the nutrient elements to plants and the activity of beneficial bacteria. Lime also neutralizes exchangeable aluminum. This counteracts the adverse effects that high levels of aluminum have 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. For example, magnesium and available calcium levels can be low in soils that have a sandy surface texture. The desired pH levels can differ, depending upon the soil properties and the crop to be grown.

Nitrogen fertilizer is required for most crops. It is generally not required for peanuts, clover, and some rotations of soybeans or for alfalfa after it has been established. No soil test is available for predicting nitrogen requirements. Applications of nitrogen may be needed on sandy soils more than once during the growing season because it can be readily leached from these soils.

The need for phosphorus and potassium fertilizers can be predicted from soil tests. Because past applications of phosphorus and potassium tend to build up in the soil, requirements for these nutrients need to be determined.

Chemical Weed Control

The use of herbicides for weed control in crops is a common practice in Stanly County. Successful use results in less tillage and is an integral part of modern farming. 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 this survey area. Table 15 shows a general range of organic matter content. The surface texture is shown in table 14 in the "USDA texture" column.

In some cases, the organic matter content projected for the different soils is outside the range shown in table 15. Higher organic matter content can occur in soils that have received high amounts of animal or manmade waste. Soils currently being brought into cultivation can have higher organic matter content in the surface layer than similar soils that have been in cultivation for a long time. Conservation tillage increases organic matter content in the surface layer. Lower levels of organic matter 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 soil surface texture.

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 5. 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.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

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 5 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 Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. 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 rangeland, for woodland, and for engineering purposes.

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

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

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

No class I, V, or VIII soils are recognized in Stanly County.

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

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

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

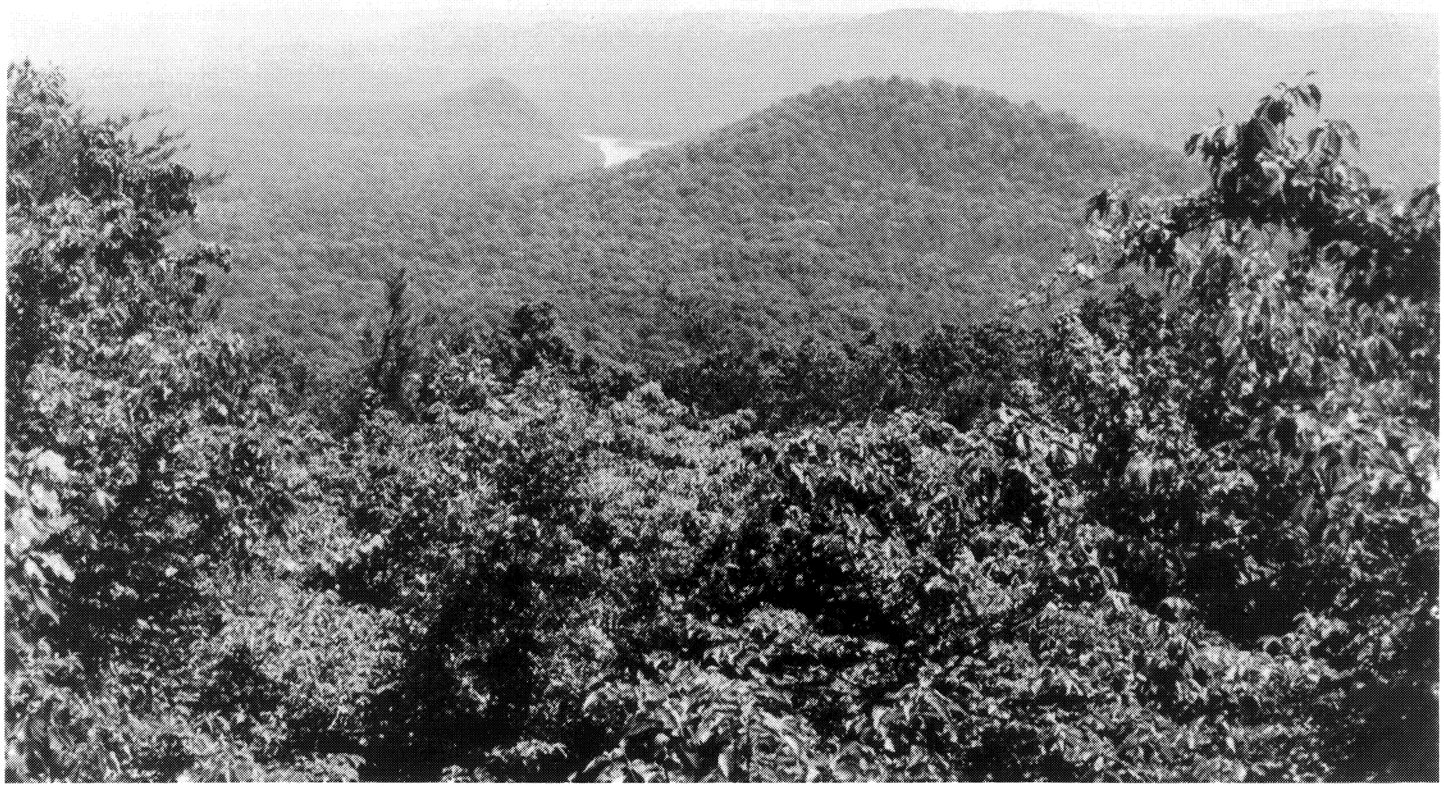


Figure 15.—The Uwharrie Mountains in Stanly County are heavily forested.

Woodland Management and Productivity

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

Forest lands are of economic, social, recreational, and environmental importance to Stanly County (fig. 15). Forested areas have aesthetic value and provide suitable habitat for wildlife, but estimates are that more than half of the woodland harvested annually in Stanly County receives no reforestation or stand improvement consideration. Much of the acreage harvested in the county is high graded or cut for limited products, resulting in a poorly stocked residual stand of timber. Windthrow can be a serious management concern because of many of the shallow, slaty soils in the county.

Commercial forests cover 101,000 *(16)* acres, or about 40 percent of the land area of Stanly County. Commercial forest land is land that is producing or can produce crops of industrial wood and is not withdrawn from timber utilization. Loblolly pine is the most important timber-producing tree in the county because it grows fast, adapts to the soil and climate, brings the highest average sale value per acre, and is easy to establish and manage.

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

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 the 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. For example, coarse textured soils generally are low in nutrient content and available water capacity. Fine textured soils can have high nutrient content and high available water capacity. If clays are compacted, however, aeration is reduced and root growth is inhibited.

Other site factors, such as steepness of topography and length of slope, affect water movement and availability. In mountainous areas, elevation and aspect affect solar radiation and rates of evaporation so that south aspects are warmer and drier than north aspects. The best tree growth is generally on lower slopes on north and east aspects, in sheltered coves, and on gentle concave slopes. Rainfall and length of growing season also influence site productivity.

Soils vary in their ability to produce trees. Depth, fertility, texture, and the available water capacity influence tree growth. Elevation, aspect, and climate determine the kinds of trees that can grow on a site. Available water capacity and depth of the root zone are major influences of tree growth. Elevation and aspect are of particular importance in mountainous areas.

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. The section "Detailed Soil Map Units" indicates for each map unit suitable for producing timber the management concerns affecting timber production. The common forest understory plants are also listed. Table 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight, moderate*, and *severe* are used to indicate the degree of the major soil limitations to be considered in forest management.

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 7 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare. 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 *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *D* indicates a soil that has a limitation because of restricted rooting depth, such as a shallow soil that is underlain by hard rock, hardpan, or other layers that restrict roots. The letter *C* indicates a soil that has a limitation because of the kind or amount of clay in the upper part of the 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, X, 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 from 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 larger than usual planting stock or to make special site preparations.

The potential productivity of *common trees* on a soil is expressed as a *site index*. Common trees are listed in the order of their observed general occurrence. Generally, only two or three tree species dominate.

The soils that are commonly used to produce timber have the yield predicted in cubic feet and board feet. The yield is predicted at the point where mean annual increment culminates. The productivity of the soils in this survey is mainly based on longleaf pine *(15)*; loblolly pine and shortleaf pine *(8)*; Virginia pine *(9)*; yellow poplar *(3)*; white oak, cherrybark oak, scarlet oak, black oak, northern red oak, and southern red oak *(7)*; sweetgum *(4)*; eastern cottonwood *(5)*; post oak *(10)*; and water oak *(6)*.

Site index is a measure of soil quality and productivity. Loblolly or shortleaf pines have been used as key indicator species for determining site index for most soils in the county except where hardwoods are the only suitable species. Site index can be used in conjunction with yield tables showing volume produced for a normal stand of trees by species and age *(16)*.

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 *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

A wide variety of recreational activities are available in Stanly County. Morrow Mountain State Park is about six miles east of Albemarle. The park covers 4,425 acres in the Uwharrie Mountains. It has campgrounds, cabins, picnic areas, nature trails, a natural history museum, and other facilities. Several large lakes, many small ponds, and streams offer water-related recreational opportunities. Plentiful game, such as deer, quail, and ducks, make hunting a popular sport in the county.

In table 8, 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 ares. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, 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 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 11 and interpretations for dwellings without basements and for local roads and streets in table 10.

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 or 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, horseback riding, and bicycling 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, helped prepare this section.

In Stanly County, the habitat for rabbits and quail is good and habitat for squirrels, ducks, and dove is fair. Deer habitat is fair, and the highest population is in the eastern part of the county adjacent to the Uwharrie Mountains.

Land use in the county favors the edge species, such as rabbit and quail. About 42 percent of the farms are 100 to 259 acres and about 17 percent are only 100 to 139 acres. This small farm size and the varied land use (44 percent is forest land, 13.7 percent is pastureland, and 32.3 percent is cropland) provide favorable habitat for most small game species. Nongame species, such as songbirds, are also plentiful.

Stanly County is rapidly urbanizing, causing a downward trend in wildlife habitat quality and quantity. Future wildlife management is needed in which the concentration is on developing conservation plans that emphasize wildlife habitat preservation, development, or both. Soils information can guide the wildlife manager in locating areas with high management potential.

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 9, 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, 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 goldenrod, beggarweed, and grama.

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, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

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

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, 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, pheasant, 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 wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

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

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet, 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 10 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, a cemented pan, or a very firm dense layer, 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, shrink-swell potential, and organic layers 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, frost-action 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, or 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.

Sanitary Facilities

Table 11 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 11 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 water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

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

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 11 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 water table, depth to bedrock, flooding, large stones, and content of organic matter.

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, bedrock, and cemented pans 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 11 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, depth to a water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench 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, a cemented pan, 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 12 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, depth to a 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 12, 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 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 shale and siltstone, are not considered to be sand and gravel.

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

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, 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 13 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, irrigation, 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, organic matter, or salts or sodium. Depth to a 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, permeability of the aquifer, and the salinity of the soil. 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; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

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 or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or 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 or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, 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. 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 17.

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 14 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, OL, MH, CH, and OH; and highly organic soils as PT. 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. Highly organic soils are classified in group A-8 on the basis of visual inspection.

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 17.

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 15 shows estimates of some characteristics and features that affect soil behavior *(11)*. 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 ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of movement of water through the soil when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, 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 15, 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 16 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. All 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.

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, some organic soils, 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, by runoff from adjacent slopes, or by inflow from high tides. 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 16 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 is expressed as *none, rare, common, occasional,* or *frequent. None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding ares infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding ares 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 are is expressed in months. November-May, for example, means that flooding can are during the period November through May. About two-thirds to three-fourths of all flooding ares 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 16 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 16.

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 or that the water table exists for less than a month.

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 such 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 17 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, 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).

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

Formation of the Soils

Soils are the products of soil-forming processes that act upon material altered or deposited by geologic forces. Climate, plant and animal life, parent material, topography, and time are the factors that contribute to the differences among soils. Climate, plants, and animals, particularly plants, are active forces in soil formation. Topography and the length of time the parent material has been in place modify the effect of climate and plant and animal life. The relative importance of each factor differs from place to place. In some places one factor dominates the formation and determines most of the properties of a soil, but normally the interaction of all five factors determines the soil that develops in any given place.

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.

Stanly County has a warm, humid climate. The county is on a moderate plateau and ranges in elevation from 210 feet at the easternmost extent of the Rocky River to 936 feet at the top of Morrow Mountain. Mountains to the west of the county have a modifying effect on both temperature changes and precipitation; therefore, changes are gradual. The climate of Stanly County is favorable to rapid chemical processes that result in decomposing of organic matter and weathering of rock. The temperature and rainfall are especially favorable to intense leaching and oxidizing.

The soils of Stanly County reflect the effects of climate. Mild temperatures throughout the year and abundant rainfall have depleted the organic matter and considerably leached the soluble bases from most soils, leaving them acid. The minor variations in climate in the county probably have not caused major local differences in soils. The most important effect that climate has had on the formation of soils in Stanly County is in the altering of parent materials through changes in the 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 weathering rocks and in decomposing 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 enters 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. Organisms also modify certain chemical and physical properties. In the soils of Stanly County, most 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. Earthworms and other small invertebrates then mix the material with the uppermost mineral part of the soil.

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 soil. The 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 Stanly 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.

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 Stanly County, the parent material is a major factor in determining what kind of soil forms. It is largely responsible for the chemical and mineralogical composition of soils and for the major differences among 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.

Residuum and alluvium are the two broad classes of parent material in Stanly County. Residual material is residue that has weathered from the underlying rock. Alluvial material has weathered from soils or rocks and has been transported by water.

In Stanly County, the parent material of the residual soils was derived chiefly from a group of fine textured rocks referred to as Carolina slates. Argillites and graywacke sandstones are examples of this group. Soils developing in residuum from slates tend to have a high silt content and a low pH. Badin and Goldston soils are examples of soils that develop mainly over argillites, and Georgeville soils are an example of a soil that develops dominantly over graywacke sandstone.

Small areas of the county are underlain by sills or dikes of basic materials. The basic, or mafic, rocks are mostly gabbro. Soils developed in residuum from this type of rock have a high pH and tend to have a plastic, clayey subsoil. Enon soils are an example.

The transported parent material is mostly recently deposited alluvium. It consists of material that has been changed very little by the soil-forming processes. The Oakboro and Chewacla soils developed in alluvium on flood plains along the streams.

Relief

Relief influences drainage, runoff, soil temperature, and the extent of geologic erosion. In Stanly County, relief is largely determined by the kind of underlying bedrock, the geology of the area, and the amount of landscape dissection by streams.

Relief affects the percolation of water through the profile. Water movement through the profile 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, the well developed Georgeville, Tatum, and Hiwassee soils generally have deeper, better defined profiles than soils in the steeper areas. Relief can also affect the depth of soils. Geologic erosion removes soil material almost as fast as it forms from some soils that have slopes of 15 percent. As a result, most of the strongly sloping to steep soils have a thinner solum. An example is the Goldston soils that are not as deep nor as 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 Misenheimer soils on uplands are imperfectly drained because they are nearly level to gently sloping and internal movement of water is slow.

Soils at a lower elevation are less sloping and receive runoff from adjacent higher areas. This water accumulates in the nearly level to depressional areas. An example is the moderately well drained Oakboro soils on flood plains.

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 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 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 Stanly County, the effects of time as a soil-forming factor are more apparent in the older soils, such as Georgeville and Hiwassee soils, which are in the broader parts of the uplands. These soils have more distinct horizons than Oakboro soils, which formed in alluvium and are still acquiring new deposits from the uplands.

Oakboro soils and some other 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. Goldston soils, for example, are not so well developed because they are steep and geologic erosion keeps pace with soil development. The rate of geologic erosion also partly accounts for the shallowness over bedrock.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(14)*. 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 18 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 not wet but in a humid climate, 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 Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that has a udic moisture regime).

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 Hapludults.

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 Hapludults.

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.

Soil Series and Their Morphology

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

Characteristics of the soil and the material in which it formed are identified for each series. 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 location of this pedon is described along with the state plane coordinates (586,000N; 1,656,900E). The detailed description of each soil horizon follows standards in the *Soil Survey Manual (13)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (14)*. 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."

Badin Series

The Badin series consists of moderately deep, well drained, moderately permeable soils on undulating to steep Piedmont uplands. These soils formed in residuum weathered from fine-grained rocks, such as argillite and graywacke sandstone, that are classed as Carolina slates. Slope is 2 to 45 percent.

Typical pedon of Badin channery silt loam, 2 to 8 percent slopes; 0.7 mile north of Anderson Grove Church in Albemarle on State Road 1537, 100 yards east of road in a cultivated field (586,100N; 1,656,900E):

Ap—0 to 6 inches; brown (7.5YR 5/4) channery silt loam; weak medium granular structure; very friable; common fine roots; 25 percent slate fragments ⅛ inch to 2 inches in length; medium acid; abrupt wavy boundary.

Bt1—6 to 9 inches; strong brown (7.5YR 5/6) channery silty clay loam; weak medium subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; 25 percent slate fragments ⅛ inch to 2 inches in length; medium acid; clear wavy boundary.

Bt2—9 to 18 inches; yellowish red (5YR 5/8) silty clay; moderate medium subangular blocky structure; firm; few fine roots; common faint clay films on faces of peds; 10 percent slate fragments; extremely acid; gradual wavy boundary.

Bt3—18 to 25 inches; mottled red (2.5YR 5/8), yellowish red (5YR 5/8), and strong brown (7.5YR 5/8) channery silty clay loam; weak medium subangular blocky structure; friable; few fine roots; few distinct clay films on faces of peds; 30 percent slate fragments; extremely acid; clear irregular boundary.

Cr—25 to 40 inches; red (2.5YR 5/8), yellowish red (5YR 5/8), and strong brown (7.5YR 5/8) highly fractured slate; few seams of silt loam in cracks; can be dug with difficulty with a spade; clear irregular boundary.

R—40 inches; pale red (2.5YR 6/2), fractured slate.

The clayey Bt horizon is 6 to 24 inches thick. The combined thickness of the loamy and clayey horizons is 20 to 40 inches. They are underlain by soft fractured slate. Reaction ranges from strongly acid to extremely acid except where lime has been added to the soil.

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 that has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 2 to 4. Texture is channery silt loam.

Some pedons have a BE horizon that has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is channery silt loam or channery silty clay loam.

The Bt horizon has hue of 7.5YR to 2.5YR, value of 4 to 6, and chroma of 6 to 8. Mottles in shades of red, yellow, or brown are in many pedons. Texture is silty clay, silty clay loam, channery silty clay, or channery silty clay loam that has 35 to 55 percent clay.

Some pedons have a BC horizon that has colors similar to those of the Bt horizon or that is mottled in shades of those colors. Texture is channery or very channery silty clay loam or channery or very channery silt loam.

The Cr horizon is soft, multicolored, highly fractured slate.

The R horizon is hard fractured slate.

Chewacla Series

The Chewacla series consists of very deep, somewhat poorly drained, moderately permeable soils that formed in recent alluvium. These soils are on nearly level flood plains. Slope is 0 to 2 percent.

Typical pedon of Chewacla loam, occasionally flooded; 2.4 miles southeast of Norwood on State Road 1766, 0.2 mile southwest on State Road 1790, 1.5 miles southwest on a farm road, 200 feet southeast of road in a cultivated field (520,000N; 1,669,850E):

Ap—0 to 7 inches; dark brown (10YR 4/3) loam; weak medium granular structure; very friable; many fine roots; very strongly acid; clear wavy boundary.

Bw1—7 to 20 inches; yellowish brown (10YR 5/8) loam; many medium prominent light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; very friable; common fine roots; common dark concretions; slightly acid; gradual wavy boundary.

Bw2—20 to 36 inches; yellowish brown (10YR 5/4) loam; many medium prominent light brownish gray (2.5Y 6/2) mottles; weak medium subangular blocky structure; friable; few fine roots; common dark concretions; slightly acid; gradual wavy boundary.

Bg—36 to 64 inches; light brownish gray (2.5Y 6/2) sandy clay loam; common medium distinct yellowish brown (10YR 5/4) mottles and common fine faint light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; friable; few fine roots; common dark concretions; slightly acid.

Cg—64 to 80 inches; light brownish gray (2.5Y 6/2) stratified sand and gravel; single grained; loose; slightly acid.

The combined thickness of the loamy horizons ranges from 40 to more than 60 inches. Depth to hard bedrock is 5 feet to more than 10 feet. Few fine slate fragments are in most pedons. Reaction ranges from very strongly acid to slightly acid except where lime has been added to the soil. Dark concretions are few to common in most pedons.

The A or Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Texture is silt loam or loam.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8. Gray mottles, indicative of wetness, are within 24 inches of the surface. Also, mottles in shades of brown are common in the Bw horizon. Texture is loam, silt loam, or sandy clay loam.

The Bg horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 1 or 2, or it is neutral. Texture is sandy clay loam, loam, or silt loam. Mottles are in shades of brown, yellow, olive, or gray.

The Cg or C horizon is similar to the Bw or Bg horizon in color of matrix and mottles. Texture is stratified sandy loam, silt loam, loamy sand, or sand and gravel.

Congaree Series

The Congaree series consists of well drained, moderately permeable, bottom-land soils on flood plains. These soils formed in loamy alluvium along the Pee Dee and Rocky Rivers. This alluvium was derived primarily from crystalline rock formations outside of Stanly County in the Yadkin and Rocky river basins. Slope is 0 to 4 percent.

Typical pedon of Congaree fine sandy loam, frequently flooded; 3.4 miles southeast of Norwood on State Road 1766 to dead end, 1.1 miles south on a farm road, 0.5 mile southeast on another farm road, 150 feet south of farm road in a cultivated field (512,050N; 1,679,050E):

Ap1—0 to 6 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; many fine roots; few pebbles; medium acid; abrupt wavy boundary.

Ap2—6 to 10 inches; yellowish brown (10YR 5/4) fine sandy loam; massive; friable; few fine roots; common medium pores; slightly acid; abrupt smooth boundary.

C1—10 to 22 inches; dark yellowish brown (10YR 4/4) loam; common medium faint dark brown (10YR 3/3) mottles; massive; friable; few fine roots; common fine pores; slightly acid; gradual wavy boundary.

C2—22 to 40 inches; yellowish brown (10YR 5/6) loam; common medium faint dark brown (10YR 4/3) mottles; massive; friable; few fine roots; few fine pores; few fine flakes of mica; few thin lenses of loamy fine sand; slightly acid; gradual wavy boundary.

C3—40 to 60 inches; yellowish brown (10YR 5/4) and dark yellowish brown (10YR 4/4) loamy fine sand; massive; very friable; few fine flakes of mica; common organic stains; slightly acid.

The combined thickness of the loamy horizons ranges from 35 to 60 inches. Depth to bedrock commonly is more than 10 feet. Reaction ranges from medium acid to neutral, but part of the 10- to 40-inch control section has pH of 5.5 or higher. Thin strata of contrasting textures are in the C horizon. Few to many flakes of mica are in most horizons. Content of coarse fragments is commonly less than 2 percent. The organic matter content is erratic with depth, and buried horizons are common in some pedons below a depth of 24 inches. Texture is fine sandy loam.

The A or Ap horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 2 to 4.

The C horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. In some pedons, mottles or horizons have chroma of 2 or less in the lower part of the control section. Texture is dominantly fine sandy loam, loam, or silty clay loam. The 10- to 40-inch control section averages between 18 and 35 percent clay, but some pedons contain thin horizons that are more sandy or clayey. Texture below 40 inches ranges from loamy sand to silty clay. Color below 60 inches ranges from brown to gray, commonly with contrasting mottles.

Enon Series

The Enon series consists of very deep, well drained, slowly permeable soils on undulating to hilly Piedmont uplands. These soils formed in residuum weathered from hornblende, gabbro, and other rocks high in ferromagnesian minerals. Slope is 2 to 25 percent.

Typical pedon of Enon cobbly loam, 2 to 8 percent slopes; on the campus of Stanly Technical Institute in Albemarle, 100 feet northeast of upper parking lot, 400 feet northeast of the automotive shop (579,700N; 1,631,300E):

Oe—2 to 0 inches; partly decomposed hardwood litter.

A—0 to 2 inches; dark grayish brown (10YR 4/2) cobbly loam; weak medium granular structure; very friable;

many fine and medium roots; 20 percent rock fragments; strongly acid; abrupt wavy boundary.

E—2 to 6 inches; yellowish brown (10YR 5/4) cobbly loam; weak medium granular structure; very friable; many medium and coarse roots; 20 percent rock fragments; strongly acid; abrupt wavy boundary.

Bt1—6 to 16 inches; yellowish brown (10YR 5/6) clay; strong medium and coarse angular blocky structure; very firm, very sticky and very plastic; common fine, medium, and coarse roots; few fine pores; common prominent clay films on faces of peds; common black concretions of partly weathered primary minerals; medium acid; gradual wavy boundary.

Bt2—16 to 25 inches; yellowish brown (10YR 5/8) clay; few fine faint yellow (10YR 7/8) mottles; moderate medium and coarse angular blocky structure; very firm, very sticky and very plastic; common fine and medium roots; few fine pores; common prominent clay films on faces of peds; common black concretions of partly weathered primary minerals; slightly acid; gradual wavy boundary.

Bt3—25 to 28 inches; yellowish brown (10YR 5/8) clay loam; many medium distinct dark yellowish brown (10YR 4/4) and yellow (10YR 7/8) mottles; moderate medium angular blocky structure; firm, sticky and plastic; few fine and medium roots; few fine pores; few distinct clay films on faces of peds; common black concretions of partly weathered primary minerals; slightly acid; gradual wavy boundary.

C1—28 to 36 inches; mottled yellowish brown (10YR 5/8), dark yellowish brown (10YR 4/4), and yellow (10YR 7/8) saprolite that easily crushes to loam; massive; few fine roots; common black concretions of partly weathered primary minerals; few seams of illuviated clay; mildly alkaline; gradual irregular boundary.

C2—36 to 65 inches; yellowish brown (10YR 5/6) and yellow (10YR 8/6) saprolite that crushes to fine sandy loam; massive; common black concretions; few seams of clay in vertical cracks; mildly alkaline; clear wavy boundary.

R—65 inches; gabbro.

The B horizon is 15 to 30 inches thick. Reaction ranges from strongly acid to slightly acid in the upper part except where lime has been added to the soil. Reaction is slightly acid to mildly alkaline in the lower part. In most pedons, manganese concretions are few to common in some horizons. COLE ranges from 0.04 to 0.09.

The A horizon has hue of 10YR to 2.5Y, value of 3 or 4, and chroma of 2 to 4. Texture is cobbly loam or very stony loam. Rock fragments, mostly cobbles and stones, range from 15 to 50 percent. Most of the fragments are 3 to 24 inches in diameter.

The E horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 2 to 4. Texture is cobbly loam or cobbly sandy loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8. Mottles having hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2 to 8 are in some pedons. The fine earth fraction of the Bt horizon is clay or clay loam. The Bt horizon contains up to 14 percent rock fragments.

The C horizon is varicolored weathered saprolite that crushes to loam, sandy loam, or fine sandy loam. Rock fragments range from 5 to 14 percent.

The R horizon is gabbro.

Georgeville Series

The Georgeville series consists of very deep, well drained, moderately permeable soils on broad, gently sloping Piedmont uplands. These soils formed in residuum weathered from fine textured rocks, such as tuff, argillite, and graywacke sandstone, that are classed as Carolina slates. Slope is 2 to 8 percent.

Typical pedon of Georgeville silt loam, 2 to 8 percent slopes; on State Road 1134, 1.3 miles north of intersection with North Carolina Highway 73 in Millingport, 100 yards west of road, 200 feet southwest of a farmhouse in a cultivated field (602,525N; 1,611,250E):

Ap—0 to 8 inches; strong brown (7.5YR 5/6) silt loam; moderate medium granular structure; friable; many fine roots; few quartz and argillite pebbles; slightly acid; abrupt wavy boundary.

Bt1—8 to 34 inches; red (2.5YR 4/8) silty clay; moderate medium subangular blocky structure; firm, sticky and slightly plastic; common fine roots; common fine pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bt2—34 to 53 inches; red (2.5YR 4/8) silty clay; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few fine roots; few fine pores; common distinct clay films on faces of peds; very strongly acid; gradual wavy boundary.

B/C—53 to 59 inches; red (2.5YR 4/6) silty clay loam; weak medium subangular blocky structure; friable; few fine pores; few distinct clay films on faces of peds; 15 percent argillite saprolite that crushes to silt loam; very strongly acid; gradual wavy boundary.

C—59 to 80 inches; mottled weak red (10R 4/4) and yellowish brown (10YR 5/8) saprolite that crushes to silt loam; massive; friable; very strongly acid.

The clayey Bt horizon is 24 to 48 inches thick. The combined thickness of the A and B horizons is 60 inches or more. Depth to bedrock is more than 60 inches. Reaction is very strongly acid or strongly acid except where lime has been added to the soil. Content of rock fragments ranges to 10 percent in the A horizon and to 5 percent in the Bt horizon.

The A or Ap horizon has hue of 5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 6. Texture is silt loam or silty clay loam. In some pedons, the Ap horizon is eroded and has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 4 to 6.

Some pedons have a BA horizon. It has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 6 to 8. Texture is silty clay loam or clay loam.

The Bt horizon has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 6 to 8. Mottles in shades of yellow or brown are common in the lower part of some pedons. Texture is clay or silty clay, but some pedons have thin layers of clay loam. The control section averages more than 30 percent silt or more than 40 percent silt plus very fine sand.

The B/C horizon has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 6 to 8. Mottles are commonly in shades of yellow or brown. Texture is silty clay loam, clay loam, or silt loam.

The C horizon is multicolored in shades of brown, yellow, gray, or red. Texture is saprolite that crushes to silt loam or loam. The C horizon commonly contains rock fragments of soft or hard argillite or graywacke sandstone.

Goldston Series

The Goldston series consists of shallow, well drained to excessively drained, moderately rapidly permeable soils on undulating to steep Piedmont upland side slopes and knolls. These soils formed in residuum weathered from fine textured rocks, such as argillite and graywacke sandstone, that are classed as Carolina slates. Slope is 4 to 45 percent.

Typical pedon of Goldston very channery silt loam, 15 to 45 percent slopes; from intersection of U.S. Highway 52 and North Carolina Highway 49 in Richfield, 2.8 miles southwest on North Carolina Highway 49, 150 feet south of highway, 600 feet east of Big Bear Creek (626,525N; 1,616,025E):

A—0 to 1 inch; dark grayish brown (10YR 4/2) very channery silt loam; weak medium granular structure; very friable; many fine and medium roots; few medium pores; 40 percent slate fragments ¼ inch to 3 inches in length; very strongly acid; abrupt smooth boundary.

E—1 to 7 inches; brown (10YR 5/3) very channery silt loam; weak medium granular structure; many fine and medium roots; 40 percent slate fragments ¼ inch to 3 inches in length; very strongly acid; abrupt wavy boundary.

Bw—7 to 16 inches; brownish yellow (10YR 6/6) very channery silt loam; weak medium subangular blocky structure in the fine earth material; very friable; common fine and medium roots; few fine pores; 60 percent slate fragments ½ inch to 6 inches in length; strongly acid; gradual wavy boundary.

Cr—16 to 36 inches; weathered, highly fractured slate; few seams of silt loam in cracks; very strongly acid; gradual irregular boundary.

R—36 inches; fractured slate.

The combined thickness of the loamy horizons ranges from 10 to 20 inches. This soil averages more than 35 percent rock fragments. Depth to hard fractured bedrock is 20 to 40 inches or more. Reaction ranges from extremely acid to medium acid except where lime has been added to the soil.

The A horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. Texture is very channery silt loam. Rock fragments from ¼ inch to 6 inches or more in length range from 35 to 60 percent.

The E horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. Texture is very channery silt loam.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 4 to 8. Texture is very channery silt loam. Mottles of strong brown, yellowish red, and red are in some pedons. Rock fragments from ½ inch to 6 inches in length range from 35 to 60 percent.

The Cr horizon is dominated by multicolored, weathered fractured slate. Content of rock fragments is 60 percent or more.

The R horizon is fractured slate.

Hiwassee Series

The Hiwassee series consists of very deep, well drained, moderately permeable soils on gently sloping to strongly sloping Piedmont uplands. These soils formed in residuum weathered from basic rocks, such as gabbro and basaltic and andesitic tuff. Slope is 2 to 15 percent.

Typical pedon of Hiwassee gravelly loam, 2 to 8 percent slopes; 2.2 miles east of New London on North Carolina Highway 740, 0.3 mile northeast on State Road 1517, 0.8 mile north on State Road 1582, 50 feet northeast of road in a hardwood forest (626,475N; 1,647,400E):

Oe—0.5 to 0 inches; partly decomposed hardwood litter.

A—0 to 6 inches; dark reddish brown (5YR 3/4) gravelly loam; moderate medium granular structure; friable; many fine and medium roots; 15 percent quartz pebbles; medium acid; abrupt wavy boundary.

Bt1—6 to 27 inches; dark red (2.5YR 3/6) clay; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—27 to 48 inches; dark red (2.5YR 3/6) clay; common medium distinct reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt3—48 to 58 inches; red (2.5YR 4/6) clay loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; friable, sticky and slightly plastic; few fine roots; common distinct clay films on faces of peds; few fine flakes of mica; strongly acid; gradual wavy boundary.

BC—58 to 70 inches; red (2.5YR 4/6) loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; weak medium subangular blocky structure; friable, sticky and slightly plastic; few fine roots; few fine flakes of mica; strongly acid; gradual wavy boundary.

C—70 to 80 inches; red (2.5YR 4/6) saprolite that crushes to loam; common medium distinct reddish yellow (7.5YR 6/8) mottles; massive; common fine flakes of mica; strongly acid.

The clayey Bt horizon is 32 to 54 inches thick. The combined thickness of the A and B horizons is 70 inches or more. Depth to hard bedrock is more than 6 feet. Rock fragments, mostly pebbles, range from 15 to 35 percent in the surface layer. Some pedons contain a few fine pebbles of quartz and dark concretions throughout the lower B horizons. Flakes of mica are few to common in some pedons. Reaction is medium acid to very strongly acid except where lime has been added to the soil.

The A or Ap horizon has hue of 2.5YR to 5YR, value of 3, and chroma of 3 to 6. Texture is gravelly loam. Content of rock fragments ranges from 15 to 35 percent.

The Bt horizon has hue of 10R to 2.5YR, value of 3, and chroma of 3 to 6 within a depth of 40 inches or more. In many pedons, it has hue of 10R to 2.5YR, value of 4 or 5, and chroma of 6 to 8 at a depth more than 40 inches. Mottles in shades of brown or reddish yellow are in the lower part of the Bt horizon in many pedons. Texture is clay or clay loam. Clay content of the upper 20 inches of the Bt horizon ranges from 35 to 60 percent.

The BC horizon has hue of 2.5YR, value of 3 to 5, and chroma of 6 to 8. Texture is clay loam, silty clay loam, loam, or sandy clay loam. Mottles in shades of brown, yellow, or red are in most pedons.

The C horizon has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 4 to 8, or it is mottled or streaked with these colors. The C horizon is saprolite that crushes to loam, sandy clay loam, or sandy loam.

Kirksey Series

The Kirksey series consists of deep, moderately well drained, moderately slowly permeable soils on broad ridges, in depressed areas, and around the head of drainageways. These soils formed in residuum weathered from fine textured rocks, such as argillite and graywacke sandstone, that are classed as Carolina slates. Slope is dominantly 1 to 4 percent but ranges from 0 to 6 percent.

Typical pedon of Kirksey silt loam, 0 to 6 percent slopes; 2.2 miles northwest of Locust on North Carolina Highway 200, 2 miles northeast on State Road 1206, 0.3 mile west on State Road 1207, 220 yards northeast of road in a mixed hardwood and pine forest (572,850N; 1,577,900E):

Oi—2 to 0 inches; partly decomposed pine and hardwood litter.

A—0 to 6 inches; grayish brown (2.5Y 5/2) silt loam; moderate medium granular structure; very friable; many fine and medium roots; 5 percent fine pebbles; very strongly acid; abrupt wavy boundary.

E—6 to 10 inches; light yellowish brown (2.5Y 6/4) silt loam; common medium faint light olive brown (2.5Y 5/6) mottles; weak coarse granular structure; very friable; many fine and medium roots; 5 percent fine pebbles; very strongly acid; gradual wavy boundary.

Bt1—10 to 20 inches; olive yellow (2.5Y 6/6) silty clay loam; few fine distinct light gray (2.5Y 7/2) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; common fine roots; few distinct clay films on faces of peds; 5 percent fine pebbles; very strongly acid; gradual wavy boundary.

Bt2—20 to 26 inches; olive yellow (2.5Y 6/6) silty clay loam; common medium faint light brownish gray (2.5Y 6/2) mottles, few fine distinct yellowish brown (10YR 5/8) mottles, and common medium faint light gray (2.5Y 7/2) mottles; moderate medium subangular blocky structure; friable; few fine roots; few distinct clay films on faces of peds; 5 percent fine pebbles; very strongly acid; gradual wavy boundary.

BC—26 to 34 inches; mottled light brownish gray (10YR 6/2), light yellowish brown (10YR 6/4), and reddish yellow (7.5YR 6/8) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; few fine slate channers; very strongly acid; gradual wavy boundary.

C—34 to 46 inches; mottled brownish yellow (10YR 6/6) and light brownish gray (10YR 6/2) channery silt loam; massive; firm; very strongly acid; gradual irregular boundary.

R—46 inches; slate.

The Bt horizon is 14 to 29 inches thick. The combined thickness of the A and B horizons is 20 to 40 inches. Depth to moderately hard bedrock ranges from 40 to 60 inches. Slate channers and quartz pebbles range from 0 to 15 percent throughout the A and B horizons. Reaction is strongly acid or very strongly acid except where lime has been added to the soil. In some pedons, the C horizon is extremely acid.

The A or Ap horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. Texture is silt loam. The E horizon has hue of 10YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. Texture is silt loam.

The Bt horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. Mottles have hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 1 to 8. Texture is silty clay loam or silt loam. In all pedons, mottles with chroma of 1 or 2 are within 24 inches of the top of the argillic horizon.

The C horizon commonly is mottled and has hue of 5YR to 5Y, value of 5 to 8, and chroma of 2 to 8. Texture is silt loam or channery silt loam.

The R horizon is slate.

The BC horizon commonly is mottled and has hue of 5YR to 2.5Y, value of 5 to 8, and chroma of 2 to 8. Texture is silt loam, loam, or silty clay loam.

Misenheimer Series

The Misenheimer series consists of shallow, somewhat poorly drained, moderately rapidly permeable soils on nearly level to gently sloping broad ridges, in depressed areas, and around the head of drainageways. These soils formed in residuum weathered from argillite and graywacke sandstone that are classed as Carolina slates. Slope is 0 to 4 percent.

Typical pedon of Misenheimer channery silt loam, 0 to 4 percent slopes; 0.4 mile northwest of Richfield on State Road 1005, 100 feet southwest of road in a mixed hardwood and pine forest (632,875N; 1,626,200E):

O—2 to 0 inches; undecomposed pine and hardwood litter.

A—0 to 2 inches; dark grayish brown (10YR 4/2) channery silt loam; weak medium granular structure; very friable; many fine and medium roots; 15 percent slate fragments ¼ to 1 inch in length; extremely acid; abrupt smooth boundary.

E—2 to 7 inches; pale yellow (2.5Y 7/4) channery silt loam; weak fine granular structure; very friable; common medium roots; 15 percent slate fragments ¼ to 1 inch in length; extremely acid; abrupt smooth boundary.

Bw—7 to 14 inches; light yellowish brown (10YR 6/4) channery silt loam; few medium distinct light gray (2.5Y 7/2) mottles and few fine faint brownish yellow mottles; weak medium platy structure parting to weak fine and medium subangular blocky; friable; common fine roots; 15 percent slate fragments ¼ inch to 1½ inches in length; extremely acid; gradual irregular boundary.

Cr—14 to 25 inches; multicolored weathered and fractured slate; 65 percent hard slate fragments ¼ inch to 3 inches in length; few seams mottled brown (7.5YR 5/4), gray (10YR 6/1), and yellow (10YR 8/6) silt loam in cracks along faces of rocks; extremely acid; gradual irregular boundary.

R—25 inches; fractured slate.

Combined thickness of the loamy horizons is 10 to 20 inches. These horizons are underlain by a paralithic contact. Depth to fractured bedrock is 20 to 40 inches. Reaction ranges from extremely acid to strongly acid in all horizons except where lime has been added to the soil.

The A1 or Ap horizon has hue of 10YR to 5Y, value of 4 to 7, and chroma of 1 to 4. Texture is channery silt loam. The E horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 2 to 4. Texture is channery silt loam or channery loam.

The Bw horizon has hue of 10YR to 5Y, value of 5 to 7, and chroma of 4 to 6. Texture is channery silt loam or channery loam. Mottles are in shades of gray, brown, yellow, or olive.

Some pedons have a multicolored C horizon that commonly has hue of 10YR to 5Y. Texture is channery or very channery silt loam.

The Cr horizon is dominated by multicolored weathered slate that has nearly horizontal beds. The Cr horizon has 60 percent or more slate fragments.

The R horizon is fractured slate.

Oakboro Series

The Oakboro series consists of deep, moderately well drained, moderately permeable soils on nearly level flood plains. These soils formed in alluvium from slate, siltstone, sandstone, and tuff. Slope is 0 to 2 percent.

Typical pedon of Oakboro silt loam, frequently flooded; east from Albemarle on North Carolina Highways 24 and 27 to State Road 1740, south 0.6 mile to Jacobs Creek, 400 feet east of road and 300 feet north of creek (564,000N; 1,657,00E):

Oi—1 to 0 inches; undecomposed and partly decomposed hardwood and pine litter.

A—0 to 4 inches; yellowish brown (10YR 5/4) silt loam; weak medium granular structure; very friable; many fine and medium roots; strongly acid; abrupt wavy boundary.

E—4 to 10 inches; light yellowish brown (2.5Y 6/4) silt loam; common fine prominent brown (7.5YR 4/4) mottles; weak medium granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

Bw1—10 to 18 inches; brownish yellow (10YR 6/6) silty clay loam; common fine prominent light yellowish brown (2.5Y 6/4) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; few pebbles; medium acid; gradual wavy boundary.

Bw2—18 to 38 inches; mottled brownish yellow (10YR 6/6, 6/8), light yellowish brown (10YR 6/4), and light gray (10YR 7/1) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; few pebbles; few fine iron-manganese concretions; medium acid; gradual wavy boundary.

Bw3—38 to 46 inches; mottled brownish yellow (10YR 6/6), light yellowish brown (10YR 6/4), and light gray (10YR 7/2) silty clay loam; weak medium subangular blocky structure; firm; few fine roots; 5 percent slate channers; few to common iron-manganese concretions; medium acid; abrupt wavy boundary.

R—46 inches; fractured slate.

The combined thickness of the loamy horizons is 40 to 60 inches. These horizons are underlain by a lithic contact. Rock fragments range from 0 to 15 percent throughout. Depth to hard bedrock is 40 to 60 inches. Reaction ranges from very strongly acid to slightly acid except where lime has been added to the soil. Iron-manganese concretions are in some horizons of most pedons.

The A or Ap horizon has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 2 to 4. Some pedons have an E horizon that has hue of 7.5YR to 2.5Y, value of 5 to 8, and chroma of 3 to 6. Texture is silt loam or loam.

Some pedons have a BE horizon that has hue of 10YR to 2.5Y, value of 5 or 6, and chroma of 4 to 8. Texture is silt loam, loam, or silty clay loam.

The Bw horizon has hue of 7.5YR to 2.5Y, value of 5 to 7, and chroma of 3 to 8. Mottles are in shades of brown, yellow, or gray. Mottles having chroma of 2 or less are within 24 inches of the surface. Horizons in which the matrix has chroma of 2 or less are in the lower part of some pedons. Texture of the Bw horizon is silt loam, loam, or silty clay loam. Silty clay or clay is in some pedons as a thin layer overlying the R horizon.

Some pedons have a Cr horizon that is weathered fragmented slate with silt loam or loam in the seams.

The R horizon is fractured slate, siltstone, or sandstone.

Tatum Series

The Tatum series consists of deep, well drained, moderately permeable soils on gently sloping to steep Piedmont uplands. These soils formed in residuum weathered from fine textured rocks, such as argillite and graywacke sandstone, that are classed as Carolina slates. Slope is 2 to 35 percent.

Typical pedon of Tatum channery silt loam, 2 to 8 percent slopes; 3 miles southwest of Richfield on State Road 1134 to intersection with State Road 1450 near Mt. Tabor Church, 0.15 mile south of intersection in a cultivated field (612,100N; 1,616,025E):

Ap—0 to 7 inches; brown (7.5YR 5/4) channery silt loam; weak medium granular structure; very friable; many fine roots; 20 percent slate and quartz fragments ¼ to 1 inch in length; medium acid; abrupt wavy boundary.

Bt1—7 to 12 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; common fine roots; few faint clay films on faces of peds; 5 percent slate and quartz fragments ¼ to 1 inch in length; medium acid; abrupt wavy boundary.

Bt2—12 to 36 inches; red (2.5YR 5/8) silty clay; moderate medium subangular blocky structure; friable; few fine roots; common distinct clay films on faces of peds; 5 percent slate fragments; strongly acid; gradual wavy boundary.

Bt3—36 to 44 inches; red (2.5YR 4/8) channery silty clay loam; few fine prominent yellow (10YR 7/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few faint clay films on faces of peds; 20 percent slate fragments; strongly acid; gradual wavy boundary.

Cr—44 to 60 inches; red (2.5YR 4/8) saprolite that crushes to silt loam; massive; firm in place; digs easily; few seams of silty clay loam; 20 percent slate fragments; very strongly acid; gradual irregular boundary.

R—60 inches; graywacke sandstone.

The Bt horizon is 28 to 40 inches thick. Depth to bedrock is 40 to 60 inches or more. Content of rock fragments ranges from 5 to 30 percent throughout. Reaction is strongly acid or very strongly acid except where lime has been added to the soil.

The A or Ap horizon has hue of 7.5YR to 10YR, value of 4 or 5, and chroma of 4 to 8. The Ap horizon in the eroded phase has hue of 5YR, value of 4 or 5, and chroma of 4 to 8. The A horizon is gravelly loam, channery silt loam, or channery silty clay loam.

Some pedons have a BE horizon that has hue of 5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8. Texture is silt loam, silty clay loam, channery silt loam, or channery silty clay loam.

The Bt horizon has hue of 2.5YR, value of 4 or 5, and chroma of 6 to 8. Texture is silty clay or clay. Texture of a thin Bt horizon in the upper or lower parts of most pedons is silty clay loam or channery silty clay loam.

Some pedons have a BC horizon that has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 6 to 8. In some pedons, mottles have hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 6 to 8. Texture is channery silty clay loam, silty clay loam, channery silt loam, or silt loam.

The C horizon is highly unweathered saprolite with coarse channers of argillite or graywacke sandstone. The saprolite crushes to channery silt loam or silt loam.

The R horizon is hard argillite or graywacke sandstone.

Uwharrie Series

The Uwharrie series consists of very deep, well drained, moderately permeable soils on gently sloping to steep Piedmont uplands. These soils formed in residuum weathered from fine textured rocks, such as argillite and graywacke sandstone. Stones and boulders cover 15 to 25 percent of the soil surface. Slope is 4 to 45 percent.

Typical pedon of Uwharrie stony loam, 4 to 15 percent slopes, very bouldery; 2 miles east of New London on North Carolina Highway 740, 0.75 mile north on State Road 1516, 200 feet east of road in a hardwood forest (625,600N; 1,635,700E):

A—0 to 4 inches; yellowish red (5YR 5/8) stony loam; weak medium granular structure; friable; many fine roots; few quartz tuff fragments; 25 percent stones and boulders; medium acid; abrupt smooth boundary.

BA—4 to 7 inches; yellowish red (5YR 5/6) silty clay loam; weak medium subangular structure; friable; common fine roots; few quartz pebbles; strongly acid; abrupt smooth boundary.

Bt1—7 to 18 inches; red (2.5YR 4/6) clay; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

Bt2—18 to 31 inches; red (2.5YR 4/6) clay; common medium prominent reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; firm, sticky and slightly plastic; few fine roots; common distinct clay films on faces of peds; strongly acid; gradual wavy boundary.

BC—31 to 46 inches; red (2.5YR 4/6) silty clay; common fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm, few fine roots; common distinct clay films on ped surfaces; strongly acid; gradual wavy boundary.

C—46 to 74 inches; yellowish brown (10YR 5/6), red (2.5YR 5/8), and white (5Y 8/2) saprolite that crushes to silt loam; massive; friable; few pockets of silty clay; strongly acid.

The combined thickness of the clayey horizons ranges from 30 to 60 inches. Depth to bedrock is more than 60 inches. Reaction is very strongly acid to strongly acid unless lime has been added to the soil.

Content of rock fragments, from stones to boulders, ranges from 15 to 35 percent in the A horizon. Clay content of the particle-size control section ranges from 55 to 75 percent.

The A 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 or 5, and chroma of 3 to 8. Texture is stony loam.

The BA horizon has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 6 to 8. Texture is silty clay loam or clay loam, or the stony analogs of these textures. Some pedons do not have a BA horizon.

The Bt horizon has hue of 10R to 5YR, value of 4 or 5, and chroma of 6 to 8. Mottles in shades of brown and yellow are in most pedons. Texture is dominantly clay but ranges to silty clay or clay loam in the lower part.

The BC horizon has hue of 2.5YR to 5YR, value of 4 or 5, and chroma of 6 to 8. Mottles are in shades of brown, yellow, or gray. Texture is clay loam, silty clay loam, or silty clay. Some pedons do not have a BC horizon.

The C horizon has hue of 10R to 5YR, value of 4 to 6, and chroma of 6 to 8. Mottles are in shades of brown, yellow, or gray. In some pedons, the C horizon is mottled in shades of these colors. In many pedons, the mottled colors are a remnant of highly weathered slate. Texture is silty clay loam, silt loam, or loam with soft saprolite of fine grained rock material.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

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.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single 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.

Bottom land. The normal flood plain of a stream, subject to flooding.

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.

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.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

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 to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:
Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.
Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.
Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.
Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.
Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.
Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.
Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

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

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic)—Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated)—Erosion much more rapid than geologic erosion, mainly as a result of the

activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

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.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

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.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

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.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

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.

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.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Low strength. The soil is not strong enough to support loads.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

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.

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.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Poor outlets (in tables). In these areas, surface or subsurface drainage outlets are difficult or expensive to install.

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 value are—

Extremely acid	below 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.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saprolite (soil science). Unconsolidated, residual material underlying the soil and grading to hard bedrock below.

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.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

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.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

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.

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.

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.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 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."

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."

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

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.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

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.

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 1951-73 at Albemarle, North Carolina]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have -- Maximum temperature higher than--	2 years in 10 will have -- Minimum temperature lower than--	Average number of growing degree days *	Average	2 years in 10 will have -- Less than--	2 years in 10 will have -- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	54.2	30.4	42.3	76	8	28	3.52	1.95	4.90	6	1.5
February----	56.9	32.4	44.6	79	12	33	4.13	3.08	5.11	7	.1
March-------	63.3	36.8	50.1	84	17	118	4.24	2.72	5.61	7	.5
April-------	74.5	46.8	60.7	91	27	328	3.46	2.28	4.53	6	.0
May---------	80.0	54.6	67.4	95	35	539	3.81	1.96	5.43	6	.0
June--------	86.7	62.7	74.7	101	46	741	4.05	2.03	5.80	7	.0
July--------	89.3	66.0	77.7	101	54	859	5.00	2.57	7.11	8	.0
August------	87.1	65.1	76.1	97	52	809	5.42	2.44	7.96	8	.0
September---	82.8	58.8	70.8	97	43	624	3.92	1.24	6.10	5	.0
October-----	73.3	47.9	60.6	90	27	235	3.02	.70	4.86	4	.0
November----	64.5	37.5	51.0	84	16	118	2.07	.88	3.07	4	.0
December----	55.0	31.2	43.1	75	8	69	3.97	2.47	5.32	6	.0
Yearly:											
Average-	72.3	47.5	59.9	---	---	---	---	---	---	---	---
Extreme-	---	---	---	103	8	---	---	---	---	---	---
Total---	---	---	---	---	---	4,601	46.61	35.14	64.70	74	4.1

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Data recorded in the period 1951-73 at Albemarle, 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--	April 1	April 10	April 21
2 years in 10 later than--	March 25	April 6	April 16
5 years in 10 later than--	March 13	March 27	April 9
First freezing temperature in fall:			
1 year in 10 earlier than--	November 1	October 22	October 11
2 years in 10 earlier than--	November 6	October 28	October 16
5 years in 10 earlier than--	November 15	November 7	October 26

TABLE 3.--GROWING SEASON

[Data recorded in the period 1951-73 at Albemarle, North Carolina]

Probabiliby	Daily minimum temperature during growing season		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
9 years in 10	225	201	183
8 years in 10	232	209	188
5 years in 10	246	224	199
2 years in 10	259	239	210
1 year in 10	266	247	216

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
BaB	Badin channery silt loam, 2 to 8 percent slopes	36,277	14.3
BaD	Badin channery silt loam, 8 to 15 percent slopes	27,333	10.8
BaF	Badin channery silt loam, 15 to 45 percent slopes	8,862	3.5
BbB	Badin-Urban land complex, 2 to 8 percent slopes	4,450	1.8
BbD	Badin-Urban land complex, 8 to 25 percent slopes	1,372	0.5
Ch	Chewacla loam, occasionally flooded	726	0.3
Ck	Chewacla silt loam, frequently flooded	2,114	0.8
Co	Congaree fine sandy loam, frequently flooded	1,031	0.4
EcB	Enon cobbly loam, 2 to 8 percent slopes	2,627	1.0
EcD	Enon cobbly loam, 8 to 15 percent slopes	1,488	0.6
EnC	Enon very stony loam, 4 to 15 percent slopes	4,216	1.7
EnE	Enon very stony loam, 15 to 25 percent slopes	3,075	1.2
GeB	Georgeville silt loam, 2 to 8 percent slopes	6,862	2.7
GfB2	Georgeville silty clay loam, 2 to 8 percent slopes, eroded	2,396	0.9
GoC	Goldston very channery silt loam, 4 to 15 percent slopes	35,236	13.9
GoF	Goldston very channery silt loam, 15 to 45 percent slopes	21,120	8.3
HeB	Hiwassee gravelly loam, 2 to 8 percent slopes	1,781	0.7
HeD	Hiwassee gravelly loam, 8 to 15 percent slopes	1,370	0.5
KkB	Kirksey silt loam, 0 to 6 percent slopes	15,352	6.1
MhB	Misenheimer channery silt loam, 0 to 4 percent slopes	16,407	6.5
Oa	Oakboro silt loam, frequently flooded	10,298	4.1
Qu	Quarries	118	.1
TaF	Tatum gravelly loam, 15 to 35 percent slopes	2,383	0.9
TbB	Tatum channery silt loam, 2 to 8 percent slopes	25,828	10.2
TbD	Tatum channery silt loam, 8 to 15 percent slopes	4,766	1.9
TcB2	Tatum channery silty clay loam, 2 to 8 percent slopes, eroded	5,165	2.0
TcD2	Tatum channery silty clay loam, 8 to 15 percent slopes, eroded	1,175	0.5
TdB	Tatum-Urban land complex, 2 to 8 percent slopes	2,451	1.0
Ud	Udorthents, loamy	940	0.4
Ur	Urban land	820	0.3
UwC	Uwharrie stony loam, 4 to 15 percent slopes, very bouldery	2,737	1.1
UwF	Uwharrie stony loam, 15 to 45 percent slopes, very bouldery	2,523	1.0
	Total land area	253,299	100.0
	Water	5,888	
	Total area	259,187	

TABLE 5.--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	Wheat	Barley	Sorghum silage	Grass-legume hay	Pasture
		Bu	Bu	Bu	Bu	Tons	Tons	AUM*
BaB------------- Badin	IIIe	25	85	40	50	---	4.5	7.5
BaD------------- Badin	IVe	20	75	35	45	---	4.2	7.0
BaF------------- Badin	VIIe	---	---	---	---	---	3.9	6.5
BbB, BbD. Badin-Urban land								
Ch-------------- Chewacla	IIIw	35	130	---	---	---	6.6	11.0
Ck-------------- Chewacla	IVw	30	80	---	---	---	5.4	9.0
Co-------------- Congaree	IIIw	40	140	---	---	---	---	---
EcB------------- Enon	IIIe	30	85	40	---	---	5.1	8.5
EcD------------- Enon	IVe	25	75	40	---	---	4.8	8.0
EnC------------- Enon	VIs	---	---	---	---	---	2.7	4.5
EnE------------- Enon	VIIs	---	---	---	---	---	---	---
GeB------------- Georgeville	IIe	---	95	---	---	---	4.2	8.0
GfB2------------ Georgeville	IIIe	---	90	---	---	---	4.5	7.5
GoC------------- Goldston	IVs	20	70	35	45	---	2.8	4.5
GoF------------- Goldston	VIIs	---	---	---	---	---	1.8	3.0
HeB------------- Hiwassee	IIe	---	95	---	---	---	4.5	7.5
HeD------------- Hiwassee	IVe	---	75	---	---	---	3.3	5.5

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Soybeans	Corn	Wheat	Barley	Sorghum silage	Grass-legume hay	Pasture
		Bu	Bu	Bu	Bu	Tons	Tons	AUM*
KkB------------- Kirksey	IIe	30	90	---	---	---	3.6	---
MhB------------- Misenheimer	IIIw	20	60	30	---	---	3.0	5.0
Oa-------------- Oakboro	IVw	30	80	---	---	---	---	---
Qu. Quarries								
TaF------------- Tatum	VIe	---	---	---	---	---	2.6	4.5
TbB------------- Tatum	IIe	30	90	50	---	---	4.8	8.0
TbD------------- Tatum	IIIe	30	85	45	---	---	4.5	7.5
TcB2------------ Tatum	IIIe	30	90	50	---	---	4.8	8.0
TcD2------------ Tatum	IVe	30	85	45	---	---	4.5	---
TdB. Tatum-Urban land								
Ud. Udorthents								
Ur. Urban land								
UwC------------- Uwharrie	VIs	---	---	---	---	---	2.5	4.0
UwF------------- Uwharrie	VIIs	---	---	---	---	---	---	---

* 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 6.--CAPABILITY CLASSES AND SUBCLASSES

[Miscellaneous areas are excluded. Absence of an entry indicates no acreage]

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	---	---	---	---
II	49,823	49,823	---	---
III	69,395	51,231	18,164	---
IV	79,014	31,366	12,412	35,236
V	---	---	---	---
VI	9,336	2,383	---	6,953
VII	35,580	8,862	---	26,718
VIII	---	---	---	---

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available. Absence of a map unit indicates that it is not suitable for woodland or that it is committed to another land use and unlikely to become available for woodland]

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
BaB, BaD----------- Badin	8A	Slight	Slight	Slight	Loblolly pine--------	80	8	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	68	7	
					Yellow poplar--------	---	---	
					White oak------------	66	4	
BaF---------------- Badin	8R	Moderate	Moderate	Slight	Loblolly pine--------	80	8	Loblolly pine, shortleaf pine.
					Shortleaf pine-------	68	7	
					Virginia pine--------	---	---	
					Yellow poplar--------	---	---	
					White oak------------	66	4	
Ch, Ck------------- Chewacla	9W	Slight	Moderate	Slight	Loblolly pine--------	96	9	Loblolly pine, hardwoods **.
					Yellow poplar--------	100	8	
					American sycamore----	---	---	
					Sweetgum-------------	97	9	
					Water oak------------	---	---	
					Eastern cottonwood---	---	---	
					Green ash------------	---	---	
					Southern red oak-----	---	---	
					Blackgum-------------	---	---	
Co----------------- Congaree	9A	Slight	Slight	Slight	Loblolly pine--------	90	9	Loblolly pine, hardwoods **.
					Sweetgum-------------	100	10	
					Yellow poplar--------	107	8	
					Cherrybark oak-------	107	4	
					Eastern cottonwood---	---	---	
					American sycamore----	---	---	
					Black walnut---------	---	---	
					Scarlet oak----------	100	4	
					Willow oak-----------	---	---	
EcB, EcD----------- Enon	7A	Slight	Slight	Slight	Loblolly pine--------	73	7	Loblolly pine.
					Shortleaf pine-------	63	7	
					Virginia pine--------	63	7	
					Northern red oak-----	84	4	
					Sweetgum-------------	78	5	
					White oak------------	69	4	
					Yellow poplar--------	88	6	
					Hickory--------------	---	---	
EnC, EnE----------- Enon	7R	Slight	Severe	Moderate	Loblolly pine--------	73	7	Loblolly pine.
					Shortleaf pine-------	63	7	
					Virginia pine--------	63	7	
					Northern red oak-----	84	4	
					Sweetgum-------------	78	5	
					White oak------------	69	4	
					Yellow poplar--------	88	6	
					Hickory--------------	---	---	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class*	
GeB----------------- Georgeville	8A	Slight	Slight	Slight	Loblolly pine--------	81	8	Loblolly pine.
					Longleaf pine--------	67	5	
					Shortleaf pine-------	63	7	
					White oak------------	69	4	
					Scarlet oak----------	70	4	
					Southern red oak-----	67	3	
GfB2---------------- Georgeville	6C	Moderate	Moderate	Moderate	Loblolly pine--------	70	6	Loblolly pine.
					Longleaf pine--------	60	4	
GoC----------------- Goldston	7D	Slight	Slight	Slight	Loblolly pine--------	73	7	Loblolly pine.
					Shortleaf pine-------	63	7	
					Southern red oak-----	63	3	
					White oak------------	63	3	
					Longleaf pine--------	68	5	
					Post oak-------------	63	3	
GoF----------------- Goldston	7D	Moderate	Moderate	Slight	Loblolly pine--------	73	7	Loblolly pine.
					Shortleaf pine-------	63	7	
					Southern red oak-----	63	3	
					White oak------------	63	3	
					Longleaf pine--------	68	5	
					Post oak-------------	63	3	
HeB, HeD------------ Hiwassee	7A	Slight	Slight	Slight	Loblolly pine--------	75	7	Loblolly pine.
					Northern red oak-----	70	4	
					Shortleaf pine-------	70	8	
					White oak------------	70	4	
					Yellow poplar--------	85	6	
KkB----------------- Kirksey	6W	Slight	Moderate	Slight	Loblolly pine--------	67	6	Loblolly pine.
MhB----------------- Misenheimer	6D	Slight	Slight	Moderate	Shortleaf pine-------	60	6	Loblolly pine, shortleaf pine.
					Willow oak-----------	---	---	
					White oak------------	70	4	
					Sweetgum-------------	---	---	
Oa------------------ Oakboro	8A	Slight	Slight	Slight	Yellow poplar--------	100	8	Loblolly pine.
					White oak------------	84	4	
					Northern red oak-----	78	4	
					Shortleaf pine-------	81	9	
					Loblolly pine--------	94	9	
					Virginia pine--------	86	8	
					Sweetgum-------------	---	---	
					Hickory--------------	---	---	
TaF----------------- Tatum	8R	Moderate	Moderate	Moderate	Loblolly pine--------	78	8	Loblolly pine.
					Virginia pine--------	68	7	
					Shortleaf pine-------	68	7	
					Northern red oak-----	72	4	
					Yellow poplar--------	83	5	

See footnotes at end of table.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Ordination symbol	Management concerns			Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	Productivity class*	
TbB, TbD, TcB2, TCD2: 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	
UwC: Uwharrie	7X	Slight	Moderate	Slight	Yellow poplar	96	7	Loblolly pine.
					White oak	---	---	
					Southern red oak	---	---	
					Black oak	84	4	
					Chestnut oak	---	---	
					Virginia pine	---	---	
					Shortleaf pine	---	---	
					Black cherry	---	---	
					Blackgum	---	---	
UwF: Uwharrie	7R	Moderate	Severe	Slight	Yellow poplar	96	7	Loblolly pine.
					White oak	---	---	
					Southern red oak	---	---	
					Black oak	84	4	
					Chestnut oak	---	---	
					Virginia pine	---	---	
					Shortleaf pine	---	---	
					Black cherry	---	---	
					Blackgum	---	---	

* 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. 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.

** 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 8.--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
BaB: Badin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
BaD: Badin	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, large stones, slope.
BaF: Badin	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
BbB:					
Badin	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, large stones.
Urban land.					
BbD:					
Badin	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
Urban land.					
Ch: Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ck: Chewacla	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
Co: Congaree	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.	Severe: flooding.
EcB: Enon	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, small stones, percs slowly.	Slight	Slight.
EcD: Enon	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
EnC: Enon	Severe: small stones.	Severe: small stones.	Severe: large stones, slope, small stones.	Moderate: large stones.	Severe: small stones, large stones.
EnE: Enon	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Moderate: large stones, slope.	Severe: small stones, large stones.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
GeB------------------- Georgeville	Slight----------	Slight----------	Moderate: slope, small stones.	Severe: erodes easily.	Slight.
GfB2------------------ Georgeville	Slight----------	Slight----------	Moderate: slope.	Severe: erodes easily.	Slight.
GoC------------------- Goldston	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: large stones.	Severe: small stones, thin layer.
GoF------------------- Goldston	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.	Severe: small stones, slope, thin layer.
HeB------------------- Hiwassee	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
HeD------------------- Hiwassee	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
KkB------------------- Kirksey	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, small stones, wetness.	Severe: erodes easily.	Moderate: wetness.
MhB------------------- Misenheimer	Severe: wetness.	Severe: depth to rock.	Severe: small stones, wetness, depth to rock.	Moderate: wetness.	Severe: depth to rock.
Oa-------------------- Oakboro	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
Qu. Quarries					
TaF------------------- Tatum	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
TbB------------------- Tatum	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
TbD------------------- Tatum	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.
TcB2------------------ Tatum	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
TcD2------------------ Tatum	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight----------	Moderate: small stones, slope.

TABLE 8.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TdB: Tatum	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
TdB: Urban land.					
Ud. Udorthents					
Ur. Urban land					
UwC Uwharrie	Moderate: dusty, slope.	Moderate: dusty, slope.	Severe: slope.	Moderate: large stones, dusty.	Moderate: slope, large stones.
UwF Uwharrie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

TABLE 9.--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 herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
BaB: Badin	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
BaD: Badin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
BaF: Badin	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
BbB:										
Badin	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Urban land.										
BbD:										
Badin	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
Ch: Chewacla	Poor	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Ck: Chewacla	Very poor.	Poor	Poor	Good	Good	Fair	Fair	Poor	Good	Fair.
Co: Congaree	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
EcB: Enon	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
EcD: Enon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
EnC, EnE: Enon	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
GeB: Georgeville	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GfB2: Georgeville	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
GoC: Goldston	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
GoF: Goldston	Very poor.	Very poor.	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
HeB: Hiwassee	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
HeD: Hiwassee	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

TABLE 9.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
KkB----------------- Kirksey	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
MhB----------------- Misenheimer	Fair	Good	Good	Fair	Fair	Fair	Fair	Good	Good	Fair.
Oa------------------ Oakboro	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
Qu. Quarries										
TaF----------------- Tatum	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
TbB----------------- Tatum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TbD----------------- Tatum	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TcB2---------------- Tatum	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
TcD2---------------- Tatum	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
TdB:										
Tatum---------------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Urban land.										
Ud. Udorthents										
Ur. Urban land										
UwC----------------- Uwharrie	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
UwF----------------- Uwharrie	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

TABLE 10.--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
BaB: Badin	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones, large stones.
BaD: Badin	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, large stones, slope.
BaF: Badin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
BbB:						
Badin	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones, large stones.
Urban land.						
BbD:						
Badin	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
Urban land.						
Ch: Chewacla	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness.
Ck: 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.	Severe: flooding.
EcB: Enon	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
EcD: Enon	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
EnC: Enon	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Severe: small stones, large stones.

TABLE 10.--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
EnE: Enon	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: small stones, large stones.
GeB, GfB2: Georgeville	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
GoC: Goldston	Severe: depth to rock.	Moderate: slope, depth to rock, large stones.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, large stones.	Severe: small stones, thin layer.
GoF: Goldston	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope, thin layer.
HeB: Hiwassee	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Severe: low strength.	Slight.
HeD: Hiwassee	Moderate: too clayey, slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: low strength.	Moderate: slope.
KkB: Kirksey	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.	Moderate: wetness.
MhB: Misenheimer	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness, depth to rock.	Severe: wetness.	Moderate: wetness, depth to rock.	Severe: depth to rock.
Oa: Oakboro	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding.	Severe: flooding.
Qu. Quarries						
TaF: Tatum	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.	Severe: slope.
TbB: Tatum	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
TbD: Tatum	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.
TcB2: Tatum	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
TcD2: Tatum	Moderate: slope, too clayey.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: small stones, slope.

TABLE 10.--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
TdB:						
Tatum-----------	Moderate: too clayey.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
Urban land.						
Ud. Udorthents						
Ur. Urban land						
UwC-------------- Uwharrie	Moderate: too clayey, slope, large stones.	Moderate: shrink-swell, slope, large stones.	Moderate: slope, shrink-swell, large stones.	Severe: slope.	Severe: low strength, large stones.	Moderate: slope, large stones.
UwF-------------- Uwharrie	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.

TABLE 11.--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
BaB: Badin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
BaD: Badin	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
BaF: Badin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
BbB:					
Badin	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: area reclaim, too clayey, hard to pack.
Urban land.					
BbD:					
Badin	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: area reclaim, too clayey, hard to pack.
Urban land.					
Ch, Ck: 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.
EcB: Enon	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
EcD, EnC: Enon	Severe: percs slowly.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey, hard to pack.
EnE: Enon	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
GeB, GfB2: Georgeville	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey, hard to pack.

TABLE 11.--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
GoC------------------ Goldston	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
GoF------------------ Goldston	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
HeB------------------ Hiwassee	Moderate: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight------------	Fair: too clayey, hard to pack.
HeD------------------ Hiwassee	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, hard to pack, slope.
KkB------------------ Kirksey	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock, wetness.	Moderate: depth to rock, wetness.	Fair: area reclaim, too clayey.
MhB------------------ Misenheimer	Severe: depth to rock, wetness.	Severe: seepage, depth to rock, wetness.	Severe: depth to rock, seepage, wetness.	Severe: seepage, depth to rock, wetness.	Poor: thin layer, wetness, depth to rock.
Oa------------------- Oakboro	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, depth to rock, wetness.	Severe: flooding, wetness.	Fair: area reclaim, wetness, thin layer.
Qu. Quarries					
TaF------------------ Tatum	Severe: slope.	Severe: slope.	Severe: slope, too clayey, depth to rock.	Severe: slope.	Poor: too clayey, hard to pack, small stones.
TbB------------------ 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.
TbD------------------ 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.
TcB2----------------- 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.
TcD2----------------- 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.

TABLE 11.--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
TdB:					
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.
Urban land.					
Ud. Udorthents					
Ur. Urban land					
UwC Uwharrie	Moderate: percs slowly, slope, large stones.	Severe: large stones, slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
UwF Uwharrie	Severe: slope.	Severe: large stones, slope.	Severe: too clayey, slope.	Severe: slope.	Poor: too clayey, slope.

TABLE 12.--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
BaB, BaD: Badin	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
BaF: Badin	Poor: area reclaim, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
BbB:				
Badin	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Urban land.				
BbD:				
Badin	Poor: area reclaim, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Urban land.				
Ch, Ck: 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.
EcB, EcD: Enon	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
EnC: Enon	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
EnE: Enon	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
GeB, GfB2: Georgeville	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
GoC: Goldston	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
GoF: Goldston	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.

TABLE 12.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
HeB, HeD: Hiwassee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
KkB: Kirksey	Fair: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
MhB: Misenheimer	Poor: depth to rock, thin layer.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, depth to rock, thin layer.
Oa: Oakboro	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
Qu. Quarries				
TaF: Tatum	Poor: slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, too clayey.
TbB, TbD, TcB2, TcD2: Tatum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
TdB:				
Tatum	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, too clayey.
Urban land.				
Ud. Udorthents				
Ur. Urban land				
UwC: Uwharrie	Moderate: shrink-swell.	Improbable	Improbable	Poor: thin layer, large stones.
UwF: Uwharrie	Severe: slope.	Improbable	Improbable	Poor: thin layer, slope, large stones.

TABLE 13.--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	Irrigation	Terraces and diversions	Grassed waterways
BaB---------------- Badin	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
BaD, BaF---------- Badin	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
BbB:							
Badin------------	Moderate: seepage, depth to rock, slope.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
Urban land.							
BbD:							
Badin------------	Severe: slope.	Severe: thin layer.	Severe: no water.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Urban land.							
Ch, Ck------------ Chewacla	Moderate: seepage.	Severe: piping, hard to pack, wetness.	Moderate: slow refill.	Flooding-------	Wetness, flooding.	Wetness---------	Wetness.
Co---------------- Congaree	Moderate: seepage.	Severe: piping.	Moderate: deep to water, slow refill.	Flooding-------	Wetness, soil blowing.	Erodes easily, wetness, soil blowing.	Erodes easily.
EcB--------------- Enon	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope.	Percs slowly---	Percs slowly.
EcD--------------- Enon	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
EnC, EnE---------- Enon	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Percs slowly, slope.	Slope, large stones, percs slowly.	Large stones, slope, percs slowly.
GeB, GfB2--------- Georgeville	Moderate: slope, seepage.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--			Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Irrigation	Terraces and diversions	Grassed waterways
GoC, GoF: Goldston	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, depth to rock, rooting depth.	Slope, large stones, depth to rock.	Large stones, slope, depth to rock.
HeB: Hiwassee	Moderate: seepage, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
HeD: Hiwassee	Severe: slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
KkB: Kirksey	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Slope	Wetness, slope, erodes easily.	Erodes easily, wetness.	Erodes easily.
MhB: Misenheimer	Severe: depth to rock.	Severe: thin layer.	Severe: depth to rock.	Depth to rock	Wetness, depth to rock.	Large stones, depth to rock, wetness.	Large stones, wetness, depth to rock.
Oa: Oakboro	Moderate: seepage, depth to rock.	Severe: piping, wetness.	Severe: no water.	Flooding	Wetness, flooding.	Wetness	Favorable.
Qu. Quarries							
TaF: Tatum	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
TbB: Tatum	Moderate: seepage, depth to rock, slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
TbD: Tatum	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.
TcB2: Tatum	Moderate: seepage, depth to rock, slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
TcD2: Tatum	Severe: slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Slope	Slope.

TABLE 13.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Limitations for-- Aquifer-fed excavated ponds	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
TdB:							
Tatum	Moderate: seepage, depth to rock, slope.	Severe: piping, hard to pack.	Severe: no water.	Deep to water	Slope	Favorable	Favorable.
Urban land.							
Ud. Udorthents							
Ur. Urban land							
UwC Uwharrie	Slight	Severe: hard to pack.	Severe: no water.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.
UwF Uwharrie	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Large stones, slope.	Slope, large stones.	Large stones, slope.

TABLE 14.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. some soils may have Unified classifications 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		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
BaB, BaD, BaF---- Badin	0-6	Channery silt loam.	ML, CL, GC, GM	A-4, A-5, A-6	0-10	60-100	50-80	45-75	30-70	25-50	4-20
	6-25	Silty clay, silty clay loam, channery silty clay loam.	CL, CH, MH	A-6, A-7	0-5	65-100	60-100	55-100	50-98	30-65	15-35
	25-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
BbB, BbD: Badin-----------	0-6	Channery silt loam.	ML, CL, GC, GM	A-4, A-5, A-6	0-10	60-100	50-80	45-75	30-70	25-50	4-20
	6-25	Silty clay, silty clay loam, channery silty clay loam.	CL, CH, MH	A-6, A-7	0-5	65-100	60-100	55-100	50-98	30-65	15-35
	25-40	Weathered bedrock	---	---	---	---	---	---	---	---	---
	40	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											
Ch--------------- Chewacla	0-7	Loam-------------	ML, CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	70-100	55-90	25-49	4-20
	7-64	Sandy clay loam, loam, sandy loam.	SM, SM-SC, ML	A-4, A-7-6	0	96-100	95-100	60-96	36-70	20-45	NP-15
	64-80	Variable---------	---	---	---	---	---	---	---	---	---
Ck--------------- Chewacla	0-6	Silt loam--------	ML, CL, CL-ML	A-4, A-6, A-7	0	98-100	95-100	70-100	55-90	25-49	4-20
	6-60	Silt loam, silty clay loam, clay loam.	ML, CL	A-4, A-6, A-7	0	96-100	95-100	80-100	51-98	30-49	4-22
	60-80	Variable---------	---	---	---	---	---	---	---	---	---
Co--------------- Congaree	0-10	Fine sandy loam	SM, SM-SC	A-2, A-4	0	95-100	95-100	70-100	20-50	<30	NP-7
	10-40	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
	40-60	Variable---------	---	---	---	---	---	---	---	---	---
EcB, EcD--------- Enon	0-6	Cobbly loam	SM, SM-SC, SC	A-2-4, A-4	0-5	80-100	80-100	60-85	25-49	<30	NP-10
	6-28	Clay loam, clay	CH, CL	A-7-6, A-6	0-5	85-100	80-100	75-98	65-95	38-60	15-35
	28-65	Variable---------	---	---	---	---	---	---	---	---	---
EnC, EnE--------- Enon	0-6	Very stony loam	GM, GC, SM, SC	A-1, A-2-4	25-50	45-85	35-75	25-55	10-35	<30	NP-10
	6-26	Clay, clay loam	CH	A-7-6	0-10	85-100	80-100	65-98	55-95	40-75	20-45
	26-65	Variable---------	---	---	---	---	---	---	---	---	---

TABLE 14.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
GeB------------- Georgeville	0-8	Silt loam--------	ML	A-4	0-2	90-100	85-100	65-100	51-98	<40	NP-10
	8-59	Clay, silty clay, silty clay loam.	MH, ML	A-7	0-1	95-100	95-100	90-100	75-98	41-79	15-40
	59-80	Silty clay loam, loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0-5	90-100	90-100	65-100	51-95	<30	NP-12
GfB2------------ Georgeville	0-8	Silty clay loam	CL, ML	A-6, A-7	0-2	90-100	90-100	85-100	65-98	30-49	11-20
	8-60	Clay, silty clay, silty clay loam.	MH, ML, CH	A-7	0-1	95-100	95-100	90-100	75-98	41-79	15-40
	60-72	Silty clay loam, loam, silt loam.	ML, CL, CL-ML	A-4, A-6	0-5	90-100	90-100	65-100	51-95	<30	NP-12
GoC, GoF--------- Goldston	0-7	Very channery silt loam.	GM, SM, ML	A-2-4, A-4	20-50	40-80	30-80	25-80	20-75	20-40	NP-10
	7-16	Very channery silt loam, very channery very fine sandy loam.	GM, GC, SM, ML	A-2-4, A-4	20-50	40-80	30-80	25-80	20-60	20-40	NP-10
	16-36	Weathered bedrock	---	---	---	---	---	---	---	---	---
	36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HeB, HeD--------- Hiwassee	0-6	Gravelly loam	SM, SM-SC	A-4, A-2	0-2	95-100	90-100	70-95	30-50	10-35	NP-7
	6-58	Clay, silty clay, clay loam.	CL, ML, MH	A-7-5, A-7-6	0-2	95-100	95-100	80-100	51-95	40-80	12-36
	58-80	Sandy loam, loam, sandy clay loam.	SM, ML, SM-SC, CL	A-4, A-5, A-6, A-7	0-5	90-100	85-99	60-90	36-70	20-49	4-20
KkB-------------- Kirksey	0-10	Silt loam--------	ML	A-4	0-2	90-100	88-100	80-95	70-90	<40	NP-8
	10-34	Silty clay loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6	0-1	95-100	90-100	90-98	80-95	20-40	4-15
	34-46	Channery silt loam, fine sandy loam, loam.	ML	A-4, A-6	0-2	95-100	90-100	85-96	50-90	<40	NP-12
	46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MhB-------------- Misenheimer	0-14	Channery silt loam.	GM, SM, ML, CL	A-4, A-2-4, A-6	0-15	65-90	55-80	30-80	40-75	15-40	NP-15
	14-25	Weathered bedrock	---	---	---	---	---	---	---	---	---
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oa--------------- Oakboro	0-10	Silt loam--------	ML, CL-ML, CL	A-4, A-6	0-15	96-100	95-100	85-100	60-90	<35	NP-10
	10-46	Loam, silt loam, silty clay loam.	ML, CL-ML, CL	A-4, A-6	0-15	96-100	95-100	85-100	70-95	<35	NP-15
	46	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Qu. Quarries											

TABLE 14.--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	
TaF: Tatum	0-6	Gravelly silt loam, silt loam.	GM, ML, SM	A-4	0-10	60-80	55-75	45-75	40-70	22-36	2-10
	6-42	Silty clay loam, silty clay, gravelly clay.	MH, GM, SM	A-7	0-10	60-100	55-98	50-96	45-90	50-80	10-36
	42-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
	60+	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TbB, TbD: Tatum	0-7	Channery silt loam.	GM, ML, SM	A-4	0-10	60-80	55-75	45-75	40-70	22-36	2-10
	7-44	Silty clay loam, silty clay, channery silty clay loam.	MH, GM, SM	A-7	0-10	60-100	55-98	50-96	45-90	50-80	10-36
	44-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
	60+	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
TdB:											
Tatum	0-7	Channery silt loam.	GM, ML, SM	A-4	0-10	60-80	55-75	45-75	40-70	22-36	2-10
	7-44	Silty clay loam, silty clay, gravelly clay.	MH, GM, SM	A-7	0-10	60-100	55-98	50-96	45-90	50-80	10-36
	44-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
	60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											
Ud. Udorthents											
Ur. Urban land											
UwC, UwF: Uwharrie	0-4	Stony loam	ML, CL, CL-ML	A-4, A-6	15-35	90-100	85-100	65-100	51-98	<40	NP-10
	4-7	Silt loam, silty clay loam, clay loam.	ML, MH	A-4, A-6, A-7	0-30	75-100	65-100	60-100	51-98	32-61	4-28
	7-31	Sandy clay, clay loam, clay.	MH, ML, CL	A-4, A-6, A-7	0-10	95-100	95-100	70-92	51-80	35-70	15-30
	31-46	Clay, silty clay, clay loam.	CL, ML, CL-ML	A-4, A-6, A-7	0-10	98-100	95-100	78-100	51-70	25-48	6-20
	46-74	Variable	---	---	---	---	---	---	---	---	---

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

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
BaB, BaD, BaF: Badin	0-6	10-27	1.40-1.60	0.6-2.0	0.14-0.20	3.6-6.5	Low	0.15	3	1-3
	6-25	35-55	1.30-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Moderate	0.24		
	25-40	---	---	---	---	---	-------------	----		
	40	---	---	---	---	---	-------------	----		
BbB, BbD:										
Badin	0-6	10-27	1.40-1.60	0.6-2.0	0.14-0.20	3.6-6.5	Low	0.15	3	1-3
	6-25	35-55	1.30-1.50	0.6-2.0	0.14-0.19	3.6-5.5	Moderate	0.24		
	25-40	---	---	---	---	---	-------------	----		
	40	---	---	---	---	---	-------------	----		
Urban land.										
Ch: Chewacla	0-7	10-27	1.30-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.28	5	1-4
	7-64	18-35	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.5	Low	0.28		
	64-80	---	---	---	---	---	-------------	----		
Ck: 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
	6-60	18-35	1.30-1.50	0.6-2.0	0.15-0.24	4.5-6.5	Low	0.32		
	60-80	---	---	---	---	---	-------------	----		
Co: Congaree	0-10	5-15	1.30-1.60	0.6-6.0	0.12-0.18	4.5-7.3	Low	0.24	5	<4
	10-40	18-35	1.20-1.50	0.6-2.0	0.12-0.20	4.5-7.3	Low	0.37		
	40-70	---	---	---	---	---	-------------	----		
EcB, EcD: Enon	0-6	5-15	1.45-1.65	2.0-6.0	0.11-0.15	5.1-6.5	Low	0.28	2	.5-2
	6-28	20-35	1.30-1.50	0.6-2.0	0.15-0.20	5.1-6.5	Low	0.24		
	28-65	35-60	1.20-1.40	0.06-0.2	0.15-0.20	5.1-7.8	High	0.28		
EnC, EnE: Enon	0-6	5-20	1.45-1.65	2.0-6.0	0.06-0.11	5.1-6.5	Low	0.10	4	.5-2
	6-28	20-35	1.30-1.50	0.6-2.0	0.15-0.20	5.1-6.5	Low	0.24		
	28-65	35-60	1.20-1.40	0.06-0.2	0.15-0.20	5.1-7.8	High	0.28		
GeB: Georgeville	0-8	5-27	1.20-1.40	0.6-2.0	0.15-0.20	4.5-6.0	Low	0.43	4	.5-2
	8-59	35-60	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.28		
	59-80	15-40	1.20-1.40	0.6-2.0	0.05-0.10	4.5-5.5	Low	0.32		
GfB2: Georgeville	0-8	27-35	1.20-1.40	0.6-2.0	0.13-0.18	4.5-6.0	Low	0.49	4	<.5
	8-59	35-60	1.20-1.40	0.6-2.0	0.13-0.18	4.5-5.5	Low	0.28		
	59-80	15-40	1.20-1.40	0.6-2.0	0.05-0.10	4.5-5.5	Low	0.32		
GoC, GoF: Goldston	0-7	5-15	1.40-1.60	2.0-6.0	0.6-0.12	3.6-5.5	Low	0.05	2	.5-2
	7-16	5-27	1.40-1.60	2.0-6.0	0.06-0.12	3.6-5.5	Low	0.05		
	16-36	---	---	---	---	---	-------------	----		
	36	---	---	---	---	---	-------------	----		
HeB, HeD: Hiwassee	0-6	7-20	1.45-1.65	0.6-2.0	0.10-0.14	4.5-6.5	Low	0.28	5	.5-2
	6-58	35-60	1.30-1.45	0.6-2.0	0.12-0.15	4.5-6.5	Moderate	0.28		
	58-80	7-35	1.45-1.65	0.6-2.0	0.10-0.14	4.5-6.5	Low	0.28		
KkB: Kirksey	0-10	4-20	1.20-1.40	0.6-2.0	0.15-0.22	5.1-6.5	Low	0.43	3	.5-2
	10-34	18-35	1.20-1.40	0.2-0.6	0.12-0.18	4.5-5.5	Low	0.43		
	34-46	5-25	1.20-1.40	0.6-2.0	0.11-0.15	3.6-5.5	Low	0.43		
	46	---	---	---	---	---	-------------	----		

TABLE 15.--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 K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
MhB------------- Misenheimer	0-14	7-35	1.40-1.60	0.6-6.0	0.12-0.18	3.6-5.5	Low----------	0.15	2	.5-1
	14-25	---	---	---	---	---	-------------	----		
	25	---	---	---	---	---	-------------	----		
Oa-------------- Oakboro	0-10	10-27	1.30-1.50	0.6-2.0	0.15-0.20	4.5-6.5	Low----------	0.28	4	1-4
	10-46	18-35	1.30-1.50	0.6-2.0	0.15-0.25	4.5-6.5	Low----------	0.28		
	46	---	---	---	---	---	-------------	----		
Qu. Quarries										
TaF, TbB, TbD, TcB2, TcD2------ Tatum	0-7	12-27	1.10-1.40	0.6-2.0	0.10-0.17	4.5-5.5	Low----------	0.24	4	.5-2
	7-44	48-60	1.40-1.60	0.6-2.0	0.12-0.18	4.5-5.0	Moderate-----	0.28		
	44-60	---	---	---	---	---	-------------	----		
	60+	---	---	---	---	---	-------------	----		
TdB: Tatum-----------	0-7	12-27	1.10-1.40	0.6-2.0	0.10-0.17	4.5-5.5	Low----------	0.24	4	.5-2
	7-44	48-60	1.40-1.60	0.6-2.0	0.12-0.18	4.5-5.0	Moderate-----	0.28		
	44-60	---	---	---	---	---	-------------	----		
	60+	---	---	---	---	---	-------------	----		
Urban land.										
Ud. Udorthents										
Ur. Urban land										
UwC, UwF---------- Uwharrie	0-4	10-35	1.20-1.50	0.6-2.0	0.08-0.12	4.5-6.0	Low----------	0.20	4	.2-5
	4-7	10-35	1.20-1.50	0.6-2.0	0.10-0.16	4.5-6.0	Low----------	0.28		
	7-31	35-75	1.25-1.55	0.6-2.0	0.12-0.16	4.5-6.0	Moderate-----	0.28		
	31-46	15-75	1.30-1.60	0.6-2.0	0.12-0.16	4.5-6.0	Moderate-----	0.28		
	46-74	---	---	---	---	---	-------------	----		

TABLE 16.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
BaB, BaD, BaF: Badin	C	None	---	---	>6.0	---	---	20-40	Soft	High	High.
BbB, BbD: Badin	C	None	---	---	>6.0	---	---	20-40	Soft	High	High.
Urban land.											
Ch: Chewacla	C	Occasional	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High	Moderate.
Ck: Chewacla	C	Frequent	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---	High	Moderate.
Co: Congaree	B	Frequent	Brief	Nov-Apr	2.5-4.0	Apparent	Nov-Apr	>60	---	Moderate	Moderate.
EcB, EcD: Enon	C	None	---	---	>6.0	---	---	>60	---	High	Moderate.
EnC, EnE: Enon	C	None	---	---	>6.0	---	---	>60	---	High	Moderate.
GeB, GfB2: Georgeville	B	None	---	---	>6.0	---	---	>60	---	High	High.
GoC, GoF: Goldston	C	None	---	---	>6.0	---	---	10-20	Soft	Moderate	High.
HeB, HeD: Hiwassee	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
KkB: Kirksey	C	None	---	---	1.5-3.0	Perched	Dec-Mar	40-60	Soft	Moderate	High.
MhB: Misenheimer	C	None	---	---	1.0-1.5	Perched	Dec-May	10-20	Soft	High	High.
Oa: Oakboro	C	Frequent	Brief	Nov-Apr	1.5-2.0	Apparent	Dec-Apr	40-60	Hard	High	Moderate.
Qu. Quarries											
TaF, TbB, TbD, TcB2, TcD2: Tatum	B	None	---	---	>6.0	---	---	40-60	Soft	High	High.
TdB: Tatum	B	None	---	---	>6.0	---	---	40-60	Soft	High	High.
Urban land.											
Ud. Udorthents											

TABLE 16.--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			
Ur. Urban land											
UwC, UwF---------- Uwharrie	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Moderate.

TABLE 17.--ENGINEERING INDEX TEST DATA

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--					Maximum dry density	Optimum moisture
	AASHTO	Unified	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm				
										Pct		Lb/ft3	Pct
Badin channery silt loam: * (S79NC-167-001)													
Ap - - - - - - - - 0 to 6	A-6(8)	ML	80	76	70	67	59	36	15	40	13	98.7	22.5
Bt2 - - - - - - - 9 to 18	A-7-5(20)	MH	100	100	99	98	94	75	52	61	29	95.8	25.7
Bt3 - - - - - - - 18 to 25	A-7-5(15)	MH	100	100	99	96	90	66	40	56	20	95.2	27.7
Georgeville silt loam: * (S79NC-167-006)													
Ap - - - - - - - - 0 to 8	A-6(8)	CL	95	93	91	79	63	35	21	33	11	106.4	17.8
Bt1 - - - - - - - 8 to 34	A-7-6(20)	CH	100	100	100	97	90	71	57	62	33	29.0	29.0
C - - - - - - - - 59 to 80	A-4(7)	ML	100	100	99	69	52	29	20	36	10	102.1	21.7
Goldston very channery silt loam: ** (S79NC-167-007)													
A - - - - - - - - 0 to 6	A-2-4(0)	GM	43	30	26	24	19	8	2	38	5	106.8	18.0
Bw - - - - - - - - 6 to 17	A-2-4(0)	GM	46	35	31	30	25	13	5	30	5	98.4	20.5
Hiwassee loam: * (S79NC-167-003)													
A - - - - - - - - 0 to 6	A-7-5(12)	MH	91	88	80	70	57	27	13	54	17	81.5	32.7
Bt1 - - - - - - - 6 to 27	A-7-5(20)	MH	99	99	97	93	87	69	54	63	29	93.8	27.0
Bt4 - - - - - - - 58 to 65	A-4(7)	ML	94	88	84	69	49	19	8	28	4	85.7	33.0
Misenheimer channery silt loam: * (S79NC-167-002)													
A - - - - - - - - 2 to 7	A-4(5)	ML	85	73	64	61	51	25	12	31	5	108.7	16.5
Bw - - - - - - - - 7 to 14	A-4(6)	ML	79	71	65	63	52	27	13	31	7	107.8	17.2
Tatum channery silt loam: * (S79NC-167-005)													
Ap - - - - - - - - 0 to 7	A-6(8)	CL	93	86	84	77	53	28	16	31	11	108.8	16.5
Bt2 - - - - - - - 12 to 36	A-7-5(17)	MH	99	99	98	96	82	66	47	55	25	98.3	24.4
C - - - - - - - - 44 to 60	A-4(8)	ML	100	100	99	76	60	34	22	39	8	99.9	22.2

* Typical pedon for the survey area. See "Soil Series and Their Morphology" for location and additional information.
** Goldston very channery silt loam: south from Stanfield on North Carolina Highway 1001 to State Road 1152, west on State Road 1152 for 0.6 mile, 150 feet north of State Road 1152.

TABLE 18.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Badin	Clayey, mixed, thermic Typic Hapludults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Congaree	Fine-loamy, mixed, nonacid, thermic Typic Udifluvents
Enon	Fine, mixed, thermic Ultic Hapludalfs
Georgeville	Clayey, kaolinitic, thermic Typic Hapludults
Goldston	Loamy-skeletal, siliceous, thermic, shallow Typic Dystrochrepts
Hiwassee	Clayey, kaolinitic, thermic Typic Rhodudults
Kirksey	Fine-silty, siliceous, thermic Aquic Hapludults
Misenheimer	Loamy, siliceous, thermic, shallow Aquic Dystrochrepts
Oakboro	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Tatum	Clayey, mixed, thermic Typic Hapludults
Uwharrie	Clayey, mixed, thermic Typic Hapludults

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