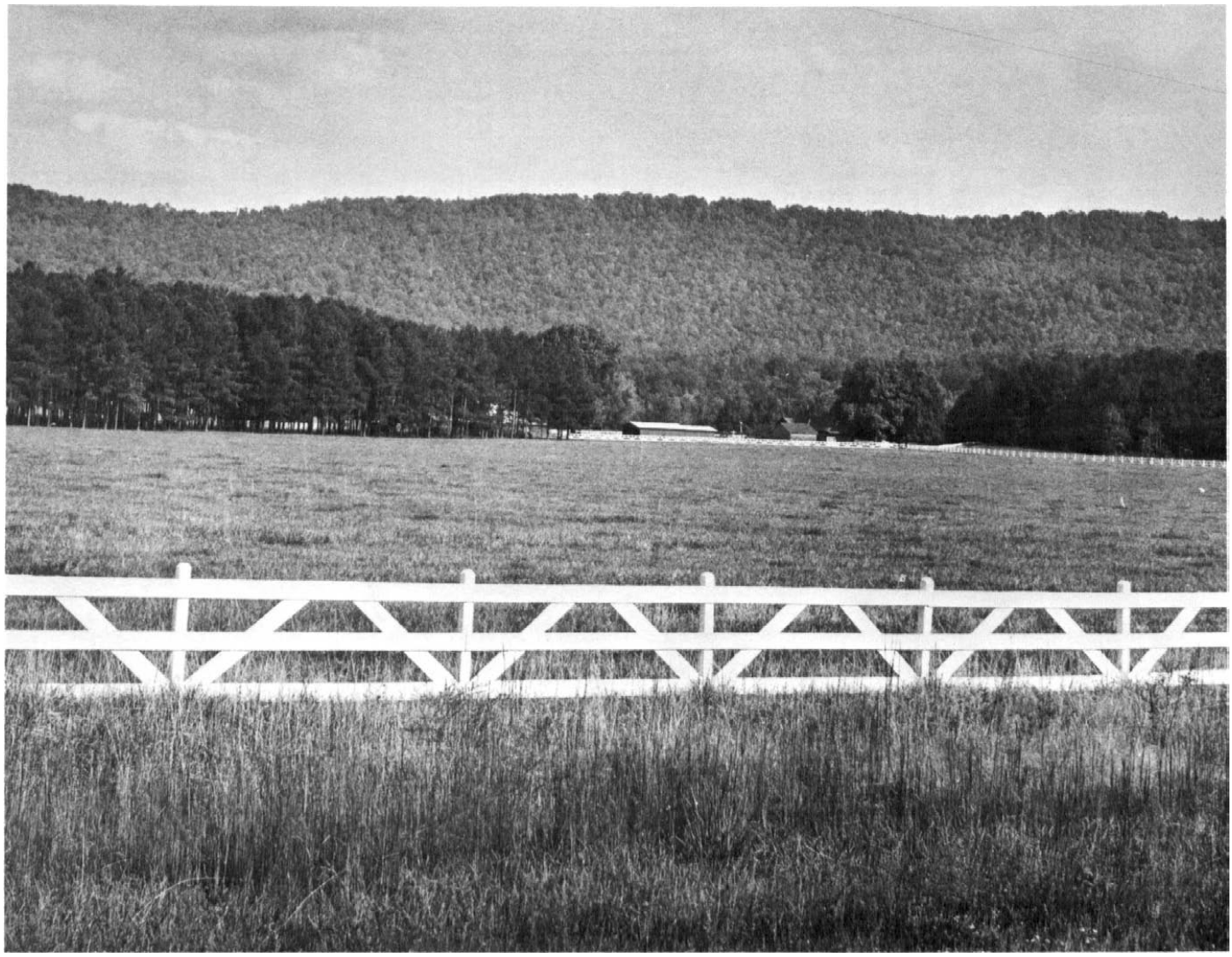
SOIL SURVEY OF

Etowah County, Alabama

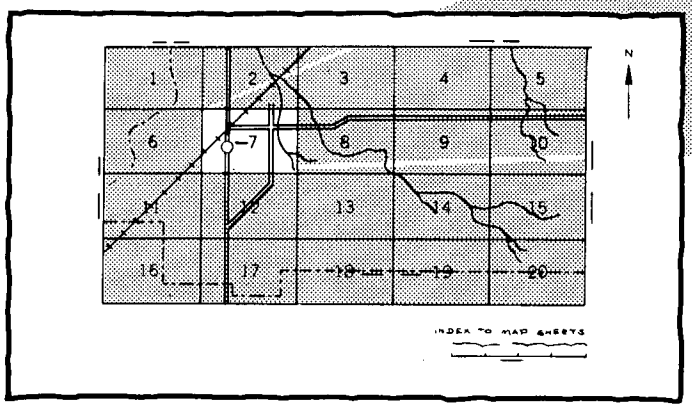


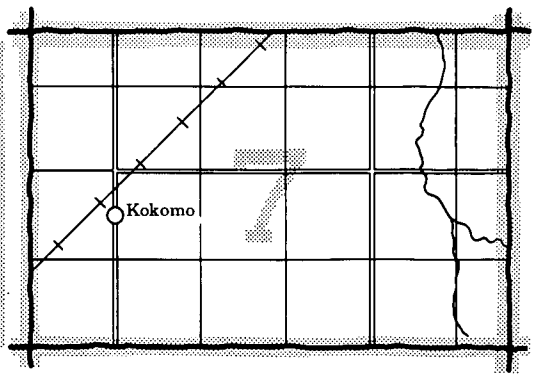
United States Department of Agriculture
Soil Conservation Service

in cooperation with the
Alabama Agricultural Experiment Station and the
Alabama Department of Agriculture and Industries

HOW TO USE

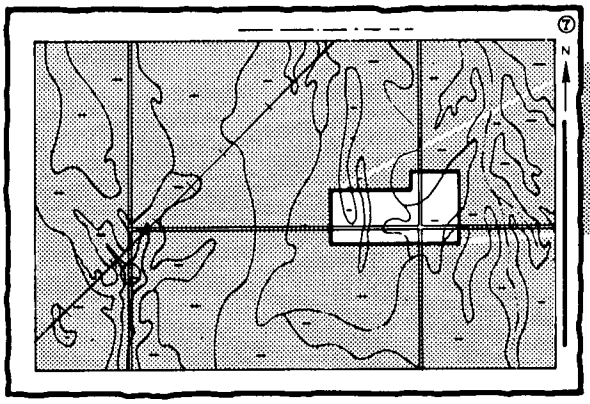
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

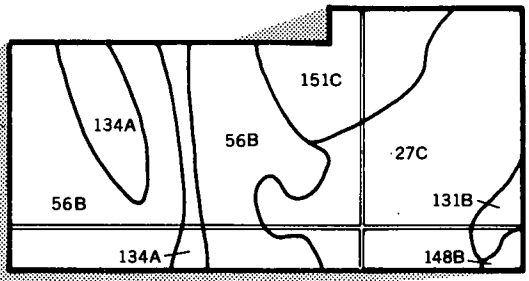




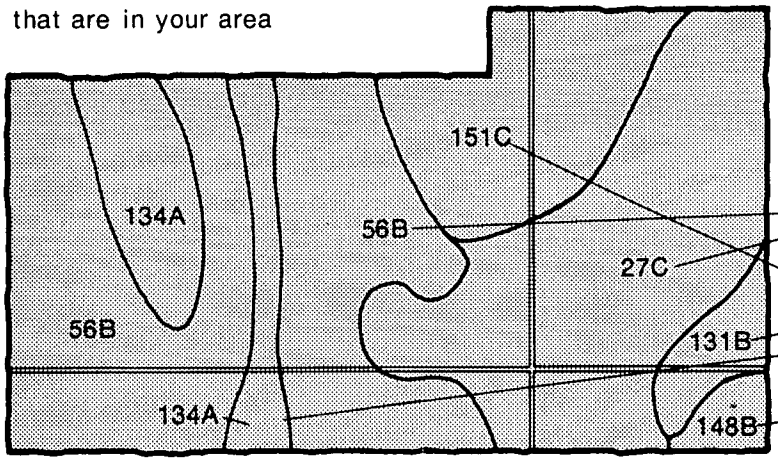
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

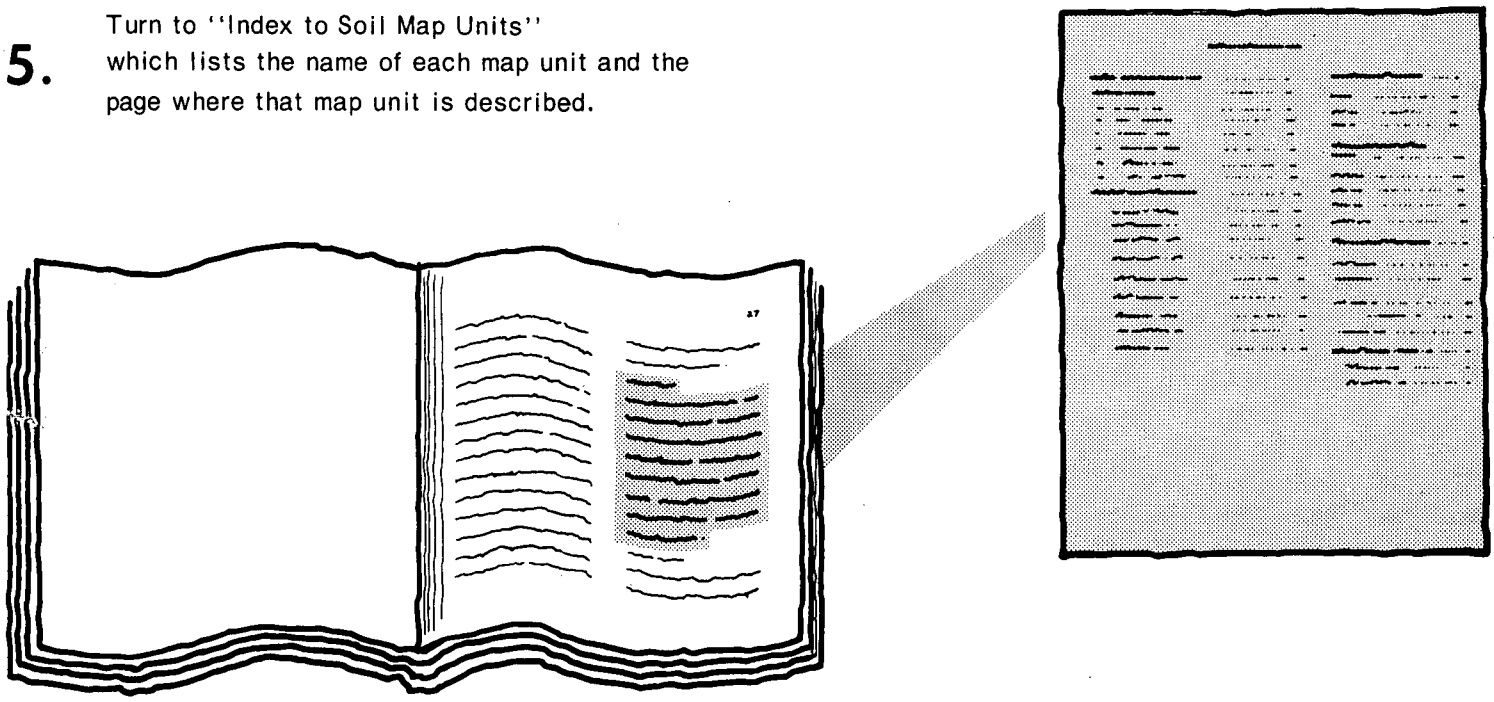


Symbols

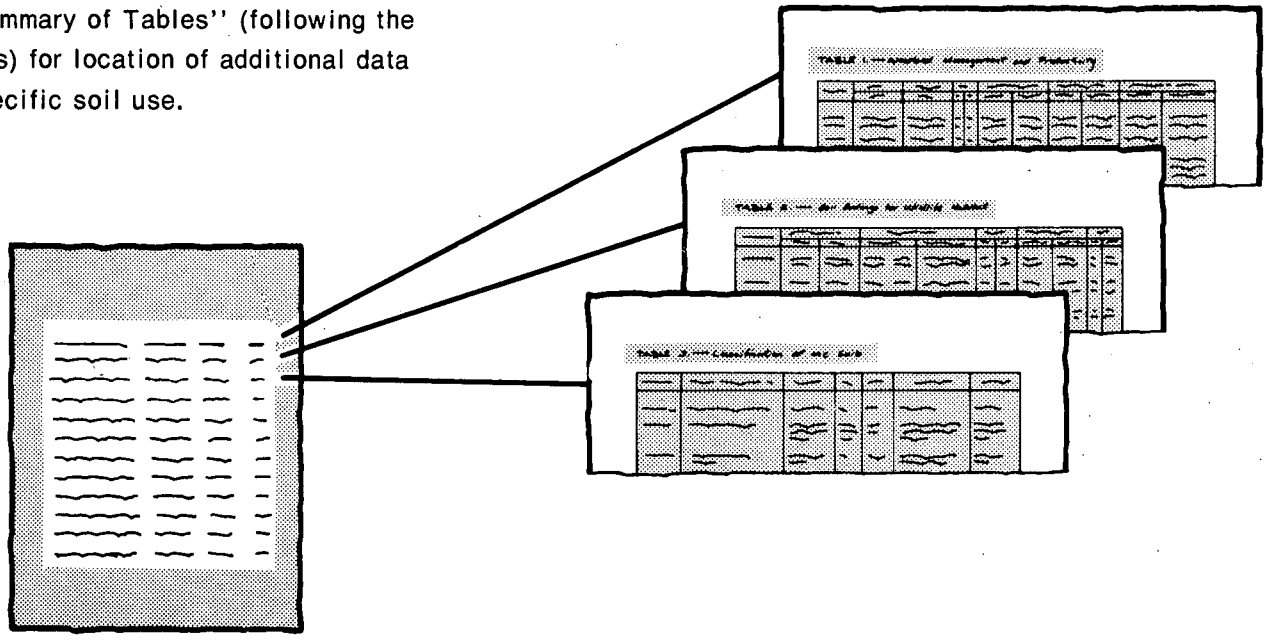
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1972-76. Soil names and descriptions were approved in 1976. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service, the Alabama Agricultural Experiment Station, and the Alabama Department of Agriculture and Industries. It is part of the technical assistance furnished to the Etowah County Soil and Water Conservation District.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Fescue pasture on Conasauga loam, 1 to 5 percent slopes. The wooded mountain in the background is an area of Nella association, steep.

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Issued June 1978

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Foreword

The Soil Survey of Etowah County, Alabama contains much information useful in any land-planning program. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

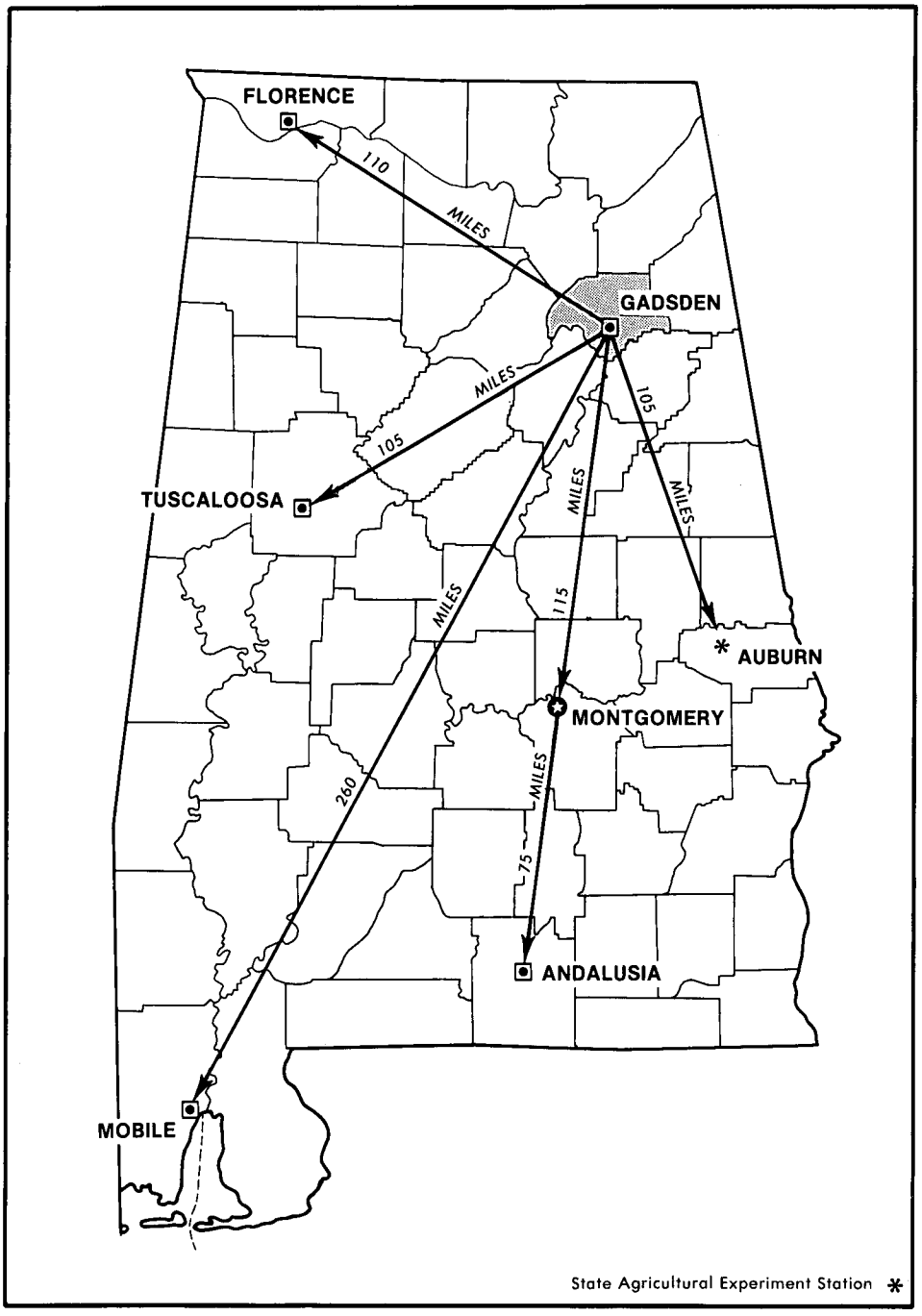
This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and homebuyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

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

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.

W. B. Lingle
State Conservationist
Soil Conservation Service



Location of Etowah County in Alabama.

SOIL SURVEY OF ETOWAH COUNTY, ALABAMA

By Charles F. Montgomery, Harold B. Neal, and William V. Anderson,
Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service,
in cooperation with the Alabama Agricultural Experiment Station and the
Alabama Department of Agriculture and Industries

ETOWAH COUNTY is in the northeastern part of Alabama (see map on facing page). Gadsden is the county seat. The county has a total area of 355,200 acres, or 555 square miles.

Sand Mountain and Lookout Mountain extend into the northern part of the county. These mountains are part of the Sand Mountain Land Resource Area. They have steep, rocky side slopes with numerous gorges and bluffs and are fairly smooth on top. The remainder of the county is in the Southern Appalachian Ridges and Valleys Land Resource Area. The Coosa River enters the county on the northeast side and winds in a southwesterly direction through the county. It creates a wide, generally smooth valley. A flat shale area, locally known as the "flatwoods," occurs in the south-central and east-central parts of the county. The remaining areas appear to be a series of ridges and valleys, created by upheaval and folding, which run in a northeasterly-southwesterly direction. The ridges form mountain ranges with steep side slopes and narrow tops. The valleys are narrow and have rolling slopes (*1*). Elevations range from about 500 to 1,500 feet above sea level.

General nature of the county

Farming

Since the late 1940's, the acreage of most row crops grown in Etowah County has been declining, while the acreage of improved pasture has more than doubled. The Depression of the 1930's and a succession of dry years in the 1950's forced many to abandon farming operations. Most farming today is concentrated on the terraces of the Coosa River and on Sand and Lookout Mountains.

The Etowah County Soil and Water Conservation District was granted a certificate of incorporation in May 1958. Before that, Etowah County was part of the Coosa River Soil Conservation District.

About 25,000 acres, or 7 percent of the county, is in row crops, and about 37,000 acres, or 10 percent, is in pasture. The major row crops are soybeans and truck crops. Beef and dairy cattle, hogs, and poultry are the main kinds of livestock raised in the survey area.

Natural resources

Soil is one of the most important natural resources in the county. Livestock that graze the grassland, crops produced on farms, and timber produced in woodland are marketable products that are derived from the soil.

In most of the county, water is adequate for domestic use and for livestock. The Coosa River and several other perennial streams provide ample surface water. Adequate supplies from wells and springs are common.

The Sand Mountain and Lookout Mountain areas produce moderate amounts of coal. Limestone is mined at several locations in the Appalachian Ridges and Valleys section.

Climate

Table 1 gives data on temperature and precipitation for the survey area, as recorded at Gadsden for the period 1953 to 1974. 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 44 degrees F, and the average daily minimum temperature is 33 degrees. The lowest temperature on record, which occurred at Gadsden on January 30, 1966, is -2 degrees. In summer the average temperature is 78 degrees, and the average daily maximum temperature is 89 degrees. The highest recorded temperature, which occurred on August 16, 1954, is 105 degrees.

Growing degree days, shown in table 1, 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.

Of the total annual precipitation, 25 inches, or 48 percent, usually falls in April through September, which includes the growing season for most crops. In 2 years out of 10, the rainfall in April through September is less than 20 inches. The heaviest 1-day rainfall during the period of record was 5.85 inches at Gadsden on December 12, 1961. Thunderstorms occur on about 58 days each year, and half occur in summer.

Snowfall is rare; in 81 percent of the winters, there is no measurable snowfall. The snowfall, usually of short duration, is less than 4 inches. The heaviest 1-day snowfall on record was more than 5 inches.

The average relative humidity in midafternoon in spring is less than 55 percent; during the rest of the year it is about 60 percent. Humidity is higher at night in all seasons, and the average at dawn is about 85 percent. The percentage of possible sunshine is 65 in summer and 45 in winter. The prevailing wind is from the south. Average windspeed is highest, 10 miles per hour, in March.

Climatic data in this section were specially prepared for the Soil Conservation Service by the National Climatic Center, Asheville, North Carolina.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

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

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers. and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit 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 provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The soils in the survey area vary widely in their potential for major land uses. Table 4 shows the extent of the map units shown on the general soil map and gives general ratings of the potential of each, in relation to the other map units, for major land uses. Soil properties that pose limitations to the use are indicated. The ratings of soil potential are based on the assumption that practices in common use in the survey area are being used to overcome soil limitations. These ratings reflect the ease of

overcoming the soil limitations and the probability of soil problems persisting after such practices are used.

Each map unit is rated for *cultivated farm crops, specialty crops, woodland, urban uses,* and *recreation areas.* Cultivated farm crops are those grown extensively by farmers in the survey area. Specialty crops include vegetables, fruits, and nursery crops grown on limited acreage and generally requiring intensive management. Woodland refers to land that is producing either trees native to the area or introduced species. Urban uses include residential, commercial, and industrial developments. Intensive recreation areas include campsites, picnic areas, ballfields, and other areas that are subject to heavy foot traffic. Extensive recreation areas include those used for nature study and as wilderness.

Areas dominated by well drained and somewhat excessively drained, steep soils on mountains

This group makes up about 14 percent of the county. The soils formed in material weathered from sandstone, shale, or cherty limestone, and some of them contain gravel, boulders, and rock outcrops. Areas generally have a northeasterly-southwesterly orientation and are on long, narrow mountain ranges and side slopes of plateaus. They are in all parts of the county.

Most soils in this group are used as woodland. The steep slopes and rock outcrops restrict the use of these soils for farming, urban development, and most other uses. They have good potential for extensive recreational development.

1. Nella-Allen-Rock outcrop

Deep, loamy soils that formed in material weathered from sandstone; and Rock outcrop

Areas of these steep, well drained soils are scattered across the county. These areas are long, narrow mountain ranges and the side slopes of sandstone plateaus. They generally have a northeasterly-southwesterly orientation.

This unit occupies about 11 percent of the county. About 39 percent of the unit is Nella soils, 10 percent is Allen soils, and about 20 percent is Rock outcrop. The remaining 31 percent is soils of minor extent.

Nella soils are generally slightly higher in elevation than Allen soils. They also contain pebbles and cobbles throughout the profile (fig. 1). Rock outcrop occurs as bluffs along the upper rim of the unit and at intervals down the side slopes.

The minor soils in this unit include the moderately deep Hartsells and Townley soils.

This unit is used mainly as woodland. Steep slopes and Rock outcrop limit the use of these soils for farming, urban development, and most other uses. The potential as habitat for woodland wildlife is good, and the potential for extensive recreational use is good.

2. Townley-Leesburg-Palmerdale

Moderately deep and deep, clayey and loamy soils that formed in material weathered from shale and sandstone

Areas of these steep, well drained and somewhat excessively drained soils are in the east-central and western parts of the county. These areas are long, narrow mountain ranges that have a general northeasterly-southwesterly orientation.

This unit occupies about 1 percent of the county. About 45 percent of the unit is Townley soils, 25 percent is Leesburg soils, and about 10 percent is Palmerdale soils. The remaining 20 percent is soils of minor extent.

Townley soils are generally on the southeastern side of the slope, and Leesburg soils are on the northern side. Townley soils have a moderately deep, clayey, and somewhat plastic subsoil over shale bedrock. Leesburg soils have a gravelly, loamy subsoil. Palmerdale soils are in the strip mined area around Altoona. They are shaly and loamy.

The minor soils in this unit include the moderately deep, well drained Hartsells soils. There are also areas of Rock outcrop.

This unit is used mainly as woodland. Steep slopes limit the use of these soils for farming, urban development, and most other uses. The potential as habitat for woodland and openland wildlife is good, and the potential for extensive recreational use is good.

3. Minvale-Bodine-Townley

Deep and moderately deep, loamy and clayey soils that formed in material weathered from cherty limestone and shale

Areas of these steep, well drained and somewhat excessively drained soils are in the northwestern and southern parts of the county. These areas are long, narrow mountain ranges with a general northeasterly-southwesterly orientation.

This unit occupies about 2 percent of the county. About 50 percent of the unit is Minvale soils, 19 percent is Bodine soils, and about 7 percent is Townley soils. The remaining 24 percent is soils of minor extent.

Minvale soils are generally on the ridgetops and toe slopes, and Bodine soils are on the steeper side slopes. They have a loamy subsoil that contains chert fragments. Townley soils are only in the areas in the south-central part of the county on the northwestern side of the slopes. They have a moderately deep, clayey, and somewhat plastic subsoil over shale bedrock.

The minor soils in this unit include the moderately well drained Stemley soils and soils that are similar to Townley soils except that they are shallower to shale bedrock.

This unit is used mainly as woodland. Steep slopes limit the use of these soils for farming, urban development, and most other uses. The potential as habitat for woodland wildlife is good, and the potential for extensive recreational use is good.

Areas dominated by well drained, gently sloping to moderately steep soils on sandstone plateaus

This group makes up about 28 percent of the county. The soils formed in material weathered from sandstone and shale and are on broad plateaus mostly in the northeastern and northwestern parts of the county.

Most of the soils in this group are used for cultivated crops and pasture. Slope and depth to rock restrict the use of these soils for most purposes. They have good potential for extensive recreational development.

4. Hartsells-Linker-Townley

Moderately deep, loamy and clayey soils that formed in material weathered from sandstone and shale

These gently sloping to moderately steep, well drained soils are on the broad sandstone plateaus in the northern part of the county.

This unit occupies about 28 percent of the county. About 43 percent of the unit is Hartsells soils, 19 percent is Linker soils, and 17 percent is Townley soils. The remaining 21 percent is soils of minor extent.

Hartsells soils are generally slightly lower in elevation than Linker soils. Linker soils are generally along the rims of the plateaus. Townley soils generally are on more rolling landscapes. They have a clayey subsoil that is slightly sticky and plastic when wet.

The minor soils in this unit include the somewhat poorly drained Chewacla soils, the moderately well drained Wynnville soils, and soils that are similar to Hartsells soils except that they are shallower to sandstone bedrock.

This unit is used mainly for cultivated crops and pasture. Most of the acreage has been cleared. Erosion is the main limitation to use of these soils for farming.

This unit has good to fair potential for cultivated farm crops when good conservation practices are followed. Depth to bedrock is a severe limitation for some urban uses. The potential as habitat for woodland and openland wildlife is good.

Areas dominated by somewhat excessively drained to moderately well drained, gently sloping to steep soils on dissected valleys and ridges

This group makes up about 39 percent of the county. The soils formed in material weathered from sandstone, cherty limestone, and shale and are on ridgetops and toe slopes and in narrow valleys and broad flats in all parts of the county.

Most of the acreage of the soils in this group is in woodland, but a significant part is used for cultivated crops and pasture. The content of coarse fragments tends to make some of the soils somewhat droughty. Slope, small stones, depth to rock, and the clayey nature of some of the soils restrict their use for most purposes. The soils have good to fair potential for extensive recreational development.

5. Minvale-Bodine

Deep, cherty, loamy soils that formed in material weathered from cherty limestone

These steep, well drained and somewhat excessively drained soils are on upland ridges mainly in the central and southern parts of the county.

This unit occupies about 8 percent of the county. About 52 percent of the unit is Minvale soils, and about 25 percent is Bodine soils. The remaining 23 percent is soils of minor extent.

Minvale soils are generally on the ridgetops and toe slopes. The more cherty Bodine soils occupy the steeper side slopes.

Minor soils in this unit include the moderately well drained Stemley and Lobelville soils and the well drained Ennis soils. These minor soils are mainly in narrow drainageways.

This unit is used mainly as woodland. Steep slopes and the high content of chert fragments limit the use of these soils for farming and many urban uses. The potential as habitat for woodland wildlife is fair to good.

6. Minvale-Dewey-Bodine

Deep, cherty, loamy and clayey soils that formed in material weathered from cherty limestone

These gently sloping to moderately steep, well drained and somewhat excessively drained soils are in long narrow valleys between the mountain ranges. Areas are scattered throughout the county.

This unit occupies about 10 percent of the county. About 44 percent of the unit is Minvale soils, about 14 percent is Dewey soils, and about 7 percent is Bodine soils. The remaining 35 percent is soils of minor extent.

Minvale and Bodine soils generally are along the edges of the valley floors in toe slope positions. These loamy soils have a high content of chert fragments. Dewey soils occur on low ridges in the valleys, and they have a thick, red, clayey subsoil.

The minor soils in this unit include the well drained Allen, Leesburg, and Nella soils; the moderately well drained Cloudland and Lobelville soils; and the somewhat poorly drained Chewacla soils.

This unit is used mainly for cultivated crops and pasture. Most of the acreage has been cleared.

Potential is fair for cultivated row crops and good for pasture and hay crops. The content of coarse fragments tends to make the soils in this unit somewhat droughty, and in some areas they interfere with tillage operations and pasture maintenance.

This unit has fair potential for most urban uses. The soils generally have moderate permeability and low

shrink-swell potential. The potential as habitat for woodland and openland wildlife is good to fair.

7. Allen-Dewey

Deep, loamy and clayey soils that formed in material weathered from sandstone and cherty limestone

These gently sloping to moderately steep, well drained soils are on toe slopes along the bases of some of the interbedded sandstone and shale mountains. Areas are scattered throughout the county.

This unit occupies about 2 percent of the county. About 60 percent of the unit is Allen soils, and about 25 percent is Dewey soils. The remaining 15 percent is soils of minor extent.

Allen and Dewey soils generally are on low ridges on the edges of the narrow valleys between mountain ranges. These soils have a thick, red subsoil and in some places contain coarse fragments.

The minor soils in this unit are the well drained, cherty Minvale soils; the gravelly Leesburg and Nella soils; the moderately well drained Cloudland soils; and the somewhat poorly drained Chewacla soils.

This unit is used mainly for cultivated crops and pasture. Most of the acreage has been cleared.

Potential is fair for cultivated row crops and for pasture and hay crops. Erosion is the main limitation to use of these soils for farming.

This unit has good to fair potential for most urban uses. The soils have moderate permeability and low shrink-swell potential. The potential as habitat for woodland and openland wildlife is good.

8. Conasauga-Firestone

Moderately deep, clayey soils that formed in material weathered from shale

These nearly level to steep, moderately well drained and well drained soils are in large, relatively flat areas in the south-central and southeastern parts of the county.

This unit occupies about 19 percent of the county. About 48 percent of the unit is Conasauga soils, and about 18 percent is Firestone soils. The remaining 34 percent is soils of minor extent.

Conasauga soils generally are at lower elevations and more gently sloping than Firestone soils. Conasauga soils are moderately well drained. Both have a clayey subsoil which is sticky and plastic when wet.

The minor soils in this unit include the well drained Leesburg soils and the poorly drained Gaylesville soils. There are also small areas of limestone rock outcrop.

This unit is used mainly as woodland and pasture. It has fair potential for cultivated row crops. It is suited to small grains and adapted pasture grasses.

This unit has poor potential for most urban uses. The soils are slowly permeable and have moderate to high shrink-swell potential. The potential as habitat for woodland and openland wildlife is good.

Areas dominated by well drained to somewhat poorly drained, nearly level to gently sloping soils on stream terraces and bottoms

This group makes up about 19 percent of the county. The soils formed in alluvial sediments on broad terraces, bottoms, and narrow toe slopes adjacent to streams within the county.

Soils in this group are used mainly for cultivated crops and pasture and are among the most productive soils in the county. Flooding and wetness in some areas restrict the use of the soils for farming and urban development. The soils have good to fair potential for extensive recreational development.

9. Holston-Cloudland-Cedarbluff

Deep, loamy soils that formed in alluvial material

These nearly level to gently sloping, well drained to somewhat poorly drained soils are on high terraces mainly along the Coosa River and the larger creeks in the county.

This unit occupies about 10 percent of the county. About 42 percent of the unit is Holston soils, about 20 percent is Cloudland soils, and about 15 percent is Cedarbluff soils. The remaining 23 percent is soils of minor extent.

Holston soils generally are at the highest elevations in the unit. Cloudland and Cedarbluff soils are at lower elevations in depressions and drainageways.

The minor soils in this unit are the poorly drained to somewhat poorly drained Chewacla and Gaylesville soils adjacent to stream channels and the well drained, gravelly Leesburg soils on steeper slopes at higher elevations. Also included are areas of Waynesboro soils.

This unit is used mainly for row crops. Most of the acreage has been cleared except for some areas of the more poorly drained soils. The areas of Holston soils at the higher elevations have good potential for most crops (fig. 2). The soils on the lower elevations have fair potential for adapted row crops and good potential for pasture and hay crops.

The Holston soils have good potential for most urban uses. They are moderately permeable and have low shrink-swell potential. The Cloudland and Cedarbluff soils have poor potential for most urban uses because of flooding and wetness. The potential as habitat for woodland and openland wildlife is good, and Cedarbluff soils have fair potential as habitat for wetland wildlife.

10. Chewacla-Choccolocco

Deep, loamy soils that formed in alluvial material

These nearly level, somewhat poorly drained and well drained soils are on low terraces and bottoms along the Coosa River and other streams in the county.

This unit occupies about 8 percent of the county. About 47 percent of the unit is Chewacla soils, and about 12 per-

cent is Choccolocco soils. The remaining 41 percent is soils of minor extent.

Chewacla soils generally are along the smaller drainageways and are usually a few inches lower in elevation than the Choccolocco soils. Choccolocco soils usually are along the larger streams.

The minor soils in this unit include the well drained McQueen and Wickham soils and the somewhat poorly drained Cedarbluff soils.

This unit is used mainly as cropland and pasture. Most of the acreage has been cleared except for some areas of Chewacla soils that do not have drainage outlets. Where drainage outlets are available, this unit has fair to good potential for adapted crops.

This unit has poor potential for most urban uses because of flooding. Chewacla soils have fair potential as habitat for wetland wildlife.

11. Chewacla-Ennis-Stemley

Deep, loamy and cherty soils that formed in alluvial material

These nearly level to gently sloping, well drained to somewhat poorly drained soils are on stream bottoms and toe slopes mainly in the southeastern part of the county.

This unit occupies about 1 percent of the county. About 35 percent of the unit is Chewacla soils, about 28 percent is Ennis soils, and about 24 percent is Stemley soils. The remaining 13 percent is soils of minor extent.

Chewacla soils generally are along the larger streams and drainageways; Ennis soils are in small, narrow drainageways; and Stemley soils are on toe slopes.

The minor soils in this unit are the somewhat poorly drained Cedarbluff soils and the moderately well drained Cloudland and Lobelville soils.

This unit is used mainly as woodland and pasture. Most of the acreage has been cleared, but much of it has now reverted to woods and brush. These soils have fair to poor potential for row crops because of flooding and poor drainage.

This unit has poor potential for most urban uses because of flooding. Chewacla soils have fair potential for wetland wildlife habitat.

Broad land use considerations

Deciding which land should be used for urban development is an important issue in the survey area. Each year a considerable amount of land is being developed for urban uses in Gadsden, Rainbow City, Southside, and other cities in the county. It is estimated that about 100,000 acres, or nearly one-third of the survey area, is urban or built-up land. The general soil map is most helpful for planning the general outline of urban areas; it cannot, however, be used for the selection of sites for specific urban structures. In general, in the survey area the soils that have good potential for cultivated crops also have good potential for urban development. The data about specific soils in this survey can be helpful in planning future land use patterns.

Areas where the soils are so unfavorable that urban development is prohibitive are not extensive in the survey area. However, large portions of the Holston-Cloudland-Cedarbluff unit and the Chewacla-Choccolocco unit are flood plains in which flooding and ponding are severe limitations. Many parts of the Nella-Allen-Rock outcrop unit and the Townley-Leesburg-Palmerdale unit have steep slopes on which urban development is costly. The clayey soils of the Conasauga-Firestone unit have poor potential for urban development because of moderate to high shrink-swell potential.

In large areas of the county are soils that can be developed for urban uses at lower costs than can the soils named above. These include parts of the Holston-Cloudland-Cedarbluff unit that are not on flood plains, the Allen-Dewey unit, and the less sloping portions of the Minvale-Bodine and Minvale-Dewey-Bodine units. The Holston-Cloudland-Cedarbluff and Allen-Dewey units are good farmland, and this potential should not be overlooked when broad land uses are considered. The Minvale-Bodine and Minvale-Dewey-Bodine units are made up of soils that contain coarse chert fragments, but the rolling landscape, good soil drainage, and other soil qualities are favorable for residential and other nonfarm uses.

In some areas are soils that have fair or good potential for farming but poor potential for nonfarm uses. These are the Hartsells-Linker-Townley and Chewacla-Choccolocco units. In these units the dominant soils are Hartsells and Chewacla. Wetness and depth to bedrock are limitations to the nonfarm uses of these soils.

The soils in the Hartsells-Linker-Townley unit and the Holston-Cloudland-Cedarbluff unit have fair potential for vegetables and other specialty crops. The better drained soils in the latter unit warm up more quickly in the spring than the more clayey and the poorly drained soils.

Most of the soils of the county have good or fair potential as woodland. Commercially valuable trees are most common and generally grow more rapidly on the deep soils of the Minvale-Dewey-Bodine, Allen-Dewey, Holston-Cloudland-Cedarbluff, and Chewacla-Choccoloco units than they do on the soils in the other units.

The Minvale-Dewey-Bodine and Allen-Dewey units have good potential as sites for parks and extensive recreation areas. Mixed hardwood and pine forests enhance the beauty of much of the area. Undrained swamps of the Holston-Cloudland-Cedarbluff unit are good as nature study areas. All these units provide habitat for many important species of wildlife.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in

determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

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

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a *soil phase* commonly indicates a feature that affects use or management. For example, Allen fine sandy loam, 2 to 6 percent slopes, is one of several phases within the Allen series.

Some map units are made up of two or more dominant kinds of soil. Such map units identified in this survey area are called soil complexes and soil associations.

A *soil complex* consists of areas of two or more soils that are so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Linker-Townley complex, 15 to 30 percent slopes, is an example.

A *soil association* is made up of soils that are geographically associated and are shown as one unit on the map because it is not practical to separate them. A soil association has considerable regularity in geographic pattern and in the kinds of soil that are a part of it. The extent of the soils can differ appreciably from one delineation to another; nevertheless, interpretations can be made for use and management of the soils. Nella-Allen association, steep, is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called *miscellaneous areas*; they are delineated on the soil map and given descriptive names. Pits is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 5, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

1—Allen fine sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on low ridges, toe slopes, and high terraces in the Appalachian Ridges and Valleys. Slopes are smooth and convex. Individual areas are commonly 5 to 25 acres.

Typically, the surface layer is yellowish brown fine sandy loam about 6 inches thick. The upper part of the subsoil is strong brown loam and yellowish red clay loam to a depth of 32 inches. The lower part is red sandy clay loam that extends to a depth of 64 inches.

Included with this soil in mapping are small areas of Dewey, Holston, Leesburg, Minvale, Nella, and Waynesboro soils. Also included are soils that have a gravelly sandy loam surface layer and a few small areas of eroded soils on knolls; these eroded soils have a yellowish red sandy clay loam or clay loam surface layer. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate to high. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

This soil has fair potential for row crops and small grains, but high yields can be obtained. Potential is limited because of the small size of the areas and the slope of adjacent soils. The soil has good potential for hay and pasture. Good tilth can be maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, help reduce runoff and control erosion.

Potential is good for loblolly pine, Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has good potential for most urban uses. Capability subclass IIe; woodland group 3o.

2—Allen fine sandy loam, 6 to 10 percent slopes. This deep, well drained, sloping soil is on low ridges and toe slopes in the Appalachian Ridges and Valleys. Slopes are smooth and convex. Individual areas are commonly 5 to 60 acres.

Typically, the surface layer is brown fine sandy loam about 4 inches thick. The upper part of the subsoil is strong brown loam and yellowish red clay loam to a depth

of 33 inches. The lower part is yellowish red clay loam that has brown mottles and that extends to a depth of 64 inches.

Included with this soil in mapping are small areas of Dewey, Holston, Leesburg, Minvale, Nella, and Waynesboro soils. Also included are soils in which gravel content is more than 15 percent in the surface layer and a few small areas of eroded soils on knolls; these eroded soils have a yellowish red sandy clay loam or clay loam surface layer. The included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate to high. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

This soil has fair potential for row crops and small grains. The potential is limited because of the slope and the small size of the areas. The soil has good potential for hay and pasture. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cropping systems are needed that include the use of perennial sod crops about 2 years in 3.

Potential is good for loblolly pine, Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has fair potential for most urban uses. Slope is a moderate limitation, but this can be overcome by good design. Capability subclass IIIe; woodland group 3o.

3—Allen gravelly fine sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on low ridges, toe slopes, and high terraces in the Appalachian Ridges and Valleys. Slopes are smooth and generally convex. Individual areas are commonly 5 to 25 acres.

Typically, the surface layer is brown gravelly fine sandy loam about 5 inches thick. The upper part of the subsoil is strong brown loam to a depth of 25 inches, the middle part is yellowish red sandy clay loam to a depth of 37 inches, and the lower part is mottled red and brown sandy clay loam to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Dewey, Holston, Leesburg, Minvale, Nella, and Waynesboro soils. Also included are soils in which gravel content is less than 15 percent in the surface layer and soils in which gravel content is more than 15 percent in the subsoil. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 5 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth and can be worked throughout a wide range of moisture content. The gravel interferes with some farming operations. The root zone is deep and easily penetrated by plant roots.

This soil has fair potential for row crops and small grains. Potential is limited because of the small size of the areas and the slope of adjacent soils. The gravel content of the surface layer tends to make the soil slightly droughty. The soil has good potential for hay and pasture. Good tilth can be maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Minimum tillage and the use of cover crops, including grasses and legumes, help reduce runoff and control erosion.

Potential is good for loblolly pine, Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has good potential for most urban uses. Capability subclass IIe; woodland group 3o.

4—Allen gravelly fine sandy loam, 6 to 10 percent slopes. This deep, well drained, sloping soil is on low ridges and toe slopes in the Appalachian Ridges and Valleys. Slopes are smooth and convex. Individual areas are commonly 5 to 50 acres.

Typically, the surface layer is brown gravelly fine sandy loam about 6 inches thick. The upper part of the subsoil is strong brown loam and yellowish red sandy clay loam to a depth of 25 inches. The lower part is red sandy clay loam that has brown, yellow, and red mottles and that extends to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Dewey, Holston, Leesburg, Minvale, Nella, and Waynesboro soils. Also included are soils in which gravel content is less than 15 percent in the surface layer, soils on knolls that have a yellowish red sandy clay loam surface layer, and soils in which gravel content is more than 15 percent in the subsoil. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 5 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth and can be worked throughout a wide range of moisture content. The gravel interferes with some farming operations. The root zone is deep and easily penetrated by plant roots.

This soil has fair potential for row crops and small grains. The potential is limited because of the slope and the size of the areas. The gravel content of the surface layer tends to make the soil slightly droughty. The soil has good potential for hay and pasture. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cropping systems are needed that include the use of perennial sod crops about 2 years in 3.

Potential is good for loblolly pine, Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has fair potential for most urban uses. Slope is a moderate limitation, but this can be overcome by good design. Capability subclass IIIe; woodland group 3o.

5—Allen sandy clay loam, 2 to 10 percent slopes, eroded. This deep, well drained, gently sloping to sloping soil is on low ridges and toe slopes in the Appalachian Ridges and Valleys. Slopes are smooth, complex, and generally convex. Individual areas are commonly 5 to 20 acres.

Typically, the surface layer is yellowish red sandy clay loam about 4 inches thick. The upper part of the subsoil is yellowish red sandy clay loam to a depth of 26 inches. The lower part is yellowish red sandy clay loam and clay loam that has red and yellow mottles and that extends to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Dewey, Holston, Leesburg, Minvale, Nella, and Waynesboro soils. Also included are soils in which gravel content is more than 15 percent in the surface layer and soils that have a fine sandy loam and loam surface layer. The included soils make up about 3 to 15 percent of this map unit, but individual areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. Because of the erosion which has occurred, the moisture content suitable for tillage is narrow and the soil clods and crusts if it is tilled when too wet.

This soil has fair to poor potential for row crops and small grains. The potential is limited because of the erosion scars and the small size of the areas. The soil has fair to good potential for hay and pasture. Tilth can be improved by returning crop residue to the soil. The erosion hazard is high when this soil is cultivated. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Stripcropping is an effective practice that can be used on many fields where terraces are difficult to install. Cropping systems are needed that include the use of perennial sod crops about 2 years in 3.

Potential is fair for loblolly pine, Virginia pine, shortleaf pine, and eastern redcedar. Seedling mortality is a severe management concern. The erosion hazard is moderate.

This soil has good to fair potential for most urban uses. Slope of more than 8 percent is a moderate limitation, but this can be overcome by good design. Capability subclass IIIe; woodland group 4c.

6—Allen-Rock outcrop association, steep. This association consists of well drained soils and Rock outcrop that generally are in a regular and repeating pattern. Slopes range from 20 to 45 percent. The map unit is made up of two separate areas totaling more than 7,000 acres. One area is on the north side of Lookout Mountain, and the other is on the south side. The landscape is a long, narrow, steep, wooded mountainside.

A discontinuous band of limestone rock outcrop is along the toe slope of the northern side of the unit. Sandstone rock outcrops are on the higher side slopes on both sides of the mountain. They are bluffs ranging from about 6 to 50 feet in height. The southern side slopes have slightly more Rock outcrop than the northern slopes. Several smaller discontinuous bluffs are at intervals down the side slopes. The surface of the ground between the bluffs is covered with sandstone boulders as much as several feet in diameter. The Allen soils and similar soils are on foot slopes and lower side slopes. Small areas of soils derived from shale are also found throughout the unit. Individual areas of soil and Rock outcrop range from about 5 to 100 acres.

The well drained Allen soils and similar soils make up about 33 percent of the unit. Typically, the surface layer is brown fine sandy loam about 4 inches thick. The upper part of the subsoil is yellowish red loam to a depth of 9 inches, the middle part is red sandy clay loam to a depth of 30 inches, and the lower part is red sandy clay loam that has common distinct yellowish brown mottles and that extends to a depth of more than 60 inches.

The Allen soils have moderate permeability. The available water capacity is moderate to high. The soils are strongly acid to very strongly acid.

Rock outcrop makes up about 22 percent of the unit. It consists of exposed sandstone and limestone bluffs and angular pieces of sandstone and limestone ranging to as much as several feet in diameter.

Included with this unit in mapping are small areas of Leesburg, Minvale, Nella, and Townley soils. The moderately deep Townley soils and similar soils are the most extensive and are mainly along the toe slopes and on the steeper side slopes.

Most of this unit is used as woodland. It has fair potential for loblolly pine, shortleaf pine, yellow-poplar, and upland oaks. Logging operations are restricted because of slope and Rock outcrop. The erosion hazard is moderate.

This unit has poor potential for most urban uses because of slope and Rock outcrop. Capability subclass VIIe; woodland group 3r.

7—Bodine cherty silt loam, 6 to 15 percent slopes. This deep, somewhat excessively drained, sloping to moderately steep soil is on dissected ridgetops, hillsides, and toe slopes in the Appalachian Ridges and Valleys. Slopes are complex and in most places convex but are concave around the heads of drainageways and in depressions. Individual areas are 10 to several hundred acres.

Typically, the surface layer is yellowish brown cherty silt loam about 8 inches thick. The upper part of the subsoil extends to a depth of 38 inches. It is strong brown cherty loam over reddish yellow cherty silty clay loam with yellowish red and brownish yellow mottles. The lower part is yellowish red cherty clay loam that has yellowish red and brownish yellow mottles and that extends to a depth of 70 inches.

Included with this soil in mapping are small areas of Dewey, Ennis, Lobelville, Minvale, and Stemley soils. Also included are areas of soils that have compact and brittle layers in the lower part of the subsoil. The included soils make up about 5 to 20 percent of this map unit.

This moderately rapidly permeable soil is low in natural fertility and organic matter content. The available water capacity is low. The soil has fair tilth and can be worked throughout a wide range of moisture content. The root zone is deep, but the high volume of chert fragments makes root penetration difficult (fig. 3) and makes the soil difficult to cultivate.

This soil has poor potential for row crops and small grains. The potential is limited because of the slope and the high content of chert fragments. The soil has fair potential for hay and pasture. The high volume of chert makes the soil droughty. Tilth can be improved by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Contour farming, grassed waterways, and minimum tillage are effective erosion control practices. Cropping systems are needed that include the use of perennial sod crops at least 3 years in 4.

Potential is good for loblolly pine, shortleaf pine, yellow-poplar, and upland oaks. Seedling mortality and equipment use are moderate managment concerns.

This soil has fair potential for most urban uses because of slope. Small stones and seepage are severe limitations for sewage lagoons and sanitary landfills. These factors are difficult economically to overcome. Capability subclass IVs; woodland group 3f.

8—Cedarbluff fine sandy loam. This deep, somewhat poorly drained, nearly level soil is on low terraces and in upland depressions in the Appalachian Ridges and Valleys. Slopes are smooth and slightly concave and range from 0 to 2 percent. Individual areas are 5 to 50 acres.

Typically, the surface layer is dark grayish brown fine sandy loam about 8 inches thick. The subsurface layer is brown fine sandy loam to a depth of 12 inches. The upper part of the subsoil is pale brown loam that has brown, yellow, and gray mottles and that extends to a depth of 20 inches. The middle part is mottled gray and brown loam to a depth of 32 inches, and the lower part is mottled gray, brown, and yellow loam to a depth of 60 inches. The yellow soil in the lower part of the subsoil is slightly compact and brittle.

Included with this soil in mapping are small areas of Cloudland, Gaylesville, Holston, Leesburg, McQueen, Waynesboro, and Wickham soils. Also included are areas of soils that are more poorly drained than this soil and that have a very compact and brittle layer in the subsoil. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate to high. The soil has fair tilth, but water tends to pond on the surface. The root zone is deep and easily penetrated by the roots of adapted plants.

This soil has fair potential for row crops and small grains. It is frequently flooded for brief periods. Outlets are seldom available, and water tends to pond on the surface. The soil is late to warm up in spring, and many crops drown. It has good potential for adapted pasture grasses. Erosion is not a hazard on this soil. Field ditches and diversions can be used in many places to reduce ponding. Crop residues returned to the soil help maintain organic matter content.

Potential is good for loblolly pine, yellow-poplar, and sweetgum. The windthrow hazard is a moderate management concern, and use of equipment is moderately restricted because of wetness.

This soil has poor potential for most urban uses because of flooding and wetness. These factors are difficult economically to overcome. Capability subclass IIIw; woodland group 2w.

9—Chewacla silt loam. This deep, somewhat poorly drained, nearly level soil is on bottoms and in drainageways on low terraces in the Appalachian Ridges and Valleys. Slopes are smooth and slightly concave and range from 0 to 2 percent. Individual areas are 10 to 50 acres.

Typically, the surface layer is brown silt loam that has yellowish brown mottles and that is about 10 inches thick. The upper part of the subsoil is brown silt loam that has dark yellowish brown mottles and that extends to a depth of 17 inches. The middle part, to a depth of 22 inches, is light yellowish brown loam that has dark yellowish brown and light brownish gray mottles. The lower part is mottled yellowish brown, light brownish gray, and strong brown silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Choccolocco, Cloudland, Ellisville, Gaylesville, Holston, and Leadvale soils. Also included are areas of soils that have a more silty subsoil and areas of soils in which gravel content is 10 to 35 percent in the upper part. The included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 4 acres.

Organic matter content and natural fertility are moderate. The available water capacity is high. The soil is moderately permeable. It has good tilth and can be tilled through a fair range of moisture content. The root zone is deep and can be easily penetrated by plant roots.

This soil has fair potential for row crops and small grains. Frequent flooding usually occurs for brief periods during winter. Crops are occasionally damaged. Erosion is not a hazard except where flooding causes scouring. The soil has good potential for adapted hay and pasture crops. Field ditches and diversions can be used to reduce ponding. Crop residues returned to the soil help maintain organic matter content.

Potential is good for loblolly pine, yellow-poplar, red oak, sycamore, and sweetgum. Wetness is a moderate limitation for woodland use or management.

This soil has poor potential for most urban uses because of flooding and wetness. It is a good source of topsoil. Capability subclass IVw; woodland group 1w.

10—Choccolocco silt loam. This deep, well drained, nearly level soil is on low stream terraces in the Appalachian Ridges and Valleys. Slopes are smooth and slightly concave and range from 0 to 2 percent. Individual areas are 5 to 100 acres.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil is strong brown silty clay loam to a depth of 28 inches. The next layer, to a depth of 39 inches, is strong brown loam with dark brown stains and very pale brown mottles. The next layer, to a depth of 49 inches, is strong brown loam with very pale brown mottles. The lower part of the subsoil is mottled brownish yellow, very pale brown, light gray, strong brown, and dark brown loam to a depth of 54 inches. Below this is mottled brownish yellow, very pale brown, light gray, and brown sandy loam to a depth of 82 inches.

Included with this soil in mapping are small areas of Chewacla, Ellisville, Leadvale, McQueen, Toccoa, and Wickham soils. Also included are areas of soils that are loamy in the upper part of the subsoil and areas of soils that have gray mottles in the upper part of the subsoil. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate to high. The soil has good tilth and can be worked through a fair range of moisture content. The root zone is deep and easily penetrated by plant roots.

This soil has good potential for row crops and small grains. It is subject to occasional, very brief periods of flooding, but crops are seldom damaged. Erosion is not a hazard except where floods cause scouring. The soil has good potential for hay and pasture. Good tilth can be maintained by returning crop residue to the soil. Cultivated crops can be grown each year if the fertility level is maintained. Cover crops are needed if low-residue field crops are grown. Row arrangement and land smoothing are needed in some fields to help remove surplus surface water.

Potential is good for loblolly pine, Virginia pine, shortleaf pine, yellow-poplar, and red oaks. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of flooding. Capability class I; woodland group 3o.

11—Cloudland loam, 0 to 3 percent slopes. This deep, moderately well drained, nearly level soil formed in alluvial material on terraces and in upland depressions in the Appalachian Ridges and Valleys. Slopes are smooth and slightly concave. Individual areas are commonly 3 to 20 acres.

Typically, the surface layer is dark grayish brown loam about 6 inches thick. The upper part of the subsoil is light yellowish brown loam that has yellowish brown mottles and that extends to a depth of 14 inches. The middle part, to a depth of 21 inches, is light yellowish brown and yellowish brown loam with pale brown mottles. The lower part is compact and brittle. It is mottled light yellowish brown, yellowish brown, and light brownish gray loam to a depth of 30 inches and mottled yellowish brown, light yellowish brown, and light brownish gray clay loam to a depth of 62 inches.

Included with this soil in mapping are small areas of Cedarbluff, Chewacla, Conasauga, Gaylesville, Holston, Leesburg, and Stemley soils. Also included are areas of soils that have a gravelly surface layer, small areas of soils which do not have the compact and brittle layer, and small areas of soils that have a sandy clay loam subsoil. These included soils make up about 15 to 25 percent of this map unit, but separate areas generally are less than 5 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth and can be worked throughout a fairly wide range of moisture content. The root zone is moderately deep because the fragipan restricts the growth of roots and the movement of water.

This soil has fair potential for row crops. The potential is limited because of the restricted root zone and wetness. The soil is subject to rare flooding. The subsoil is saturated for short periods during the wet season, so the soil warms up slowly in spring. The soil has good potential for adapted pasture grasses. Erosion is not a hazard on this soil. Field ditches and diversions can be used in many places to remove excess surface water. Crop residues returned to the soil help maintain organic matter content.

Potential is good for loblolly pine, yellow-poplar, and shortleaf pine. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of slow permeability in the subsoil, flooding, and wetness. These factors are difficult to overcome. Capability subclass IIw; woodland group 3o.

12—Conasauga loam, 1 to 5 percent slopes. This moderately deep, moderately well drained, nearly level to gently sloping soil is on uplands and in upland depressions in the Appalachian Ridges and Valleys. Slopes are smooth and both concave and convex. Individual areas are commonly 10 to several hundred acres.

Typically, the surface layer is very dark grayish brown loam about 4 inches thick. The upper part of the subsoil is brownish yellow clay loam to a depth of 10 inches. The next layer is yellowish brown clay that has yellowish red mottles and that extends to a depth of 19 inches. The next layer, to a depth of 23 inches, is brownish yellow clay with common strong brown, yellowish red, and light gray mottles. To a depth of 30 inches is yellowish brown clay with light gray mottles. The lower part of the subsoil is mottled brownish yellow, light gray, and light yellowish brown clay to a depth of 39 inches. The underlying material is partially weathered, fractured shale that extends to a depth of 60 inches.

Included with this soil in mapping are small areas of Cloudland, Firestone, Gaylesville, Holston, and Leesburg soils. Also included are soils deeper than 40 inches to shale and soils that have a gravelly surface layer. The included soils make up about 5 to 25 percent of this map unit, but separate areas generally are less than 3 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is

low to moderate. The soil has fair tilth, but the range of moisture content over which it can be worked is narrow. The root zone is somewhat restricted because of the depth to shale.

This soil has fair potential for row crops. Potential is limited because of the moderately deep subsoil and the low to moderate available water capacity. The soil has good potential for small grains, hay, and pasture (figs. 4 and 5). Tilth can be improved by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cropping systems are needed that include the use of perennial sod crops about 2 years in 3.

Potential is fair for loblolly pine, shortleaf pine, Virginia pine, and eastern redcedar. Seedling mortality and windthrow hazard are moderate management concerns.

This soil has fair to poor potential for most urban uses. Low soil strength and moderate shrink-swell potential are limitations for works and structures. The slowly permeable subsoil is a severe limitation for septic tank absorption fields. These limitations can be partially overcome by special design. Capability subclass IIIe; woodland group 3c.

13—Conasauga loam, 5 to 15 percent slopes. This moderately deep, moderately well drained, sloping to moderately steep soil is on uplands in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 5 to 50 acres.

Typically, the surface layer is brown loam about 3 inches thick. The upper part of the subsoil is brownish yellow clay loam to a depth of 10 inches and yellowish brown clay to a depth of 18 inches. The lower part is mottled yellowish brown, brownish yellow, and light gray clay to a depth of 32 inches. The underlying material is weathered, fractured shale.

Included with this soil in mapping are small areas of Cloudland, Firestone, Gaylesville, Holston, and Leesburg soils. Also included are areas of soils that are deeper than 40 inches or shallower than 20 inches to shale and areas of soils on which rounded gravel covers more than 15 percent of the surface. The included soils make up about 5 to 25 percent of this map unit, but separate areas generally are less than 5 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is low to moderate. The soil has fair tilth, but the moisture range over which it can be tilled is narrow. The root zone is restricted because of the depth to shale.

This soil has poor potential for row crops. Potential is limited because of the slope, the moderately deep subsoil, and the low to moderate available water capacity. The soil has fair potential for small grains, hay, and pasture. Erosion is a hazard when this soil is cultivated. Contour farming, grassed waterways, and minimum tillage are effective conservation practices. Conservation cropping systems are needed that include the use of perennial sod crops at least 3 years in 4.

Potential is fair for loblolly pine, shortleaf pine, Virginia pine, and eastern redcedar. Seedling mortality and windthrow hazard are moderate management concerns.

This soil has fair to poor potential for most urban uses. Low soil strength, moderate shrink-swell potential, and slope are limitations for works and structures. The slowly permeable subsoil is a severe limitation for septic tank absorption fields. These limitations can be partially overcome by special design. Capability subclass VIe; woodland group 3c.

14—Conasauga-Firestone loams, 15 to 30 percent slopes. This map unit consists of small areas of Conasauga and Firestone soils that are so intermingled that they could not be separated at the scale selected for mapping. These moderately deep, moderately well drained and well drained soils are in broad areas of 50 to several hundred acres on steep hillsides and narrow ridges. They are mostly underlain by shale. Individual areas of each soil are mostly 2 to 5 acres but range to as much as 10 acres.

Conasauga loam makes up about 45 to 65 percent of each mapped area. Typically, the surface layer is brown loam about 3 inches thick. The upper part of the subsoil is strong brown clay loam to a depth of 10 inches and yellowish brown clay to a depth of 18 inches. To a depth of 25 inches is yellowish brown clay with common red, yellow, and brown mottles. The lower part of the subsoil is mottled yellow, brown, and gray clay to a depth of 30 inches. The underlying material is fractured, weathered shale.

This Conasauga soil is low in natural fertility and organic matter content. It is medium acid to very strongly acid. Permeability is slow, and the available water capacity is low to moderate.

Firestone loam makes up about 15 to 45 percent of each mapped area. Typically, the surface layer is brown loam about 3 inches thick. The upper part of the subsoil is yellowish red clay to a depth of 12 inches, and the middle part is yellowish red clay with common red, yellow, and brown mottles. The lower part is mottled red, yellow, and brown clay to a depth of 30 inches. The underlying material is weathered, fractured shale to a depth of more than 36 inches.

This Firestone soil is low in natural fertility and organic matter content. Permeability is slow, and the available water capacity is low. The soil is medium acid to strongly acid.

Included with these soils in mapping are small areas of Holston and Leesburg soils.

These soils have low potential for farming and urban uses. The steep slopes, moderate depth to shale, slow permeability, and moderate to high shrink-swell potential are limitations that are very difficult to overcome.

Potential is fair for loblolly pine, shortleaf pine, Virginia pine, and eastern redcedar. Most of the acreage is mixed upland oaks and pine. Seedling mortality and windthrow hazard are moderate management concerns.

These soils have good potential for woodland wildlife habitat. Capability subclass VIIe; Conasauga soil in woodland group 3c, Firestone soil in woodland group 4c.

15—Conasauga-Rock outcrop complex, 2 to 6 percent slopes. This complex consists of small areas of Conasauga soils and Rock outcrop that are so intermingled that they could not be separated at the scale selected for mapping. Areas are fairly small, 5 to 40 acres in size, and are on uplands that are underlain by shale interbedded with seams of limestone. Individual areas of soil and Rock outcrop are 1 to about 5 acres.

Conasauga soils and similar soils make up about 60 to 75 percent of each mapped area. Typically, the surface layer is brown loam 3 inches thick. The upper part of the subsoil is yellowish brown clay loam and yellowish brown clay to a depth of 19 inches. The lower part is yellowish brown clay that has light brownish gray mottles and that extends to a depth of 30 inches. Below is weathered, fractured shale interbedded with seams of limestone. It extends to a depth of more than 38 inches. Soils similar to Conasauga have a yellowish red subsoil.

These Conasauga soils are low in natural fertility and organic matter content. They are medium acid to very strongly acid. Permeability is slow, and the available water capacity is low to moderate.

Rock outcrop makes up about 10 to 25 percent of each mapped area. It is limestone bedrock which in some areas is even with the surface and in others protrudes several feet above the surface.

Included with this unit in mapping are small areas of Cloudland, Gaylesville, Holston, and Leesburg soils.

This unit has poor potential for farming and most urban uses. It has fair potential for hay and pasture, but the Rock outcrop makes seedbed preparation and pasture maintenance operations difficult. The moderate shrink-swell potential, slow permeability, and Rock outcrop are limitations that are difficult to overcome for urban uses.

Potential is fair for loblolly pine, shortleaf pine, Virginia pine, and eastern redcedar. Most of the acreage is mixed hardwoods and pines. Seedling mortality and windthrow hazard are moderate management concerns. The Rock outcrop in some areas restricts the use of equipment.

This unit has good potential for woodland and openland wildlife habitat. Capability subclass VIe; woodland group 3c.

16—Conasauga-Rock outcrop complex, 6 to 25 percent slopes. This complex consists of small areas of Conasauga soils and Rock outcrop that are so intermingled that they could not be separated at the scale selected for mapping. Areas are fairly small, 5 to 60 acres in size, and are on uplands that are underlain by shale with interbedded seams of limestone. Individual areas of soil and Rock outcrop are 1 to about 4 acres.

Conasauga soils and similar soils make up about 50 to 60 percent of each mapped area. Typically, the surface layer is brown loam about 3 inches thick. The upper part of the subsoil is light olive brown clay loam to a depth of 6 inches, yellowish brown clay to a depth of 13 inches, and strong brown clay to a depth of 24 inches. The lower part is yellowish brown clay that has common brown and gray mottles and that extends to a depth of 30 inches. The underlying material is weathered, fractured shale to a depth of more than 36 inches. Soils similar to Conasauga have a yellowish red subsoil.

These Conasauga soils are low in natural fertility and organic matter content. They are medium acid to very strongly acid. Permeability is slow, and the available water capacity is low to moderate.

Rock outcrop makes up about 15 to 30 percent of each mapped area. It is limestone bedrock which in some areas is even with the surface and in others protrudes several feet above the surface.

Included with this unit in mapping are small areas of Cloudland, Gaylesville, Holston, and Leesburg soils.

This unit has poor potential for farming and most urban uses. It has fair potential for hay and pasture, but the Rock outcrop makes seedbed preparation and pasture maintenance operations difficult. The moderate shrink-swell potential, slow permeability, and Rock outcrop are limitations that are difficult to overcome for urban uses.

Potential is fair for loblolly pine, shortleaf pine, Virginia pine, and eastern redcedar. Most of the acreage is mixed hardwoods and pines. Seedling mortality and windthrow hazard are moderate management concerns. The Rock outcrop and slope restrict the use of equipment in some areas.

This unit has good potential for woodland wildlife habitat. Capability subclass VIIe; woodland group 3c.

17—Conasauga-Urban land complex, 2 to 15 percent slopes. This unit consists of areas of gently sloping to moderately steep, moderately well drained Conasauga soils; soils similar to Conasauga soils; and Urban land. Individual areas of this unit range to as much as several hundred acres in size. They are about 45 to 65 percent Conasauga soils and about 25 to 45 percent Urban land. Areas of Conasauga soils and Urban land are so intricately mixed that they could not be separated at the scale selected for mapping.

Typically, Conasauga soils have a surface layer of very dark grayish brown loam about 4 inches thick. The upper part of the subsoil is brownish yellow clay loam, and the lower part is yellowish brown and brownish yellow clay to a depth of 39 inches. The underlying material is partially weathered, fractured shale. Soils similar to Conasauga soils have a subsoil with redder hue.

Included in mapping in the narrow drainageways and around the drainage heads are small areas of the poorly drained to somewhat poorly drained Gaylesville soils.

Many areas of this map unit are artificially drained through sewer systems, gutters, drainage tiles, and to a lesser extent, surface ditches. Areas of Conasauga soil that are not drained tend to become ponded during wet seasons.

Permeability is slow through the Conasauga soils, and organic matter content is low. Fertility is low in the surface layer. The shrink-swell potential is moderate in the subsoil.

Conasauga soils, or the open parts of the map unit, are used for parks, lawns, and gardens. They have fair potential for these uses, but they have poor potential for most engineering uses.

Several methods of artificial drainage can be successfully used on these soils. The best method for a particular area will need to be selected by onsite investigation. Perennial plants that are selected for planting should have a fairly high tolerance for wetness and clayey conditions. Soil erosion generally is not a major concern in this unit unless the soils are disturbed and left bare for a considerable period of time or are used as a water course.

Conasauga soils have moderate to severe limitations for building site development. Artificial drainage is usually needed in areas used for these purposes. Dwellings and small buildings should be designed to prevent structural damage caused by swelling and shrinking. All sanitary facilities need to be connected to commercial sewers and treatment facilities.

Urban land consists of areas which have been altered to the extent that classification is not practical. It includes areas covered by buildings, garages, sidewalks, patios, driveways, streets, schools, and churches, and areas that have been significantly disturbed by cutting, filling, or grading. Not assigned to a capability subclass.

18—Dewey silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on low ridges and foot slopes in the Appalachian Ridges and Valleys. Slopes are smooth and convex. Individual areas are 5 to 25 acres.

Typically, the surface layer is brown silt loam about 6 inches thick. The upper part of the subsoil is yellowish red silty clay loam to a depth of 12 inches and yellowish red clay to a depth of 20 inches. The middle part is yellowish red clay that has distinct strong brown mottles and that extends to a depth of 25 inches. The lower part is mottled yellow, red, and brown clay to a depth of 70 inches.

Included with this soil in mapping are small areas of Allen, Bodine, Minvale, and Stemley soils. Also included are some soils in which content of chert fragments is more than 15 percent in the surface layer and areas of soils that have a dark colored surface layer and a dark red subsoil. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate to high. The soil is easy to work and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is deep and easily penetrated by plant roots.

This soil has fair potential for row crops and small grains, but high yields can be obtained. Potential is limited because of the small size of the areas and the slope of adjacent soils. Crop residues returned to the soil help maintain organic matter content and good tilth. Erosion is a moderate hazard if cultivated crops are grown. Contour farming, terraces, grassed waterways, and minimum tillage are effective in reducing erosion on cultivated fields.

Potential is good for loblolly pine, shortleaf pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has fair to good potential for most urban uses. It has low strength, but this can be overcome by good design. Capability subclass IIe; woodland group 3o.

19—Dewey silt loam, 6 to 10 percent slopes. This deep, well drained, sloping soil is on low ridges and foot slopes in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 5 to 50 acres.

Typically, the surface layer is yellowish brown silt loam about 5 inches thick. The upper part of the subsoil is reddish yellow silty clay loam to a depth of 12 inches and yellowish red clay loam to a depth of 17 inches. To a depth of 31 inches is yellowish red silty clay with distinct yellowish brown and red mottles. The lower part is mottled yellowish red, yellowish brown, very pale brown, and red silty clay to a depth of 70 inches.

Included with this soil in mapping are small areas of Allen, Bodine, Minvale, and Stemley soils. Also included are soils in which content of chert fragments is more than 15 percent in the surface layer and areas of soils that have a dark surface layer and a dark red subsoil. The included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate to high. The soil has good tilth and can be worked over a wide range of moisture content. The root zone is deep and can be easily penetrated by plant roots.

This soil has fair potential for row crops and small grains. The potential is limited because of the slope and the small size of some of the areas. The soil has good potential for hay and pasture. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is moderate if cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Stripcropping is an effective erosion control practice that can be used on many fields where terraces are difficult to install. Cropping systems are needed that include the use of perennial sod crops about 2 years in 3.

Potential is good for loblolly pine, shortleaf pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has moderate potential for most urban uses. Slope and low strength are limitations that can be overcome by good design. Capability subclass IIIe; woodland group 3o.

20—Dewey silty clay loam, 6 to 15 percent slopes, eroded. This deep, well drained, sloping to moderately steep soil is on low ridges and foot slopes in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 10 to 80 acres.

Typically, the surface layer is dark reddish brown silty clay loam about 3 inches thick. The upper part of the subsoil is dark red silty clay loam to a depth of 12 inches and dark red silty clay to a depth of 30 inches. The lower part is dark red silty clay that has distinct strong brown mottles and that extends to a depth of 70 inches.

Included with this soil in mapping are small areas of Allen, Bodine, Minvale, and Stemley soils. Also included are small areas of soils that have a cherty surface layer and areas of soils that have a loamy surface layer. The included soils make up about 10 to 25 percent of this map unit, but separate areas generally are less than 5 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate to high. The soil has poor tilth because of the erosion which has occurred. The moisture range over which it can be worked is narrow. Many areas have shallow gullies and rills.

This soil has poor potential for row crops and fair potential for pasture. The potential is limited because of the slope and the erosion scars. Tilth can be improved by returning crop residue to the soil. The erosion hazard is high if cultivated crops are grown. Land shaping is needed on some fields where gullies are present. Good stands of pasture grasses are sometimes difficult to obtain because of the surface texture of these soils. Good fertilization and good management practices are needed on pastures to insure long-lived stands.

Potential is fair for loblolly pine, Virginia pine, eastern redcedar, and eastern white pine. The soil has moderate limitations for most woodland use and management.

This soil has fair potential for most urban uses. Slope and low strength are limitations that can be overcome by good design. Capability subclass IVe; woodland group 4c.

21—Ellisville loam. This deep, well drained, nearly level soil is on first bottoms or stream terraces in the Appalachian Ridges and Valleys. Slopes are plane to slightly convex and range from 0 to 2 percent. Individual areas are commonly 5 to 80 acres.

Typically, the surface layer is dark yellowish brown loam about 8 inches thick. The subsoil is dark yellowish brown silty clay loam to a depth of 20 inches and dark yellowish brown silty clay loam that has distinct pale brown and yellowish brown mottles and that extends to a depth of 60 inches.

Included with this soil in mapping are small areas of Chewacla, Choccolocco, Leadvale, McQueen, Toccoa, and Wickham soils. Also included are areas of soils that have sandy clay loam and clay loam subsoils. The included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately permeable soil is moderate in natural fertility and organic matter content. The available water capacity is high. The soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

This soil has fair potential for row crops and small grains. Potential is limited because of the small size of some areas. This soil is subject to occasional, very brief flooding, but crops are seldom damaged. Ponding is a problem in depressions. Shallow ditches can be used to remove surface water. Crop residues need to be returned to the soil. Cultivated crops can be grown each year.

This soil has good potential for loblolly pine, sweetgum, water oak, and yellow-poplar. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of flooding. Capability subclass IIw; woodland group 1o.

22—Ennis-Lobelville cherty loams. This unit consists of small areas of Ennis soils and Lobelville soils that are so intermingled that they could not be separated at the scale selected for mapping. These deep, well drained and moderately well drained, nearly level soils are in long narrow areas on first bottoms and are 5 to 35 acres in size.

Ennis cherty loam makes up about 30 to 50 percent of each mapped area. Typically, the surface layer is brown cherty loam about 5 inches thick. The subsoil to a depth of 13 inches is brown and yellowish brown cherty sandy loam, to a depth of 31 inches is brown cherty loam with dark yellowish brown and dark brown mottles, and to a depth of 60 inches is mottled dark yellowish brown, dark brown, and grayish brown cherty clay loam.

This Ennis soil is moderate in natural fertility and organic matter content. It is strongly acid to very strongly acid. Permeability is moderately rapid, and the available water capacity is moderate.

Lobelville cherty loam makes up about 25 to 45 percent of each mapped area. Typically, the surface layer is dark yellowish brown cherty loam about 6 inches thick. The subsoil to a depth of 16 inches is mottled yellowish brown and dark yellowish brown cherty loam and to a depth of 30 inches is mottled dark yellowish brown, grayish brown, and brown cherty loam. Below this is mottled light brownish gray, pale brown, yellowish brown, strong brown, and brown cherty sandy loam to a depth of 60 inches.

This Lobelville soil is moderate in natural fertility and organic matter content. It is strongly acid to very strongly acid. Permeability is moderate, and the available water capacity is low to moderate.

Included with these soils in mapping are small areas of Minvale and Stemley soils.

These soils have fair potential for farming. Occasional, very brief flooding usually occurs during winter, and occasionally a spring flood damages crops. Field ditches and diversions can be used to reduce ponding. Crop residues returned to the soil help maintain organic matter content. Cultivated crops can be grown each year.

Potential is good for loblolly pine, yellow-poplar, white oak, and black walnut. Most of the acreage is mixed hardwoods. The use of equipment is slightly restricted because of wetness.

These soils have poor potential for most urban uses because of flooding. They have good potential for woodland and openland wildlife habitat. Capability sub-

class IIIw; Ennis soil in woodland group 2o, Lobelville soil in woodland group 2w.

23—Firestone loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on uplands in the Appalachian Ridges and Valleys. Slopes are smooth and convex. Individual areas are 10 to several hundred acres.

Typically, the surface layer is yellowish brown loam about 5 inches thick. The subsoil to a depth of 12 inches is yellowish red clay; to a depth of 22 inches is yellowish red clay with common distinct red and yellowish brown mottles; and to a depth of 39 inches is mottled yellowish red, strong brown, red, and yellowish brown clay. The underlying material is partially weathered, fractured shale to a depth of 60 inches.

Included with this soil in mapping are small areas of Conasauga, Gaylesville, and Leesburg soils. Also included are some soils that are deeper than 40 inches or shallower than 20 inches to shale and areas of soils that have a gravelly surface layer. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is low. The soil has fair tilth, but the range of moisture content over which it can be worked is narrow. The root zone is somewhat restricted because of the depth to shale.

This soil has fair to poor potential for row crops. Potential is limited because the soil is only moderately deep and has a clayey subsoil. The soil has good potential for small grains, hay, and pasture. Tilth can be improved by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cropping systems are needed that include the use of perennial sod crops about 2 years in 3.

Potential is fair for loblolly pine, shortleaf pine, Virginia pine, and eastern redcedar. There are no significant limitations for woodland use and management.

This soil has poor potential for most urban uses. It has low strength and high shrink-swell potential and is slowly permeable. These factors can be partially overcome by special design. Capability subclass IIIe; woodland group 4o.

24—Firestone silt loam, 6 to 15 percent slopes. This moderately deep, well drained, sloping to moderately steep soil is on uplands in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 5 to 200 acres.

Typically, the surface layer is brown silt loam about 3 inches thick. The subsoil to a depth of 14 inches is yellowish red clay with common distinct strong brown mottles; to a depth of 26 inches is yellowish red clay with common distinct yellowish brown mottles; to a depth of 31 inches is strong brown clay with yellowish red, yellowish brown, and light gray mottles; and to a depth of 33 inches is light olive brown clay. The underlying material is partially weathered, fractured shale to a depth of 60 inches.

Included with this soil in mapping are small areas of Conasauga, Gaylesville, and Leesburg soils. Also included are some soils deeper than 40 inches or shallower than 20 inches to shale and areas of soils that have a gravelly surface layer. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 5 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is low. The soil has fair tilth, but the range of moisture content over which it can be worked is narrow. The root zone is somewhat restricted because of the depth to shale.

This soil has poor potential for row crops. The potential is limited because of the slope and the moderately deep, clayey subsoil. The soil has fair potential for small grains, hay, and pasture. Erosion is a hazard when this soil is cultivated. Contour farming, grassed waterways, and minimum tillage are effective conservation practices. Conservation cropping systems are needed that include the use of perennial sod crops at least 3 years in 4.

Potential is fair for loblolly pine, shortleaf pine, Virginia pine, and eastern redcedar. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses. It has low strength and high shrink-swell potential and is slowly permeable. These factors can be partially overcome by special design. Capability subclass IVe; woodland group 4o.

25—Firestone-Leesburg complex, 15 to 45 percent slopes. This unit consists of small areas of Firestone and Leesburg soils that are so intermingled that they could not be separated at the scale selected for mapping. Areas of these moderately deep and deep, well drained soils are fairly small, ranging from 5 to 40 acres. They are along a line where soils in a high river terrace position overlap soils developed from material weathered from shale. Individual areas of each soil are 1 to about 5 acres.

Firestone soils and similar soils make up about 45 to 65 percent of each mapped area. Typically, the surface layer is brown loam about 3 inches thick. The subsoil is reddish yellow clay loam to a depth of 6 inches, strong brown clay to a depth of 12 inches, and yellowish red clay to a depth of 35 inches. Below this to a depth of more than 38 inches is fractured, weathered shale. The soils similar to Firestone have a more yellow subsoil.

These Firestone soils are low in natural fertility and organic matter content. Permeability is slow, and the available water capacity is low. These soils are medium acid to strongly acid in the control section.

Leesburg soils make up about 30 to 50 percent of each mapped area. Typically, the surface layer is brown gravelly sandy loam about 4 inches thick. The subsoil to a depth of 19 inches is yellowish brown gravelly sandy clay loam and to a depth of 60 inches is yellowish brown gravelly sandy clay loam with common distinct pale brown mottles.

These Leesburg soils are low in natural fertility and organic matter content. Permeability is moderate, and the available water capacity is moderate. The soils are strongly acid to very strongly acid.

Included with this unit in mapping are small areas of Allen, Holston, Nella, and Townley soils.

These soils have poor potential for farming and most urban uses because of the steep slopes. The Firestone soils have high shrink-swell potential and are slowly permeable. These are severe limitations that are difficult to overcome for most urban uses.

Potential is fair to good for loblolly pine, Virginia pine, shortleaf pine, and yellow-poplar. Most of the acreage is mixed hardwoods and pines. Seedling mortality is a moderate management concern. Equipment use is somewhat restricted because of steep slopes.

These soils have fair potential for woodland wildlife habitat. Capability subclass VIIe; Firestone soil in woodland group 4c, Leesburg soil in woodland group 3r.

26—Gaylesville silt loam. This deep, poorly drained, nearly level soil is on low stream terraces in the Appalachian Ridges and Valleys. Slopes are smooth and slightly concave and range from 0 to 2 percent. Individual areas are 15 to 200 acres.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The subsoil to a depth of 10 inches is mottled light gray, light brownish gray, pale brown, and yellowish brown silty clay loam; to a depth of 17 inches is mottled light gray and yellowish brown silty clay; to a depth of 28 inches is light brownish gray clay with common distinct yellowish brown and strong brown mottles; and to a depth of 60 inches is mottled light brownish gray, grayish brown, and yellowish brown clay.

Included with this soil in mapping are small areas of Cedarbluff, Chewacla, Cloudland, Conasauga, Firestone, Leadvale, and McQueen soils. Also included are some areas of soils that have a less clayey subsoil. The included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 3 acres.

This slowly permeable soil is low in natural fertility and low in organic matter content. The available water capacity is high. The soil has fair tilth and can be tilled through a fair range of moisture content. The root zone is deep and can be easily penetrated by plant roots. However, the root zone is saturated with water for several months during the year.

This soil has poor potential for row crops. It is subject to frequent flooding and ponding during the wet seasons. Erosion is not a hazard. The soil has fair to good potential for adapted hay and pasture crops. Seedbed preparation and planting are usually delayed because of wetness. Surface ditches are needed for both pasture and crops, but outlets are seldom available. Crop residues returned to the soil help maintain organic matter content.

Potential is good for yellow-poplar, sweetgum, and loblolly pine. Windthrow hazard is a moderate management concern. The use of equipment is restricted by wetness.

This soil has poor potential for most urban uses because of flooding and wetness. Capability subclass IVw; woodland group 3w.

27—Hartsells fine sandy loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on broad plateaus in the Sand Mountain area. Slopes are smooth and convex. Individual areas are 5 to 35 acres.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The upper part of the subsoil, to a depth of 11 inches, is yellowish brown loam. The lower part is yellowish brown sandy clay loam to a depth of 25 inches and yellowish brown sandy clay loam that has few distinct very pale brown and yellowish red mottles and that extends to depth of 31 inches. The underlying material is sandstone bedrock.

Included with this soil in mapping are small areas of Linker, Townley, and Wynnville soils. Also included are areas of soils deeper than 40 inches to bedrock, areas of soils that have a gravelly surface layer, and areas of soils that are shallower than 20 inches to bedrock and that have a sandy loam subsoil. The included soils make up 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is low to moderate. The soil has good tilth and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is somewhat restricted because of the depth to sandstone bedrock.

This soil has good potential for row crops and small grains. Crops respond well to fertilizer. Conservation practices are needed when these soils are used for cultivated crops. Contour farming, terraces, grassed waterways, minimum tillage, and crop residue management are effective in reducing erosion. Cultivated row crops can be grown each year when good conservation practices are applied.

Potential is fair for loblolly pine, shortleaf pine, and Virginia pine. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of depth to bedrock. Capability subclass IIe; woodland group 4o.

28—Hartsells fine sandy loam, 6 to 15 percent slopes. This moderately deep, well drained, sloping to moderately steep soil is on broad plateaus in the Sand Mountain area. Slopes are complex and convex. Individual areas are 15 to several hundred acres.

Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsoil is brownish yellow loam that extends to a depth of 22 inches. Below is sandstone bedrock.

Included with this soil in mapping are small areas of Linker, Townley, and Wynnville soils. Also included are areas of soils that are deeper than 40 inches or shallower than 20 inches to bedrock and areas of soils that have a gravelly surface layer. The included soils make up 5 to 25 percent of this map unit, but individual areas generally are less than 5 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is low to moderate. The soil has good tilth and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is somewhat restricted because of the depth to sandstone bedrock.

This soil has fair potential for row crops and small grains. The potential is limited because of the slope and the restricted rooting depth. Erosion is a hazard when this soil is cultivated. Contour farming, grassed waterways, and minimum tillage are effective conservation practices. Conservation cropping systems are needed that include the use of perennial sod crops at least 3 years in 4. Crops respond well to fertilization. Crop residue returned to the soil helps maintain organic matter content.

Potential is fair for loblolly pine, shortleaf pine, and Virginia pine. There are no significant limitations for woodland use and management.

This soil has poor potential for most urban uses because of depth to bedrock and slope. Capability subclass IVe; woodland group 4o.

29—Hartsells-Rock outcrop complex, 2 to 10 percent slopes. This unit consists of small areas of Hartsells soils and Rock outcrop that are so intermingled that they could not be separated at the scale selected for mapping. These moderately deep, well drained soils and Rock outcrop are in fairly broad areas, mainly along the edges of Lookout and Sand Mountains. Individual areas of soil and Rock outcrop are 2 to about 5 acres but range to as much as 10 acres.

Hartsells soils and similar soils make up about 65 to 75 percent of each mapped area. Typically the surface layer is brown fine sandy loam about 6 inches thick. The subsoil is yellowish brown loam to a depth of 15 inches and strong brown loam to a depth of 30 inches. Below this is sandstone bedrock. Soils similar to Hartsells are slightly less than 20 inches deep to bedrock.

These Hartsells soils are low in natural fertility and organic matter content. They are extremely acid to strongly acid. Permeability is moderate, and the available water capacity is low to moderate.

Rock outcrop makes up about 22 to 35 percent of each mapped area. It is sandstone bedrock which in some areas is even with the surface and in others protrudes several feet above the surface.

Included with this unit in mapping are small areas of Townley and Wynnville soils.

This unit has poor potential for farming and most urban uses. It has fair potential for hay and pasture, but the rock outcrops make seedbed preparation and pasture maintenance operations difficult. The depth to bedrock and the rock outcrops are severe limitations that are difficult to overcome for urban uses.

Potential is fair to poor for loblolly pine, Virginia pine, and shortleaf pine. Potential is reduced because of the rock outcrops.

This unit has good potential for woodland and openland wildlife habitat. Capability subclass VIe; woodland group 4o.

30—Hartsells-Urban land complex, 2 to 15 percent slopes. This unit consists of areas of gently sloping to moderately steep, well drained Hartsells soils; soils similar to Hartsells soils; and areas of Urban land. Individual areas of this unit are as large as several hundred acres; they are about 40 to 60 percent Hartsells soils and about 20 to 40 percent Urban land. The areas of Hartsells soils and Urban land are so intricately mixed that they could not be separated at the scale selected for mapping.

Typically, Hartsells soils have a surface layer of brown fine sandy loam about 6 inches thick. The upper part of the subsoil is yellowish brown loam, and the lower part is yellowish brown sandy clay loam that extends to a depth of 31 inches. Below this is sandstone bedrock. Soils similar to Hartsells soils have a subsoil with redder hue.

Included in mapping are small areas of soils shallower than 20 inches and areas of soils deeper than 40 inches to sandstone bedrock.

The soils are well drained, and there are no significant drainage limitations.

Permeability is moderate through the Hartsells soils, and organic matter content is low. Fertility is low in the surface layer. The shrink-swell potential is low in the subsoil.

The Hartsells soils, or the open parts of the map unit, are used for parks, lawns, and gardens. They have good potential for these uses, and they have good to fair potential for most engineering uses.

Adapted plants should be selected for use on these soils because of the sandy surface textures and the shallow depth to bedrock. Soil erosion is a concern in disturbed areas that are left bare for a considerable period of time.

The Hartsells soils and similar soils have moderate to severe limitations for some building site development because of the shallow depth to bedrock and because of slope. All sanitary facilities need to be connected to commercial sewers and treatment facilities.

Urban land consists of areas which have been altered to the extent that classification is not practical. It includes areas covered by buildings, garages, sidewalks, patios, driveways, streets, schools, and churches, and areas that have been significantly disturbed by cutting, filling, or grading. Not assigned to a capability subclass.

31—Hartsells-Rock outcrop association, steep. This unit consists of moderately deep, well drained soils and Rock outcrop in a regular and repeating pattern. The unit is one single area, more than 4,000 acres in size, that runs the entire length of the county in a northeasterly-southwesterly direction. The landscape is a long, narrow, steep, wooded mountainside. Typically, the slope faces southeast. There is an almost continuous sandstone rock bluff along the upper edge of the area; this bluff ranges from a few feet to several hundred feet in height. Several smaller, discontinuous bluffs occur at intervals down the side slopes. The surface of the ground between these

bluffs is covered with sandstone boulders as much as several feet in diameter, and the highest concentrations are immediately below the bluffs. The Hartsells soils are between these boulders and the bluffs.

The well drained Hartsells soils and similar soils make up about 25 percent of the unit. Typically, the surface layer is brown fine sandy loam about 3 inches thick. The subsoil is yellowish brown fine sandy loam to a depth of 10 inches, yellowish brown loam to a depth of 25 inches, and strong brown sandy clay loam to a depth of 33 inches. Below this is sandstone bedrock. Soils similar to Hartsells have a subsoil with redder hue or are slightly less than 20 inches to bedrock.

Hartsells soils are moderately permeable. The available water capacity is low to moderate. The soils are extremely acid to strongly acid.

Rock outcrop makes up about 22 percent of this unit. It consists of exposed sandstone bluffs and angular pieces of sandstone as much as several feet across.

Included in mapping are small areas of Allen, Nella, Townley, and Wynnville soils. The deep, well drained Allen and Nella soils are the most extensive and are on the lower part of the area on toe slopes. Also included, mainly on the upper one-fourth of the side slopes, is a soil that is similar to Hartsells soils except that it is shallower to bedrock and has a coarser textured subsoil.

This unit is used mostly as woodland. It has fair to poor potential for loblolly pine, Virginia pine, and shortleaf pine. Its potential is limited by the steep slopes and the rock outcrops.

Potential is poor for most urban uses because of slope, depth to bedrock, and the sandstone rock outcrops.

This unit has fair potential for habitat for woodland wildlife. Capability subclass VIIe; woodland group 4o.

32—Holston fine sandy loam, 1 to 5 percent slopes. This deep, well drained, nearly level to gently sloping soil is on high stream terraces and toe slopes in the Appalachian Ridges and Valleys. Slopes are smooth and both concave and convex. Individual areas are 20 to several hundred acres.

Typically, the surface layer is yellowish brown fine sandy loam about 6 inches thick. The upper part of the subsoil is yellowish brown loam to a depth of 13 inches. To a depth of 20 inches is yellowish brown sandy clay loam, and to a depth of 34 inches is yellowish brown silty clay loam with faint strong brown mottles. The lower part of the subsoil is mottled yellowish brown, strong brown, light yellowish brown, and red silty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Allen, Cedarbluff, Chewacla, Cloudland, Conasauga, Holston Variant, Leesburg, Nella, and Waynesboro soils. Also included are areas of soils that have a gravelly surface layer. The included soils make up about 5 to 25 percent of this map unit, but separate areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is high. The soil has good tilth and can be cultivated over a wide range of moisture content. The root zone is deep and can be easily penetrated by plant roots.

This soil has good potential for all types of locally grown crops (fig. 6). Tilth can be maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cultivated crops can be grown each year if good conservation practices are applied.

This soil has good potential for loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has good potential for most urban uses. It has moderate limitations for works and structures because of low strength, but these can be overcome with good design. Septic tanks function well on this soil. Capability subclass IIe; woodland group 3o.

33—Holston-Urban land complex, 2 to 15 percent slopes. This map unit consists of areas of gently sloping to moderately steep, well drained Holston soils, soils similar to Holston, and areas of Urban land. Individual areas of this unit range up to several hundred acres in size; they are about 40 to 60 percent Holston soils and about 20 to 40 percent Urban land. The areas of Holston soils and Urban land are so intricately mixed they could not be separated at the scale selected for mapping.

Typically, Holston soils have a surface layer of yellowish brown fine sandy loam about 6 inches thick. The upper part of the subsoil, to a depth of 20 inches, is yellowish brown loam and sandy clay loam. The lower part is yellowish brown silty clay loam and mottled yellowish brown, strong brown, and red silty clay loam to a depth of 60 inches. Soils similar to Holston soils have gravel content of more than 15 percent throughout the solum.

Included in mapping are small areas of the somewhat poorly drained Cedarbluff soils and the moderately well drained Cloudland soils. These soils occur in narrow drainageways and shallow depressions. Also included are small areas of the well drained Waynesboro soils. These soils occupy short slope breaks near the boundaries of the mapped areas.

Permeability is moderate through the Holston soils, and organic matter content is low. Fertility is low in the surface layer. The shrink-swell potential is low in the subsoil.

The Holston soils, or the open parts of the map unit, are used for parks, lawns, and gardens. They have good potential for these uses, and they have good to fair potential for most engineering uses.

Most locally grown plants are adapted to these soils. Soil erosion is a concern where areas are left bare for a considerable period of time.

The Holston soils and similar soils have slight to moderate limitations for most building site development. Individual sanitary facilities work satisfactorily on these soils where sufficient area is available.

Urban land consists of the areas which have been altered to the extent that classification is not practical. It includes areas covered by buildings, garages, sidewalks, patios, driveways, streets, schools, and churches, and areas that have been significantly disturbed by cutting, filling, or grading. Not assigned to a capability subclass.

34—Holston Variant fine sandy loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on high stream terraces in the Appalachian Ridges and Valleys. Slopes are smooth and convex. Individual areas are 20 to several hundred acres.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The upper part of the subsoil is light yellowish brown silt loam to a depth of 24 inches and mottled very pale brown, brownish yellowish, and strong brown loam to a depth of 37 inches. The lower part to a depth of 70 inches is mottled red, strong brown, and light brownish gray clay loam that is compact and brittle in about 25 percent of the mass.

Included with this soil in mapping are small areas of Allen, Cedarbluff, Cloudland, Conasauga, Holston, Leesburg, Nella, and Waynesboro soils. Also included are areas of soils that have a gravelly surface layer and areas of soil underlain by shale. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate to high. The soil has good tilth and can be cultivated over a wide range of moisture content. The root zone is somewhat restricted by the compact and brittle subsurface layer.

This soil has good potential for locally grown crops. Tilth can be improved and maintained by returning crop residue to the soil. Erosion is a moderate hazard when cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cultivated crops can be grown each year if good conservation practices are applied.

Potential is good for loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has fair to good potential for most urban uses. Soil strength and slope are moderate limitations for some works and structures. The compact layer in the subsoil perches water during wet seasons and is a moderate limitation for septic tank filter fields and dwellings with basements. Capability subclass IIe; woodland group 3o.

35—Leadvale silt loam, 1 to 5 percent slopes. This deep, moderately well drained, nearly level to gently sloping soil is on stream terraces in the Appalachian Ridges and Valleys. Slopes are smooth and both concave and convex. Individual areas are 10 to 100 acres.

Typically, the surface layer is brown silt loam about 8 inches thick. The upper part of the subsoil is yellowish brown silty clay loam to a depth of 21 inches. The lower part is a compact and brittle layer. To a depth of 34 inches, it is light yellowish brown silty clay loam with distinct strong brown and light gray mottles; to a depth of 60 inches, it is mottled olive yellow, light gray, strong brown, yellowish red, and red silty clay loam.

Included with this soil in mapping are small areas of Chewacla, Choccolocco, Ellisville, Gaylesville, and McQueen soils. Also included are areas of soils that are similar to Leadvale soils except that they do not have the compact and brittle layer. The included soils make up about 10 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth and can be cultivated through a fairly wide range of moisture content. The root zone is restricted by the compact and brittle layer.

This soil has fair potential for producing row crops. The potential is limited because of the restricted root zone. This soil is subject to rare, very brief flooding. The subsoil is saturated for short periods during the wet season, and this causes the soil to warm up slowly in the spring. The soil has good potential for adapted pasture grasses. Erosion is a moderate hazard when this soil is cultivated. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cultivated crops can be grown each year when good conservation practices are applied.

Potential is good for loblolly pine, yellow-poplar, shortleaf pine, Virginia pine, and white oak. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of the slow permeability of the restricting layer in the subsoil and wetness. These factors are difficult to overcome. Capability subclass IIw; woodland group 3o.

36—Leesburg gravelly sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on high stream terraces in the Appalachian Ridges and Valleys. Slopes are smooth and convex. Individual areas are 10 to 50 acres.

Typically, the surface layer is brown gravelly sandy loam about 6 inches thick. The upper part of the subsoil is yellowish brown gravelly loam to a depth of about 23 inches. The middle part to a depth of 30 inches is strong brown gravelly loam with few distinct yellowish brown and light yellowish brown mottles and to a depth of 45 inches is mottled pale brown, yellowish brown, strong brown, yellowish red, and red gravelly clay loam. The lower part to a depth of 60 inches is mottled strong brown, red, yellowish red, brownish yellow, and light gray gravelly loam.

Included with this soil in mapping are small areas of Allen, Cedarbluff, Cloudland, Conasauga, Firestone, Holston, Holston Variant, Nella, Townley, and Waynesboro soils. Also included are areas of soils in which content of coarse fragments is more than 35 percent in all horizons. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth and can be cultivated over a wide range of moisture content. The coarse fragments interfere with planting and cultivation in some places. The root zone is deep and can be easily penetrated by plant roots.

This soil has fair potential for producing all types of crops. Tilth can be maintained by returning crop residue to the soil. Erosion is a moderate hazard if cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cultivated crops can be grown each year if good conservation practices are applied.

Potential is good for loblolly pine, shortleaf pine, yellow-poplar, and Virginia pine. There are no significant limitations for woodland use or management.

This soil has good potential for most urban uses. It has low shrink-swell potential and moderate permeability. Septic tanks function well on this soil. Capability subclass IIIs; woodland group 3o.

37—Leesburg gravelly sandy loam, 6 to 15 percent slopes. This deep, well drained, sloping to moderately steep soil is on high stream terraces and hillsides in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 10 to 40 acres.

Typically, the surface layer is brown gravelly sandy loam about 4 inches thick. The upper part of the subsoil is yellowish brown gravelly loam to a depth of 15 inches. The middle part, to a depth of 25 inches, is yellowish brown gravelly sandy clay loam with fine distinct strong brown and very pale brown mottles. The lower part to a depth of 60 inches is yellowish brown gravelly silty clay loam with common distinct very pale brown and strong brown mottles.

Included with this soil in mapping are small areas of Allen, Cedarbluff, Cloudland, Conasauga, Firestone, Holston, Holston Variant, Nella, Townley, and Waynesboro soils. Also included are areas of soils in which content of coarse fragments is more than 35 percent in all horizons. The included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth and can be cultivated over a wide range of moisture content. The coarse fragments interfere with planting and cultivation in some places. The root zone is deep and can be easily penetrated by plant roots.

This soil has fair potential for producing all types of crops. Tilth can be maintained by returning crop residue to the soil. Erosion is a hazard if cultivated crops are grown. Conservation practices are needed if these soils are used for cultivated crops. Contour farming, grassed waterways, and minimum tillage are effective erosion control practices. Cropping systems are needed that include the use of perennial sod crops at least 3 years in 4.

Potential is good for loblolly pine, shortleaf pine, yellow-poplar, and Virginia pine. There are no significant limitations for woodland use or management.

This soil has fair potential for most urban uses. It has low shrink-swell potential and moderate permeability. Slopes and small stones are moderate limitations for many urban uses. Capability subclass IVs; woodland group 3o.

38—Linker fine sandy loam, 2 to 6 percent slopes. This moderately deep, well drained, gently sloping soil is on upland plateaus in the Sand Mountain area of the county. Slopes are smooth and both concave and convex. Individual areas are 10 to 30 acres.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The upper part of the subsoil is strong brown loam to a depth of 7 inches. The middle part is yellowish red clay loam to a depth of 14 inches and yellowish red clay loam that has common medium, distinct, reddish yellow, red, and pale brown mottles and that extends to a depth of 28 inches. The lower part is mottled reddish yellow and red sandy clay loam to a depth of 35 inches. It is underlain by hard sandstone bedrock.

Included with this soil in mapping are small areas of Hartsells, Townley, and Wynnville soils. Also included are areas of soils that are slightly less than 20 inches or slightly more than 40 inches to bedrock. Some soils have a gravelly surface layer. The included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 3 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is low to moderate. The soil has good tilth and can be cultivated over a wide range of moisture content. The root zone is moderately deep and can be easily penetrated by plant roots.

This soil has fair potential for producing all types of locally grown crops. Its potential is restricted by the small size of the areas and the moderate erosion hazard. Tilth can be maintained by returning crop residue to the soil. Conservation practices are needed if these soils are used for cultivated crops. Contour farming, terraces, grassed waterways, minimum tillage, and crop residue management are effective in reducing erosion. Cultivated crops can be grown each year if good conservation practices are applied.

Potential is fair for loblolly pine, shortleaf pine, and Virginia pine. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of depth to rock. Capability subclass IIIe; woodland group 4o.

39—Linker fine sandy loam, 6 to 15 percent slopes. This moderately deep, well drained, sloping to moderately steep soil is on upland plateaus in the Sand Mountain area of the county. Slopes are complex and convex. Individual areas are 10 to 200 acres.

Typically, the surface layer is brown fine sandy loam about 5 inches thick. The upper part of the subsoil is strong brown sandy clay loam to a depth of 11 inches and yellowish red clay loam to a depth of 23 inches. The lower part is yellowish red clay loam that has common medium, distinct, yellowish brown and brownish yellow mottles and that extends to a depth of 38 inches. It is underlain by hard sandstone bedrock.

Included with this soil in mapping are small areas of Hartsells, Townley, and Wynnville soils. Also included are areas of soils that are slightly less than 20 inches or slightly more than 40 inches deep to bedrock. Some soils have a gravelly surface layer. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is low to moderate. The soil has good tilth and can be cultivated over a wide range of moisture content without clodding or crusting. The root zone is moderately deep and can be easily penetrated by plant roots.

This soil has fair potential for producing locally grown crops. Tilth can be maintained by returning crop residue to the soil. Erosion is a moderate to severe hazard when these soils are used for cultivated crops. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Stripcropping is effective and can be used on many fields where terraces are difficult to install. Cropping systems are needed that include the use of a perennial sod crop about 2 years in 3.

Potential is fair for loblolly pine, shortleaf pine, and Virginia pine. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of slope and depth to rock. Capability subclass IVe; woodland group 4o.

40—Linker-Townley complex, 15 to 30 percent slopes. This complex consists of areas of Linker soils and Townley soils that are so intermingled that they could not be separated at the scale selected for mapping. These moderately deep, well drained, steep soils are in fairly large areas, 50 to several hundred acres, on uplands. They are underlain by interbedded sandstone and shale. Individual areas of each soil are 3 to 5 acres but range to as much as 10 acres.

Linker soils and similar soils make up about 45 to 65 percent of each mapped area. Typically, the surface layer is yellowish brown fine sandy loam about 4 inches thick. The subsurface layer is light yellowish brown fine sandy loam to a depth of 8 inches. The subsoil is strong brown loam to a depth of 18 inches and yellowish red sandy clay loam to a depth of 36 inches. It is underlain by hard sandstone bedrock. Soils similar to Linker have a browner subsoil.

These Linker soils are low in natural fertility and organic matter content. They are strongly acid to very strongly acid. Permeability is moderate, and the available water capacity is low to moderate.

Townley soils and similar soils make up about 15 to 35 percent of each mapped area. Typically, the surface layer is yellowish brown silt loam about 5 inches thick. The upper part of the subsoil is strong brown silty clay loam to a depth of 16 inches. The lower part is strong brown silty clay to a depth of 30 inches and mottled red, yellow, brown, and gray clay to a depth of 36 inches. Below this to a depth of more than 42 inches is weathered, fractured shale. Soils similar to Townley have a browner subsoil.

These Townley soils are low in natural fertility and organic matter content. They are strongly acid to very strongly acid. Permeability is slow, and the available water capacity is moderate.

Included with these soils in mapping are small areas of Wynnville soils.

Some areas of this unit in the area south of Boaz on Lookout Mountain have a higher percentage of Townley soils than is typical for the unit.

These soils have poor potential for farming and most urban uses. The shallow depth to rock, steep slopes, and slow permeability are severe limitations that are difficult to overcome.

Potential is fair for loblolly pine, Virginia pine, and shortleaf pine. There are no significant limitations for use and management.

These soils have good potential for woodland wildlife habitat. Capability subclass VIe; Linker soil in woodland group 4o, Townley soil in woodland group 4r.

41—Linker-Urban land complex, 15 to 30 percent slopes. This map unit consists of areas of steep, well drained Linker soils and areas of Urban land. Individual areas of this unit range to as much as several hundred acres; they are about 25 to 45 percent Linker soils and about 25 to 45 percent Urban land. The areas of Linker soils and Urban land are so intricately mixed that they could not be separated at the scale selected for mapping.

Typically, Linker soils have a surface layer of brown fine sandy loam about 5 inches thick. The subsoil is strong brown sandy clay loam to a depth of 11 inches and yellowish red clay loam to a depth of 38 inches. It is underlain by sandstone bedrock.

Included in mapping are small areas of soils shallower than 20 inches and areas of soils deeper than 40 inches to sandstone bedrock. Also included are areas of the more clayey Townley soils.

Permeability is moderate through the Linker soils, and organic matter content is low. Fertility is low in the surface layer. The shrink-swell potential is low in the subsoil.

Most areas of Linker soils not covered by structures are in woodland. Because of the steep slopes, they are better suited to this use than to others. Linker soils have fair to poor potential for most engineering uses.

Adapted plants should be selected for use on this unit because of the sandy surface textures and the shallow depth to bedrock. Soil erosion is often a concern on disturbed areas that are left bare for a considerable period of time.

The Linker soils have moderate to severe limitations for most building site development because of the shallow depth to bedrock and the steep slope. All sanitary facilities should be connected to commercial sewers and treatment facilities.

Urban land consists of areas which have been altered to the extent that classification is not practical. It includes areas covered by buildings, garages, sidewalks, patios, driveways, streets, schools, and churches, and areas that have been significantly disturbed by cutting, filling, or grading. Not assigned to a capability subclass.

42—McQueen fine sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on low stream and river terraces in the Appalachian Ridges and Valleys. Individual areas are 5 to 40 acres.

Typically, the surface layer is brown fine sandy loam about 6 inches thick. The upper part of the subsoil is yellowish red clay loam to a depth of 19 inches. The middle part, to a depth of 43 inches, is strong brown clay loam with distinct yellowish red and brown mottles. The lower part is mottled brown and yellow silty clay loam to a depth of 57 inches. The underlying material is strong brown sandy clay loam to a depth of 80 inches.

Included with this soil in mapping are small areas of Cedarbluff, Choccolocco, Ellisville, Gaylesville, Leadvale, and Wickham soils. Also included are some soils that have sandstone gravel in the surface layer. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is high. The soil is subject to rare flooding of brief duration. It is easy to work and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is deep and easily penetrated by plant roots.

This soil has good potential for row crops and small grains. Potential is limited because of the small size of the areas, flooding, and wetness of adjacent soils. Crop residue returned to the soil helps maintain organic matter content and good tilth. Erosion is a moderate hazard if cultivated crops are grown. Contour farming, grassed waterways, and minimum tillage are effective in reducing erosion on cultivated fields. Cultivated crops can be grown each year if good conservation practices are followed.

Potential is good for loblolly pine, shortleaf pine, yellow-poplar, and sweetgum. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of flooding. It has low strength, but this can be overcome by good design. Capability subclass IIe; woodland group 3o.

43—Minvale cherty loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on foot slopes, benches, and fans in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 5 to 30 acres.

Typically, the surface layer is yellowish brown cherty loam about 5 inches thick. The upper part of the subsoil is yellowish brown cherty loam to a depth of 11 inches. The middle part is yellowish red cherty silty clay loam to a depth of 22 inches, and the lower part is yellowish red cherty silty clay loam that has yellowish brown and light reddish brown mottles and that extends to a depth of more than 60 inches.

Included with this soil in mapping are small areas of Allen, Bodine, Dewey, Ennis, Lobelville, and Stemley soils. Also included are soils in which content of cherty fragments is more than 35 percent in the surface layer and soils that have a compact and brittle layer in the subsoil. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil is easy to work and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is deep and easily penetrated by plant roots.

This soil has fair potential for row crops and small grains, but high yields can be obtained. Potential is limited because of the small size of the areas. The coarse fragments tend to make the soil droughty and interfere with farming operations in some places. Crop residues returned to the soil help maintain organic matter content and good tilth. Erosion is a moderate hazard if cultivated crops are grown. Contour farming, terraces, grassed waterways, and minimum tillage are effective in reducing erosion on cultivated fields. Cultivated crops can be grown each year if good conservation practices are followed.

This soil has good potential for loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has good to fair potential for most urban uses. It has low strength, but this can be overcome with good design. Capability subclass IIe; woodland group 3o.

44—Minvale cherty loam, 6 to 15 percent slopes. This deep, well drained, sloping to strongly sloping soil is on foot slopes, hillsides, benches, and fans in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 5 to 50 acres.

Typically, the surface layer is dark grayish brown cherty loam about 5 inches thick. The subsurface layer is light yellowish brown cherty silt loam to a depth of 10 inches. The upper part of the subsoil is reddish yellow cherty loam to a depth of 18 inches. The middle part is yellowish red cherty silty clay loam to a depth of 25 inches, and the lower part is yellowish red cherty silty clay loam that has red and strong brown mottles and that extends to a depth of 70 inches.

Included with this soil in mapping are small areas of Allen, Bodine, Dewey, Ennis, Lobelville, and Stemley soils. Also included are soils in which content of chert

fragments is more than 35 percent in the surface layer and soils that have a compact and brittle layer in the subsoil. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil is easy to work and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is deep and easily penetrated by plant roots.

This soil has fair to poor potential for row crops and small grains, but high yields can be obtained. Potential is limited because of the small size of the areas. The content of coarse fragments tends to make the soil droughty and interferes with farming operations in some places. Crop residues returned to the soil help maintain organic matter content and good tilth. Erosion is a moderate to severe hazard if cultivated crops are grown. Contour farming, terraces, grassed waterways, and minimum tillage are effective in reducing erosion on cultivated fields. Cropping systems are needed that include the use of perennial sod crops about 2 years in 3.

Potential is good for loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has fair potential for most urban uses. Slope, low strength, and small stones are moderate limitations for most uses. Capability subclass IVe; woodland group 3o.

45—Minvale-Bodine complex, 15 to 30 percent slopes. This complex consists of small areas of Minvale and Bodine soils that are so intermingled that they could not be separated at the scale selected for mapping. These deep, well drained and somewhat excessively drained, steep soils are in fairly large areas, 25 to 150 acres in size, and are on uplands. They are underlain by limestone. Individual areas of each soil are 5 to 50 acres.

Minvale soils make up about 52 percent of each mapped area. Typically, the surface layer is yellowish brown cherty loam about 6 inches thick. The upper part of the subsoil is yellowish red cherty silty clay loam to a depth of 22 inches. The lower part is red cherty silty clay that has yellowish brown mottles and that extends to a depth of 70 inches.

These Minvale soils are low in natural fertility and organic matter content. They are strongly acid to very strongly acid. Permeability is moderate, and the available water capacity is moderate.

Bodine soils make up about 30 percent of each mapped area. Typically, the surface layer is yellowish brown cherty silt loam about 7 inches thick. The upper part of the subsoil is light yellowish brown cherty silty clay loam to a depth of 15 inches. The lower part is yellowish brown cherty silty clay loam that has brownish yellow and light yellowish brown mottles and that extends to a depth of 70 inches.

These Bodine soils are low in natural fertility and organic matter content. They are strongly acid to very strongly acid. Permeability is moderately rapid, and the available water capacity is low.

Included with these soils in mapping are small areas of Allen, Lobelville, and Stemley soils.

These soils have poor potential for farming and most urban uses. They have fair potential for hay and pasture, but the steep slopes make seedbed preparation and pasture maintenance operations difficult. The steep slopes are severe limitations that are difficult to overcome for urban uses.

Potential is good for loblolly pine, shortleaf pine, yellow-poplar, and upland oaks. Seedling mortality is a moderate management concern. The use of equipment is somewhat restricted by steep slopes.

This complex has fair potential for woodland wildlife habitat. Capability subclass VIIe; Minvale soil in woodland group 3o, Bodine soil in woodland group 3f.

46—Minvale-Urban land complex, 2 to 15 percent slopes. This map unit consists of areas of gently sloping to moderately steep, well drained Minvale soils; soils similar to Minvale soils; and areas of Urban land. Individual areas of this unit range to as much as several hundred acres; they are about 40 to 60 percent Minvale soils and 20 to 40 percent Urban land. Areas of Minvale soils and Urban land are so intricately mixed that they could not be separated at the scale selected for mapping.

Typically, Minvale soils have a surface layer of dark grayish brown cherty loam about 5 inches thick. The subsurface layer is light yellowish brown cherty silt loam about 5 inches thick. The subsoil is reddish yellow cherty loam to a depth of 18 inches and yellowish red cherty silty clay loam to a depth of 70 inches. Soils similar to Minvale soils have a more clayey subsoil and have coarse fragment content of less than 15 percent in the solum.

Included in mapping are small areas of Bodine soils. These somewhat excessively drained soils are generally the steepest soils on the landscape.

The soils in the map unit are well drained, and there are no significant drainage limitations.

Permeability is moderate through the Minvale soils, and organic matter content is low. Fertility is low in the surface layer. The shrink-swell potential is low in the subsoil.

Minvale soils, or the open parts of the mapping unit, are used for parks, lawns, and gardens. They have good potential for these uses, and they have fair potential for most engineering uses.

Most locally grown plants are adapted to these soils. Soil erosion is a concern on this unit where the soils are disturbed and left bare for extended periods of time.

The Minvale soils and similar soils have slight to moderate limitations as building sites. Individual sanitary facilities work satisfactorily on these soils where sufficient area is available.

Urban land consists of areas which have been altered to the extent that classification is not practical. It includes areas covered by buildings, garages, sidewalks,

patios, driveways, streets, schools, and churches, and areas that have been significantly disturbed by cutting, filling, or grading. Not assigned to a capability subclass.

47—Minvale-Urban land complex, 15 to 45 percent slopes. This map unit consists of areas of steep, well drained Minvale soils; soils similar to Minvale soils; and areas of Urban land. Individual areas of this unit range to as much as several hundred acres; they are about 40 to 60 percent Minvale soils and 20 to 40 percent Urban land. The areas of Minvale soils and Urban land are so intricately mixed that they could not be separated at the scale selected for mapping.

Typically, Minvale soils have a surface layer of dark grayish brown cherty loam about 5 inches thick. The subsurface layer is light yellowish brown cherty silt loam about 5 inches thick. The subsoil is reddish yellow cherty loam to a depth of 18 inches and yellowish red cherty silty clay loam to a depth of 70 inches. Soils similar to Minvale soils have coarse fragment content of more than 35 percent in the solum.

Included in mapping are small areas of the moderately well drained Stemley soils in narrow drainageways.

Permeability is moderate through the Minvale soils, and organic matter content is low. Fertility is low in the surface layer. The shrink-swell potential is low in the subsoil.

Areas of Minvale soils that are not covered by structures are in woodland. Because of steep slopes these soils are better suited to this use than to others. They have poor potential for most engineering uses.

Most locally grown plants are adapted to these soils. Soil erosion is a concern where the soils are disturbed and left bare for extended periods of time.

The Minvale soils and similar soils have moderate to severe limitations as building sites. Individual sanitary facilities work satisfactorily on some of the more gently sloping areas of Minvale soils.

Urban land consists of areas which have been altered to the extent that classification is not practical. These include areas covered by buildings, garages, sidewalks, patios, driveways, streets, schools, and churches, and areas that have been significantly disturbed by cutting, filling, or grading. Not assigned to a capability subclass.

48—Minvale-Bodine association, steep. This unit consists of well drained and somewhat excessively drained soils that generally are in a regular and repeating pattern. Slopes range from 15 to 35 percent. This unit is made up of two separate long and narrow areas in the extreme southern and southeastern parts of the county. The combined size of the two areas is more than 9,000 acres. The landscape is wooded, sharply dissected ridges and valleys with strongly sloping to very steep side slopes. Generally, the Minvale soils are on ridges, and the Bodine soils are on side slopes. These soils developed in material weathered from cherty limestone. Individual areas of each soil range from about 10 to more than 100 acres.

Minvale soils make up about 63 percent of the unit. Typically, the surface layer is brown cherty loam about 5 inches thick. The upper part of the subsoil is yellowish brown loam to a depth of about 19 inches. The lower part is yellowish brown cherty loam to a depth of 28 inches over strong brown cherty silty clay loam that has common distinct light yellowish brown mottles and that extends to a depth of more than 55 inches.

Minvale soils are moderately permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Bodine soils make up about 25 percent of the unit. Typically, the surface layer is dark brown cherty silt loam about 5 inches thick. The subsoil is yellowish brown cherty loam to a depth of 16 inches; reddish yellow cherty silty clay loam to a depth of 24 inches; and mottled strong brown, reddish yellow, and yellowish brown cherty silty clay loam to a depth of 70 inches.

Bodine soils are moderately rapidly permeable. The available water capacity is low. The soils are strongly acid to extremely acid.

Included with these soils in mapping are Allen, Conasauga, Ennis, Firestone, Lobelville, and Stemley soils. Conasauga and Firestone soils are the most extensive and are in the lower part of the area just across the river from Whorton's Bend and northward.

Most of the acreage is woodland. The soil has good potential for loblolly pine, shortleaf pine, yellow-poplar, and upland oaks. The use of equipment is somewhat restricted because of steep slopes. Seedling mortality is a moderate management concern.

Potential is poor for most urban uses because of the steep slopes. This is a severe limitation for septic tank absorption fields and dwellings. This limitation can be partially overcome by proper design.

These soils have fair potential for woodland wildlife habitat. Capability subclass VIIe; Minvale soil in woodland group 3o, Bodine soil in woodland group 3f.

49—Minvale-Townley association, steep. This unit consists of well drained soils that generally are in a regular and repeating pattern. Slopes range from 15 to 40 percent. The unit is made up of one area of about 3,000 acres. This area is about 12 miles long and averages almost one-half mile wide. The landscape is a long, narrow, steep, wooded mountain. Typically, the steep Townley soils are on the southern side slopes and the Minvale soils are on the mountaintop and the northern side slopes. Sandstone cobbles are at the highest elevations of the unit and are on the surface of the Townley soils in many places. Colluvial sandstone soils generally are along the southern foot slopes, but their distribution is not uniform. Individual areas of each soil range from about 10 to more than 100 acres.

Minvale soils and similar soils make up about 61 percent of the unit. Typically, the surface layer is brown cherty loam about 6 inches thick. The upper part of the subsoil is brownish yellow cherty loam to a depth of 13 inches. The lower part is strong brown cherty silty clay loam to a depth of 18 inches over yellowish red cherty silty clay loam that has common distinct yellowish brown mottles and that extends to a depth of more than 55 inches.

The Minvale soils are moderately permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Townley soils and similar soils make up about 17 percent of the unit. Typically, the surface layer is brown silt loam about 3 inches thick. The upper part of the subsoil is yellowish brown shaly silty clay loam to a depth of 10 inches. The lower part is yellowish red shaly clay that has common distinct strong brown and yellowish brown mottles and that extends to a depth of 25 inches. Below this to a depth of more than 30 inches is weathered, fractured shale.

The Townley soils are slowly permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Included with these soils in mapping are Allen, Bodine, Hartsells, Linker, and Wynnville soils. Allen soils, the most extensive, are along the foot slopes. Also included are steep soils on side slopes; these soils are less than 20 inches to shale bedrock and have a loamy subsoil.

Most of the acreage of this unit is woodland. The soils have fair potential for loblolly pine, Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. The use of equipment is somewhat restricted because of slopes.

Potential is poor for most urban uses because of the steep slopes. This is a severe limitation for septic tank absorption fields and dwellings. This limitation can be partially overcome by proper design.

These soils have fair potential for woodland wildlife habitat. Capability subclass VIIe; Minvale soil in woodland group 3o, Townley soil in woodland group 4r.

50—Nella gravelly sandy loam, 10 to 25 percent slopes. This deep, well drained, moderately steep soil is on hillsides, foot slopes, or terraces in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 10 to 80 acres.

Typically, the surface layer is brown gravelly sandy loam about 4 inches thick. The subsoil is yellowish red gravelly sandy clay loam to a depth of 15 inches, yellowish red gravelly clay loam to a depth of 27 inches, and red gravelly clay loam to a depth of 65 inches.

Included with this soil in mapping are small areas of Allen, Holston, Leesburg, Townley, and Waynesboro soils. Also included are small areas of soils that have a cobbly surface layer. The included soils make up about 10 to 25 percent of this map unit, but individual areas generally are less than 5 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth and can be worked over a wide range of moisture content. The root zone is deep and can be easily penetrated by plant roots.

This soil has poor potential for row crops and fair potential for pasture. The potential is limited because of the slope and the large amount of sandstone fragments on the surface. The gravel content of this soil interferes with tillage operations and also causes the soil to be droughty. Pasture maintenance is difficult on the more sloping areas.

Potential is fair to good for Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use and management.

This soil has severe limitations for most urban uses because of the steep slopes. Capability subclass VIe; woodland group 3x.

51—Nella cobbly loam, 2 to 10 percent slope. This deep, well drained, gently sloping to sloping soil is on hillsides, foot slopes, and terraces in the Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 5 to 50 acres.

Typically, the surface layer is dark brown cobbly loam about 5 inches thick. The subsoil is yellowish red and reddish brown gravelly loam to a depth of 9 inches and yellowish red gravelly loam to a depth of 65 inches.

Included with this soil in mapping are small areas of Allen, Holston, Leesburg, Townley, and Waynesboro soils. Also included are areas of soils that have a gravelly surface layer. The included soils make up about 10 to 25 percent of this map unit, but individual areas generally are less than 5 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth and can be worked over a wide range of moisture content. The root zone is deep and can be easily penetrated by plant roots.

This soil has poor potential for row crops and fair potential for pasture. The potential is limited because of the large amount of sandstone fragments on the surface. Tilth can be improved by returning crop reside to the soil. The erosion hazard is moderate to severe if cultivated crops are grown. Contour farming, grassed waterways, terraces, minimum tillage, and stripcropping are effective erosion control practices. Cropping systems are needed that include the use of perennial sod crops about 3 years in 4.

Potential is good for Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use and management.

This soil has fair potential for most urban uses. Slope, low soil strength, and small stones are moderate limitations for many uses. Capability subclass IVe; woodland group 3x.

52—Nella association, steep. This unit consists mainly of deep, well drained soils in a regular and repeating pattern. Slopes range from 20 to 45 percent. The unit is made up of two separate areas, one of about 4,000 acres and the other of about 150 acres. Both have a northeasterly-southwesterly orientation. The landscape is a long, steeply sloping, wooded mountain. Typically, the southern side, or the side next to the Coosa River, is the steepest. A belt of cherty limestone soils is on the lower side slopes of the northern side. The Nella soils and similar soils are on the side slopes. These soils formed in material weathered from sandstone.

Nella soils and similar soils make up about 73 percent of the unit. Typically, the surface layer is yellowish brown cobbly loam about 4 inches thick. The subsoil is strong

brown loam to a depth of 16 inches; yellowish red cobbly silty clay loam to a depth of 26 inches; and mottled red, brown, and yellow silty clay loam to a depth of more than 55 inches.

Nella soils are moderately permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Included with these soils in mapping are small areas of Allen, Bodine, Hartsells, and Townley soils. Also included are small areas of rock outcrops. The most extensive are the Hartsells and Bodine soils and the rock outcrops. They are on the ridgetops and the upper third of the side slopes.

Most of the acreage is woodland. The soils have fair potential for Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. The use of equipment is moderately restricted because of the steep slopes.

Potential is poor for most urban uses because of the steep slopes.

These soils have fair potential as habitat for woodland wildlife. Capability subclass VIIe; woodland group 3x.

53—Nella-Allen association, steep. This unit consists of deep, well drained soils in a regular and repeating pattern. Slopes range from 15 to 35 percent. The unit is made up of a single area of larger than 6,500 acres that runs in a northeasterly-southwesterly direction. The landscape is a long, wide, steep, wooded mountain. Typically, the northern side slope is the steepest. A narrow belt of soils formed from interbedded limestone and shale is on the toe of the north side. The Nella and Allen soils are on the upper parts of the side slopes and on the ridge caps. These soils formed in material weathered from sandstone. A narrow band of cherty soils is on the southern toe slopes. Individual areas of each soil range from about 10 to 50 acres.

Nella soils and similar soils make up about 40 percent of the unit. Typically, the surface layer is brown gravelly sandy loam about 3 inches thick. The subsoil is yellowish red gravelly clay loam to a depth of 17 inches over yellowish red gravelly clay loam that has common distinct red, yellow, and brown mottles and that extends to a depth of more than 60 inches.

Nella soils are moderately permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Allen soils make up about 14 percent of the unit. Typically, the surface layer is brown gravelly fine sandy loam about 3 inches thick. The subsurface layer is yellowish brown loam to a depth of 9 inches. The upper part of the subsoil is brown loam to a depth of 16 inches and yellowish red clay loam to a depth of 28 inches. The lower part is yellowish red clay loam that has brown mottles and that extends to a depth of more than 60 inches.

Allen soils are moderately permeable. The available water capacity is moderate to high. The soils are strongly acid to very strongly acid.

Included with these soils in mapping are Bodine, Hartsells, Leesburg, and Townley soils. The moderately deep Hartsells soils are the most extensive and are on the ridgetops and the upper third of the side slopes. Also included are areas of soils that are similar to Hartsells soils except that they are shallower to bedrock. Bodine soils are mainly along the southern toe slopes.

Most of the acreage is woodland. These soils have fair potential for Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. The use of equipment is moderately restricted because of slopes.

Potential is poor for most urban uses because of the steep slopes.

These soils have fair potential as habitat for woodland wildlife. Capability subclass VIIe; Nella soil in woodland group 3x; Allen soil in woodland group 3r.

54—Nella-Rock outcrop association, steep. This unit consists of well drained soils and rock outcrops that generally occur in a regular and repeating pattern. Slopes range from 20 to 45 percent. The unit was mapped in two separate areas with a combined size of more than 11,000 acres. The larger area is a long, narrow, steep, wooded mountain. The smaller area, which separates Sand Mountain from the limestone and chert valleys within it, consists of wooded, very steep side slopes and ranges from 0.1 to 0.4 mile wide.

Typically, Nella soils and similar soils are on the upper side slopes and on wider ridgetops. Sandstone outcrops are on the upper side slopes and on narrow ridgetops, and limestone outcrops are on the lower parts of side slopes. A narrow band of soils formed from limestone and shale is on the lower side slopes. Individual areas of each soil range from about 10 to 100 acres.

Nella soils and similar soils make up about 40 percent of the unit. Typically, the surface layer is brown gravelly sandy loam about 3 inches thick. The upper part of the subsoil is reddish brown gravelly loam to a depth of 12 inches and red gravelly sandy clay loam to a depth of 17 inches. The lower part to a depth of 31 inches is red gravelly clay loam with common distinct yellowish red and strong brown mottles and to a depth of 65 inches is gravelly clay loam mottled with shades of red, brown, and yellow.

Nella soils are moderately permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Rock outcrop makes up about 20 percent of the unit. It consists of exposed sandstone and limestone bluffs and angular broken pieces of sandstone and limestone as much as several feet in diameter.

Included in mapping are small areas of Allen, Leesburg, and Townley soils. The moderately deep Townley soils, the most extensive, are mainly on toe slopes and on the steeper side slopes.

Most of the acreage is used as woodland. The soils have fair to poor potential for Virginia pine, shortleaf pine, yellow-poplar, and upland oaks. Logging operations are restricted because of steep slopes and the rock outcrops.

Potential is poor for most urban uses because of the steep slopes and the rock outcrops.

The unit has fair potential for habitat for woodland wildlife. Capability subclass VIIe; woodland group 3x.

55—Nella-Townley association, steep. This unit consists of deep and moderately deep, well drained soils that are generally in a regular and repeating pattern. Slopes range from 20 to 45 percent. The unit is a single area that runs in a northeasterly-southwesterly direction. The area is larger than 9,000 acres. The landscape is a long, wide, wooded mountain range made up of a continuous series of knobs and saddles. Typically, the northern side is the steepest. A narrow belt of interbedded limestone and shale is at intervals along the base of the northern side. The Nella soils are on the upper side slopes and on the ridge caps. They formed in material weathered from sandstone. Townley soils are on the lower northern side slopes. They formed in material weathered from shale. A narrow band of cherty soils is on the southern toe slope. Individual areas of each soil range from about 10 to 50 acres.

Nella soils and similar soils make up about 40 percent of the unit. Typically, the surface layer is brown gravelly sandy loam about 4 inches thick. The subsoil is brown gravelly loam to a depth of 13 inches; yellowish red gravelly clay loam to a depth of 26 inches; and yellowish red gravelly clay to a depth of 65 inches.

Nella soils are moderately permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Townley soils and similar soils make up about 15 percent of the unit. Typically, the surface layer is brownish yellow silt loam about 5 inches thick. The subsoil is light yellowish brown loam to a depth of 10 inches; strong brown silty clay loam to a depth of 22 inches; yellowish red clay to a depth of 30 inches; and mottled red, yellow, and brown clay to a depth of 36 inches. The underlying material is weathered, fractured shale.

Townley soils are slowly permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Included with these soils in mapping are small areas of Allen, Bodine, and Leesburg soils. Bodine soils, the most extensive, are on the lower third of the southern side slope. Also included along the base of the northwestern side of the area are small areas of limestone rock outcrop and areas of very clayey soils associated with this limestone.

Most of the acreage is used as woodland. The soils have fair potential for Virginia pine, shortleaf pine, loblolly pine, yellow-poplar, and upland oaks. The use of equipment is moderately restricted because of slopes.

Potential is poor for most urban uses because of the steep slopes.

These soils have fair potential for habitat for woodland wildlife. Capability subclass VIIe; Nella soil in woodland group 3x, Townley soil in woodland group 4r.

56—Palmerdale soils, 2 to 60 percent slopes. These deep, somewhat excessively drained, gently sloping to steep soils formed in mine spoil material in the Sand Mountain area. Slopes are steep in most areas, but some areas have been smoothed. The only area of Palmerdale soils mapped in the county is more than 800 acres.

Typically, the surface layer is brown, dark gray, and strong brown, very shaly loam about 9 inches thick. The underlying layers are brown, yellowish brown, and light olive brown, very shaly loam and silt loam to a depth of 34 inches over brown, dark yellowish brown, and strong brown, very shaly loam to a depth of 80 inches.

Included with these soils in mapping are small areas of Hartsells, Linker, and Townley soils. Also included are small areas of soils that are similar to Hartsells soils except that they are shallower to bedrock. The included soils make up about 5 to 15 percent of this map unit, but separate areas generally are less than 3 acres.

These moderately rapidly permeable soils are low in natural fertility and organic matter content. The available water capacity is low. The soils have poor tilth but can be worked through a wide range in moisture content.

This soil, when graded smooth, has fair potential for adapted plants. The high content of coarse fragments tends to make the soil droughty and interferes with cultivation. Erosion is a hazard when this soil is cultivated. Onsite investigation is needed to determine if areas are smoothed or unsmoothed.

This soil, where smoothed, has fair potential for loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, and upland oaks. In some areas the use of equipment is severely restricted by steep slopes. Erosion is a severe management concern.

This soil has poor potential for most urban uses because of steep slopes, small stones, and a possible hazard of subsidence. Capability subclass VIIs; woodland group 3x.

57—Pits. This unit consists of open excavations from which soil and the underlying material have been removed for use at another location. These areas range from about 5 to several hundred feet deep, and some now hold water. The floor and walls of most pits are made up of exposed geologic strata. They are mostly bare, and erosion is a severe hazard. The low available water capacity and low natural fertility make revegetation difficult. The area around most of the pits is covered with excess soil and geologic material, impurities, and refuse from the pits. It includes low-grade or impure ore and rocks as large as several feet in diameter. Many of these areas are partially covered with young pines.

These areas include gravel pits, chert pits, and limestone quarries. Not assigned to a capability subclass or a woodland group.

58—Stemley cherty loam, 1 to 5 percent slopes. This deep, moderately well drained, nearly level to gently sloping soil is in drainageways and on toe slopes in the Appalachian Ridges and Valleys. Slopes are smooth and concave. Individual areas are commonly 5 to 20 acres.

Typically, the surface layer is dark grayish brown cherty loam about 4 inches thick. The upper part of the subsoil, to a depth of 16 inches, is yellowish brown cherty

loam with faint yellowish brown mottles. The lower part is firm and brittle, mottled gray, yellow, brown, and red cherty clay loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Bodine, Cloudland, Dewey, Ennis, Lobelville, and Minvale soils. Also included are soils in which the content of cherty fragments is more than 35 percent in the surface layer and soils that do not have the firm and brittle subsoil. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is low to moderate. The soil is difficult to work and can be tilled over only a limited range of moisture content without clodding or crusting. The rooting depth is restricted by the firm and brittle layers.

This soil has fair potential for row crops and small grains. It has good potential for pastures. Potential is limited because of flooding and wetness. The soil is flooded occasionally for brief periods, usually during winter, and crops are sometimes damaged. Erosion is not a hazard except where flooding causes scouring. Field ditches and diversions can be used in many places to remove excess water. Crop residue returned to the soil helps maintain organic matter content. Cultivated crops can be grown each year where good conservation practices are followed.

This soil has good potential for yellow-poplar, white oak, black walnut, loblolly pine, and shortleaf pine. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of flooding and wetness. Capability subclass IIe; woodland group 3o.

59—Toccoa sandy loam. This deep, well drained, nearly level to gently undulating soil is on first bottoms in the Appalachian Ridges and Valleys. Slopes are plane to slightly concave and range from 0 to 2 percent. Individual areas are 5 to 25 acres.

Typically, the surface layer is dark grayisn brown sandy loam about 5 inches thick. The underlying material to a depth of 16 inches is very dark grayish brown sandy loam and to a depth of 28 inches is dark brown sandy loam with faint dark yellowish brown mottles. Below this to a depth of 60 inches is brown sandy loam mottled with shades of brown and gray.

Included with this soil in mapping are small areas of Choccolocco, Ellisville, and Wickham soils. Also included are soils that have a lighter colored surface layer and subsoil. The included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately rapidly permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil is easy to work and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is deep and easily penetrated by plant roots.

This soil has fair potential for row crops and small grains. Potential is limited because of the danger of frequent, brief flooding. Crop residues returned to the soil help maintain organic matter content and good tilth. Grassed waterways and minimum tillage are effective in reducing erosion on cultivated fields. Cultivated crops can be grown each year if good conservation practices are followed.

Potential is good for loblolly pine, yellow-poplar, sweetgum, and red oaks. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of the flood hazard. Capability subclass IIIw; woodland group 1o.

60—Townley silt loam, 3 to 12 percent slopes. This moderately deep, well drained, gently sloping to strongly sloping soil is on broad ridges and side slopes in the Sand Mountain part of the county. Slopes are smooth and convex. Individual areas are 5 to 20 acres.

Typically, the surface layer is brown silt loam about 5 inches thick. The upper part of the subsoil is strong brown silty clay loam to a depth of 9 inches over yellowish red silty clay loam to a depth of 15 inches. The lower part to a depth of 30 inches is yellowish red silty clay loam with distinct red mottles and to a depth of 36 inches is mottled yellow, gray, and red silty clay. The underlying material is weathered, fractured shale to a depth of 45 inches.

Included with this soil in mapping are small areas of Hartsells, Linker, Leesburg, and Nella soils. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 4 or 5 acres.

This slowly permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil is easy to work and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is moderately deep and easily penetrated by plant roots.

The soil has fair potential for row crops and small grains. The potential is limited because of the slope and the small size of the areas. The soil has high potential for hay and pasture. Good tilth can be maintained by returning crop residue to the soil. The erosion hazard is high if cultivated crops are grown. Contour farming, grassed waterways, terraces, and minimum tillage are effective erosion control practices. Cropping systems are needed that include the use of perennial sod crops about 2 years in 3.

Potential is fair for loblolly pine, shortleaf pine, and Virginia pine. There are no significant limitations for woodland use or management.

This soil has fair to poor potential for most urban uses. Low strength, depth to rock, and slow permeability are severe limitations for many urban uses. Capability subclass IVe; woodland group 4o.

61—Townley association, steep. This unit consists of well drained soils that generally are in a regular and repeating pattern. Slopes range from 15 to 40 percent. The

unit is a single area of more than 900 acres. The landscape is a narrow, steep, wooded mountain range. Typically, the Townley soils are throughout the unit. These soils formed in material weathered from shale.

Townley soils and similar soils make up about 60 percent of the unit. Typically, the surface layer is brown silt loam about 5 inches thick. The subsoil is yellowish brown shaly loam to a depth of 14 inches; reddish yellow, shaly silty clay loam to a depth of 22 inches; yellowish red shaly clay loam to a depth of 26 inches; and mottled red, yellow, and brown shaly clay loam to a depth of 33 inches. The underlying material is weathered shale.

Townley soils have slow permeability. The available water capacity is moderate. These soils are strongly acid to very strongly acid.

Included with these soils in mapping are small areas of Hartsells, Leesburg, Linker, and Nella soils. Hartsells soils are the most extensive and are mainly on upper side slopes.

Most of the acreage is used as woodland. The soils have fair potential for loblolly pine, shortleaf pine, and Virginia pine. The use of equipment is moderately restricted because of steep slopes. The erosion hazard is a moderate management concern.

Potential is poor for most urban uses because of steep slopes, depth to rock, and slow permeability of the subsoil. These limitations are difficult to overcome.

These soils have good potential for habitat for woodland wildlife. Capability subclass VIe; woodland group 4r.

62—Townley-Leesburg association, steep. This unit consists of well drained soils that generally are in a regular and repeating pattern. Slopes range from 15 to 35 percent. The unit is a single area of more than 2,000 acres. It is about 15 miles long and averages about one-fourth mile wide. The landscape is a long, narrow, steep, wooded, shinbone type mountain range. Typically, the Townley soils are on the southeastern slope and the Leesburg soils are on the ridge caps and the northern slopes. Individual areas of each soil range from 5 to 100 acres.

Townley soils and similar soils make up about 50 percent of the unit. Typically, the surface layer is dark yellowish brown silt loam about 4 inches thick. The upper part of the subsoil is yellowish red gravelly loam to a depth of 15 inches. The middle part, to a depth of 22 inches, is yellowish red shaly silty clay loam with common distinct strong brown mottles. The lower part, to a depth of 33 inches, is yellowish red shaly clay with common distinct strong brown and brownish yellow mottles. Below this is weathered shale.

Townley soils are slowly permeable. The available water capacity is moderate. The soils are strongly acid to very strongly acid.

Leesburg soils and similar soils make up about 31 percent of the unit. Typically, the surface layer is brown gravelly sandy loam about 4 inches thick. The subsoil is yellowish brown gravelly loam to a depth of 16 inches; yellowish brown gravelly sandy clay loam to a depth of 25 inches; and mottled yellowish brown, very pale brown, and strong brown gravelly clay loam to a depth of more than 60 inches.

Included with these soils in mapping are small areas of Conasauga, Firestone, Hartsells, and Linker soils. Firestone soils, the most extensive of this group, are along foot slopes. Small areas of rock outcrops are on some of the steeper side slopes.

Most of the acreage is used as woodland. The soils have fair potential for loblolly pine, shortleaf pine, and Virginia pine. The use of equipment is moderately restricted because of steep slopes.

Potential is poor for most urban uses because of the steep slopes and the shallow depth to rock of the Townley soils.

These soils have good potential for habitat for woodland wildlife. Capability subclass VIe; Townley soil in woodland group 4r, Leesburg soil in woodland group 3r.

63—Urban Land. This map unit is made up of extensively built-up areas; 75 to 100 percent of each mapped area is either covered by structures or has been disturbed by cutting and filling.

Most of these areas are gently sloping but a few have slopes of as much as 15 percent. Storm drain systems usually control runoff on the paved areas, but erosion on many of the exposed cuts or fill areas is severe.

Included in mapping are small areas of moderately built-up areas where structures cover only 50 to 75 percent of the surface. Also included are remnants of undisturbed soils and areas where the natural soil is covered by fill material. Included areas make up as much as 25 percent of the unit.

The soils making up the unit have been so altered or obscured that they cannot be classified. Not assigned to a capability subclass or a woodland group.

64—Waynesboro silt loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on high terraces in the Southern Appalachian Ridges and Valleys. Individual areas are 5 to 30 acres.

Typically, the surface layer is dark yellowish brown silt loam about 9 inches thick. The upper part of the subsoil is yellowish red silty clay loam and clay loam that contains common distinct strong brown mottles and that extends to a depth of 23 inches. The lower part is mottled yellowish red, red, and brownish yellow clay and extends to a depth of 70 inches.

Included with this soil in mapping are small areas of Allen, Cedarbluff, Dewey, Holston, Holston Variant, Leesburg, and Nella soils. Also included are small areas of soils that have a gravelly surface layer. These included soils make up about 5 to 20 percent of this map unit, but individual areas generally are less than 4 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. This soil has good tilth and can be worked throughout a wide range of moisture content. The root zone is deep and easily penetrated by plant roots.

This soil has fair to good potential for crops and small grains. Potential is limited because of the small size of most areas and the slope of adjacent soils. Crop residue returned to the soil helps maintain organic matter content and good tilth. Erosion is a moderate hazard if cultivated crops are grown. Contour farming, terraces, grassed waterways, and minimum tillage are effective in reducing erosion on cultivated fields.

This soil has good potential for loblolly pines, shortleaf pine, Virginia pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has good to fair potential for most urban uses. Low strength, shrink-swell potential, and slope are moderate limitations for some urban uses, but these limitations can be overcome by good design. Capability subclass IIe; woodland group 3o.

65—Waynesboro silt loam, 6 to 15 percent slopes. This deep, well drained, sloping to moderately steep soil is on high terraces in the Southern Appalachian Ridges and Valleys. Slopes are complex and convex. Individual areas are 5 to 30 acres.

Typically, the surface layer is brown silt loam about 4 inches thick. The subsoil is strong brown to yellowish red silty clay loam to a depth of 19 inches and mottled red, yellow, and brown clay to a depth of 60 inches.

Included with this soil in mapping are small areas of Allen, Cedarbluff, Dewey, Holston, Holston Variant, Leesburg, and Nella soils. Also included are areas of soils that have a gravelly surface layer. The included soils make up about 5 to 20 percent of this map unit, but individual areas are generally less than 5 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil has good tilth, and the moisture range over which it can be worked is fairly wide except in small eroded areas. The root zone is deep and can be easily penetrated by plant roots.

This soil has fair to poor potential for row crops and medium potential for pasture. The potential is limited because of the slope. Tilth can be improved by returning crop residue to the soil. The erosion hazard is high where cultivated crops are grown. Good fertilization and other good management practices are needed on pastures to insure long-lived stands. Conservation cropping systems are needed that include the use of perennial sod crops at least 3 years in 4.

Potential is good for loblolly pine, shortleaf pine, Virginia pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use and management.

This soil has fair potential for most urban uses. Slope, low strength, and shrink-swell potential are moderate limitations but can be overcome by good design. Capability subclass IVe; woodland group 3o.

66—Wickham fine sandy loam, 2 to 6 percent slopes. This deep, well drained, gently sloping soil is on low stream terraces in the Appalachian Ridges and Valleys. Slopes are smooth and convex. Individual areas are 3 to 20 acres.

Typically, the surface layer is brown fine sandy loam about 8 inches thick. The upper part of the subsoil, to a depth of 29 inches, is yellowish red sandy clay loam. The lower part, to a depth of 41 inches, is yellowish red loam with strong brown and pale brown mottles. The underlying material is mottled brown, red, and yellow sandy loam to a depth of 60 inches.

Included with this soil in mapping are small areas of Cedarbluff, Choccolocco, Ellisville, McQueen, and Toccoa soils. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 5 acres.

This moderately permeable soil is low in natural fertility and organic matter content. The available water capacity is moderate. The soil is easy to work and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is deep and easily penetrated by plant roots. This soil is subject to rare flooding.

This soil has good potential for row crops and small grains. Potential is limited because of the size of the areas and the wetness of adjacent soils. Floods occur mainly during winter. Crop residues returned to the soil help maintain organic matter content and good tilth. Erosion is a moderate hazard if cultivated crops are grown. Terraces, grassed waterways, and minimum tillage are effective in reducing erosion on cultivated fields. Cultivated crops can be grown each year if good conservation practices are followed.

Potential is good for loblolly pine, yellow-poplar, and upland oaks. There are no significant limitations for woodland use or management.

This soil has poor potential for most urban uses because of flooding. Protected areas have good to fair potential. Capability subclass IIe; woodland group 2o.

67—Wynnville fine sandy loam, 2 to 6 percent slopes. This deep, moderately well drained, gently sloping soil is on broad ridges in the Sand Mountain area of the county. Slopes are smooth and convex. Individual areas are 3 to 40 acres.

Typically, the surface layer is yellowish brown fine sandy loam about 8 inches thick. The upper subsoil is yellowish brown sandy clay loam that has a few faint pale brown mottles and that extends to a depth of 21 inches. The next layer is yellowish brown sandy clay loam that contains pockets of white material and that extends to a depth of 40 inches. The next layer is compact and brittle sandy loam that is mottled with shades of brown, yellow, and gray and that extends to a depth of 49 inches. The lower part of the subsoil is strong brown sandy clay loam that extends to a depth of 64 inches. Below is hard sandstone bedrock.

Included with this soil in mapping are small areas of Hartsells, Linker, and Townley soils. The included soils make up about 5 to 25 percent of this map unit, but individual areas generally are less than 5 acres.

This moderately slowly permeable soil is low in natural fertility and organic matter content. The available water

capacity is moderate to high. The soil is easy to work and can be tilled over a wide range of moisture content without clodding or crusting. The root zone is restricted by the compact and brittle layer.

This soil has fair potential for row crops and small grains and good potential for pasture grasses. Potential is limited by the restricted rooting depth. Crop residues returned to the soil help maintain organic matter content and good tilth. Cultivated crops can be grown each year if good conservation practices are followed.

Potential is good for yellow-poplar, loblolly pine, shortleaf pine, and upland oaks. There are no significant limitations for woodland use or management.

This soil has fair to poor potential for most urban uses because of wetness and the restrictive layer in the subsoil. Capability subclass IIe; woodland group 3o.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic tank disposal systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, rangeland, and woodland; as sites for buildings, highways and other transportation systems, sanitary facilities, and parks and other recreation facilities; and for wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

LEWIS D. WILLIAMS, conservation agronomist, Soil Conservation Service, helped prepare this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; 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 presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the management practices that are needed. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

The Alabama Conservation Needs Inventory (2) shows that more than 96,000 acres in the survey area was used for crops (fig. 7) and pasture in 1967. Of this total 31,400 acres was used for permanent pasture, and 65,345 acres was used for cropland.

The potential of the soils in Etowah county for increased production of food is good. About 40,500 acres of potentially good cropland is currently used as woodland, and about 19,000 acres is used as pasture. In addition to the reserve productive capacity represented by this land, food production could also be increased by extending the latest crop production technology to all cropland in the county. This soil survey can facilitate the application of such technology.

Acreage in crops and pasture has gradually been decreasing as more and more land is used for urban development. It was estimated that in 1975 there were about 100,000 acres of urban and built-up land in the county. The use of this soil survey to help make land use decisions that will influence the future role of farming in the county is discussed in the section "General soil map for broad land use planning."

Soil erosion is the major soil problem on about three-fourths of the cropland and pastureland in Etowah County. If the slope is more than 2 percent, erosion is a hazard. Conasauga, Leadvale, and Stemley soils, for example, have slopes of 1 to 5 percent and are also wet.

Loss of the surface layer through erosion is damaging for two reasons. First, productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as the Conasauga, Dewey, Firestone, Townley, and Waynesboro soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone. Such layers include a fragipan, as in Cloudland, Leadvale, Stemley, and Wynnville soils, or bedrock, as in Hartsells and Linker soils. Erosion also reduces productivity on soils that tend to be droughty, such as Leesburg and Minvale soils. Second, soil erosion on farmland results in sedimentation of streams. Control of erosion minimizes the pollution of streams by sediment and improves quality of water for municipal use, for recreation, and for fish and wildlife.

In many sloping fields, preparing a good seedbed and tilling are difficult on clayey spots because the original friable surface soil has been eroded away. Such spots are common in areas of eroded Dewey soils.

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

Minimum tillage and crop residue management help increase infiltration and reduce runoff and erosion. These practices can be adapted to most soils in the survey area. Also, they can be used in fields with topographic conditions unfavorable for terracing and contouring.

Terraces and diversions reduce the length of slope and reduce runoff and erosion. They are most practical on well drained, sloping soils, such as Allen, Dewey, Hartsells, Holston, Linker, Waynesboro, and Wynnville soils. Other soils are less suitable for terraces and diversions because of irregular slopes, excessive wetness in the terrace channels, or bedrock at a depth of less than 20 inches. Diversions are most practical on toe slopes and benches to intercept runoff from hilly uplands and divert the water away from the lower lying cropland fields.

Contour farming is very effective in reducing erosion on cultivated cropland fields. It is best suited to soils with smooth uniform slopes.

Information for the design of erosion control practices for each kind of soil can be obtained in the local office of the Soil Conservation Service.

Soil drainage is the major management concern on about 45,000 acres in the survey area. In most of these areas, drainage would increase crop and pasture production. These soils include the moderately well drained and somewhat poorly drained Cedarbluff, Chewacla, Conasauga, and Lobelville soils. Open ditches and tile drainage can be used to remove excess water from these soils.

Cloudland and Stemley soils have a water table in early spring. This is caused by the slower permeability of the fragipan in the lower part of the subsoil. Subsurface drainage can be used to remove this water. The land can then be planted earlier, thereby increasing yields.

The design of both surface and subsurface drainage systems varies with the kind of soil. A combination of surface drainage and tile drainage is needed in some areas of the poorly drained and very poorly drained soils used for intensive row cropping. Drains have to be more closely spaced in soils with slow permeability than in the more permeable soils. Finding adequate outlets for drainage systems is difficult in many areas of the wetter soils.

Soil fertility is naturally low in most soils on uplands in the survey area. All but Toccoa soils are naturally acid. The soils on flood plains, such as Choccolocco, Ellisville, McQueen, and Wickham soils, are higher in natural fertility than most soils on uplands. Soils in the survey area require applications of ground limestone to raise pH for optimum utilization of commercial fertilizer by plants. Crops on all soils respond well to application of fertilizer. Available phosphorus and potash levels are low in most of the soils.

On all soils, additions of lime and fertilizer should be based on the results of soil tests, on the need of the crop, and on the expected level of yields. The Cooperative Extenion Service can help in determining the kind and amounts of fertilizer and lime to apply.

Soil tilth is an important factor in the germination of seeds and in the infiltration of water into the soil. Soils with good tilth are granular and porous.

Most of the soils used for crops in the survey area have a surface layer of loam or fine sandy loam that is light in color and low in organic matter. Generally the structure of such soils is weak, and intense rainfall causes the formation of a weak crust on the surface. Regular additions of crop residues, manure, and other organic material can help to improve soil structure.

Fields crops suited to the soils and climate of the survey area include many that are not now commonly grown. Corn, soybeans, cotton, and feed grains are the main row crops. Potatoes, tomatoes, watermelons, peppers, and other truck crops can be grown if economic conditions are favorable. A small acreage of apples and peaches is grown for commercial purposes. These crops are well suited to the sandy soils of the mountain areas.

Wheat and rye are the most common small grain crops. Oats and barley could be grown. Crimson clover, white clover, Yuchi clover, ball clover, and other legumes will grow on most soils in the county. Tall fescue, common bermudagrass, and hybrid bermudagrasses are the main grasses grown for pasture and hay. Sericea lespedeza and the annual lespedezas are well suited to most soils.

Pasture and hay crops are important in the survey area. Several practices are needed on all soils that are used for pasture and hay production. They include: proper grazing or cutting heights, weed control, proper fertilization, rotational grazing, and scattering of animal droppings. Cool-season perennial grasses such as tall

fescue should be rested in the summer so that food reserves will be stored in the plants for fall and early spring growth. Overgrazing and low fertilization are the two major problems associated with pasture production. Both problems result in weak plants and poor stands that are quickly infested with weeds. The best way to prevent weeds from becoming established is to maintain a good, dense ground cover with the desired pasture species.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the crop is not suited to or not commonly grown on the soil.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Hay and pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 6.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; 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 residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

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

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

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system as used in this soil survey, all kinds of soil are grouped at two levels: capability class and subclass. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

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 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 landforms have limitations that nearly preclude their use for commercial crop production.

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

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

The capability subclass is identified in the description of each soil mapping unit in the section "Soil maps for detailed planning."

Woodland management and productivity

JERRY L. JOHNSON, forester, Soil Conservation Service, helped prepare this section.

About 176,900 acres, or 50 percent of the total land area of Etowah County, is commercial forest land. The forest acreage in the county has decreased 12 percent from 1963 to 1972. Private landowners own 96 percent of the commercial forest land; wood using industries, 3 percent; and the public, 1 percent.

The oak-hickory forest type occupies 73,200 acres; the loblolly-shortleaf pine type, 61,000 acres; the oak-pine type, 36,600 acres; and the oak-gum-cypress type, 6,100 acres (*7*). Many acres of upland hardwoods could be converted to pines, for pines generally grow better on upland sites. Hardwoods usually grow well on lowland sites, on slopes having northerly aspects, and in coves.

Good stands of merchantable timber grow in the county. Most of the soils in Etowah County have high to moderate potential productivity (*9*), but the value of the local forest production is well below its potential. There are about 36,600 acres of sawtimber, 54,900 acres of poletimber, and 85,400 acres of saplings and seedlings (*7*).

Seven primary wood using industrial plants in Etowah County provide employment for more than 100 people (*3*).

Table 7 contains information useful to woodland owners or forest managers planning use of soils for wood crops. Mapping unit symbols for soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

In table 7 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

Ratings of the *erosion hazard* indicate the risk of loss of soil in well managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if some measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Engineering

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this information are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential (fig. 8), available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational uses; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 8 shows, for each kind of soil, the degree and kind of limitations for building site development; table 9, for sanitary facilities; and table 11, for water management. Table 10 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

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

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, and local roads and streets are indicated in table 8. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates that one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, communications and power transmission lines, basements, open ditches, and cemeteries. Such digging or trenching is influenced by soil wetness caused by a seasonal high water table; the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is given, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 8 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence of the structure from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope,

and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 8 have an all-weather surface that can carry light to medium traffic all year. They consist of a subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 9 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required. Soil suitability is rated by the terms *good, fair*, or *poor*, which, respectively, mean about the same as the terms *slight, moderate*, and *severe*.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope can cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold 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. Soils that are very high in content of organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. In soils where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soil material affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil material. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation, because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 9 apply only to the soil material within a depth of about 6 feet. If

the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry periods. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

Where it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 10 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction materials. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 14 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low potential frost action, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 10 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 14.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can limit or prevent plant growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils and very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil

survey. In table 11 the soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of a soil for use in embankments, dikes, and levees.

Aquifer-fed excavated ponds are bodies of water made by excavating a pit or dugout into a ground-water aquifer. Excluded are ponds that are fed by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Ratings in table 11 are for ponds that are properly designed, located, and constructed. Soil properties and site features that affect aquifer-fed ponds are depth to a permanent water table, permeability of the aquifer, quality of the water, and ease of excavation.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Recreation

The soils of the survey area are rated in table 12 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the 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 12 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 9, and interpretations for dwellings without basements and for local roads and streets, given in table 8.

Camp areas require such site preparation as shaping and leveling for 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 for this use have mild 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 camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as 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 will 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 or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

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

Wildlife habitat

ROBERT E. WATERS, biologist, Soil Conservation Service, helped prepare this section.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either are scarce or do not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 13, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and 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* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of wildlife are very severe, and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

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

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties 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, sorghum, wheat, oats, barley, millet, cowpeas, soybeans, and sunflowers.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Major soil properties 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, bahiagrass, lovegrass, switchgrass, dallisgrass, timothy, orchardgrass, clover, alfalfa, and crownvetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Major soil properties 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 dewberry, blackberry, crotons, crabgrass, pokeweed, partridgepea, and paspalums.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of native plants are oak, poplar, cherry, sweetgum, hawthorn, dogwood, persimmon, sassafras, sumac, hickory, hazelnut, black walnut, grape, viburnum, and briers. Examples of fruit-producing shrubs that are commercially available and suitable for planting on soils rated good are autumn-olive and crabapple.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, cypress, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, rushes, sedges, reeds, and cattails.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control structures in marshes or streams. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed. Examples of shallow water areas are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The kinds of wildlife habitat are briefly 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 her-

baceous plants. The kinds of animals in these areas include bobwhite quail, mourning dove, cottontail rabbit, red fox, meadowlark, mockingbird, killdeer, field sparrow, and blackbirds.

Habitat for woodland wildlife consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. The kinds of animals in these areas include wild turkey, deer, squirrels, woodcock, gray fox, raccoon, warblers, thrushes, vireos, and woodpeckers.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. The kinds of animals in these areas include ducks, geese, herons, shore birds, rails, kingfishers, muskrat, mink, beaver, otter, and turtles.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 14 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 14 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 14 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 soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (Unified) (*5*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*4*).

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, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging 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. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The AASHTO classification for soils tested in the survey area, with group index numbers in parentheses, is given in table 18. The estimated classification, without group index numbers, is given in table 14. Also in table 14 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are deter-

mined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in both the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterburg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted.

Physical and chemical properties

Table 15 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as a range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizons is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 16 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received 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 chiefly of deep, well drained to excessively drained sands or gravels. 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 that have a layer that impedes the downward movement of water or soils that have 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 clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding is the temporary covering of soil with water from overflowing streams, with runoff from adjacent slopes, and by tides. Water standing for short periods after rains or after snow melts is not considered flooding, nor is water in swamps and marshes. Flooding is rated in general terms that describe the frequency and duration of flooding and the time of year when flooding is most likely. The ratings are based on evidence in the soil profile of the effects of flooding, namely thin strata of gravel, sand, silt, or, in places, clay deposited by floodwater; irregular decrease in organic-matter content with increasing depth; and absence of distinctive soil horizons that form in soils of the area that are not subject to flooding. The ratings are also based on local information about floodwater levels in the area and the extent of flooding; and on information that relates the position of each soil on the landscape to historic floods.

The generalized description of flood hazards is of value in land-use planning and provides a valid basis for land-use restrictions. The soil data are less specific, however, than those provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated in table 16 are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the mapping of the soils. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Physical and chemical analyses of selected soils

The results of physical and chemical analyses of several typical pedons of the survey area are given in table 17. The data presented are for samples from soil series that are important in the survey area. All samples were collected from carefully selected sites that are typical of the series and discussed in the section "Soil series and morphology." The soil samples were analyzed by the Agronomy and Soils Mineralogy Laboratory, Auburn University.

Most determinations, except those for grain-size analysis and bulk density, were made on soil material smaller than 2 millimeters in diameter. All capacity measurements are reported on an oven-dry basis. Following are the methods that were used in obtaining the data. The codes, in parentheses, refer to published methods.

Extractable bases, acidity, and base saturation were determined after the method of Hajek, Adams, and Cope (*6*). Soil reaction was determined in a 1:1 water dilution (8Cla). Cation exchange capacity is the sum of cations (5A3a). Total sand is the weight percentage of materials less than 2 millimeters across (3A1). Silt and clay is the weight percentage of materials less than 2 millimeters across, by pipette extraction (3A1).

Engineering test data

The results of analyses of engineering properties of several typical soils of the survey area are given in table 18.

The data presented are for soil samples that were collected from carefully selected sites. The soil profiles sampled are typical of the series discussed in the section "Soil series and morphology." The soil samples were analyzed by the Alabama State Highway Laboratory.

The methods used in obtaining the data are listed by code in the next paragraph. Most of the codes, in parentheses, refer to the methods assigned by the American Association of State Highway and Transportation Officials. The codes for shrinkage, Unified classification, and California bearing ratio are those assigned by the American Society for Testing and Materials.

The methods and codes are AASHTO classification (M-145-66); Unified classification (D-2487-66T); mechanical analysis (T88-57); liquid limit (T89-60); plasticity index (T90-56); moisture-density, method A (T99-57).

Soil series and morphology

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

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*8*). Unless otherwise noted, colors described are for moist soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Allen series

The Allen series consists of deep, well drained, moderately permeable soils that formed in loamy alluvium or colluvium underlain by limestone, sandstone, or shale, or they formed in residuum weathered from these rocks. These soils are on low ridges, foot slopes, and terraces. Slope ranges from 2 to 40 percent but is dominantly 2 to 15 percent.

Typical pedon of Allen fine sandy loam, 6 to 10 percent slopes, 250 feet south of Big Wills Creek, 200 feet west and 675 feet south of the NE corner, SE1/4 sec. 27, T. 11 S., R. 5 E.:

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

B1—4 to 11 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable; few fine roots; clay bridges and coatings on some sand grains; strongly acid; gradual wavy boundary.

B21t—11 to 33 inches; yellowish red (5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; few fine roots; very thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—33 to 64 inches; yellowish red (5YR 5/6) clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; very thin patchy clay films on faces of peds; very strongly acid.

Solum thickness ranges from 60 to more than 90 inches. In unlimed areas reaction ranges from very strongly acid to strongly acid.

The A horizon has hue of 10YR or 7.5YR and, in eroded areas, 5YR. Value is 4 or 5, and chroma is 3 through 8. Texture is fine sandy loam, loam, sandy clay loam, or gravelly fine sandy loam. Gravel content ranges from 0 to about 20 percent.

The B1 horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 or 5; and chroma of 4 through 8. Texture ranges from loam to sandy clay loam, and gravel content ranges from 0 to 10 percent.

The Bt horizons have hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. In most pedons they are usually mottled in the lower part with shades of red, yellow, brown, and in places gray. Texture is clay loam or sandy clay loam. Gravel content ranges from 0 to 15 percent.

The B3 horizon, where present, is mottled with shades of red, yellow, brown, and in places gray. Texture is clay loam, silty clay loam, or sandy clay loam, and gravel content ranges from 0 to about 15 percent.

Allen soils are geographically associated with Dewey, Holston, Leesburg, Minvale, Nella, and Waynesboro soils. They have a less clayey subsoil than Dewey and Waynesboro soils, and they contain fewer coarse fragments than Leesburg, Minvale, or Nella soils. They have a subsoil with redder hue than the subsoil in Holston soils.

Bodine series

The Bodine series consists of deep, somewhat excessively drained, moderately rapidly permeable soils that formed in residuum weathered from very cherty limestone. These soils contain many angular chert fragments. They are on ridgetops, hillsides, and toe slopes. Slope ranges from 6 to 50 percent but is dominantly 15 to 40 percent.

Typical pedon of Bodine cherty silt loam, 6 to 15 percent slopes, in a roadbank about 3 miles north of Reece City, 90 feet west and 310 feet south of the NE corner, SW1/4SE1/4 sec. 31, T. 11 S., R. 6 E.:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) cherty silt loam; weak fine granular structure; very friable; many fine roots; 50 percent chert fragments; strongly acid; clear smooth boundary.

B1—8 to 17 inches; strong brown (7.5YR 5/8) cherty loam; common medium distinct pale brown (10YR 6/3) mottles; weak fine subangular blocky structure; friable; few fine roots; 40 percent chert fragments; very strongly acid; clear wavy boundary.

B21t—17 to 38 inches; reddish yellow (7.5YR 6/6) cherty silty clay loam; few fine faint yellowish red and brownish yellow mottles; moderate medium subangular blocky structure; friable; 50 percent chert fragments; sand grains are bridged and coated with clay; very strongly acid; gradual wavy boundary.

B22t—38 to 70 inches; yellowish red (5YR 5/6) cherty clay loam; common medium distinct yellowish red (5YR 5/8) and brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable; 70 percent chert fragments; very thin patchy clay films on faces of peds; very strongly acid.

Solum thickness ranges from 60 to more than 90 inches. Reaction ranges from very strongly acid to extremely acid except in limed areas. Content of chert fragments is 35 to 80 percent in each horizon, although the A horizon contains a smaller amount in places.

The A horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The B1 and Bt horizons have hue of 10YR, 7.5YR, or 5YR; value of 4, 5, or 6; and chroma of 4 through 8. Texture is cherty loam or cherty clay loam. The lower part of the Bt horizon is mottled with shades of red, brown, yellow, and gray in most pedons. The texture range includes cherty silty clay loam.

Bodine soils are geographically associated with Dewey, Ennis, Lobelville, Minvale, and Stemley soils. They contain a higher percentage of chert fragments than any of these soils.

Cedarbluff series

The Cedarbluff series consists of deep, somewhat poorly drained, slowly permeable soils that formed in thick beds of loamy alluvium from uplands of sandstone and shale. These soils are on low terraces and in upland depressions. Slope ranges from 0 to 2 percent.

Typical pedon of Cedarbluff fine sandy loam in a field about one-half mile north of the Coosa River, 350 feet west and 600 feet north of the SE corner, SW1/4NE1/4 sec. 34, T. 12 S., R. 6 E.:

Ap—0 to 8 inches; dark grayish brown (2.5YR 4/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; medium acid; clear smooth boundary.

A2—8 to 12 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; few fine roots; strongly acid; clear wavy boundary.

B1—12 to 20 inches; pale brown (10YR 6/3) loam; common medium distinct mottles of very pale brown (10YR 7/3), light brownish gray (10YR 6/2), brownish yellow (10YR 6/6), and strong brown (7.5YR 5/6); weak fine subangular blocky structure; friable; few fine roots; few mica flakes; strongly acid; gradual wavy boundary.

B21t—20 to 32 inches; mottled yellowish brown (10YR 5/6), light brownish gray (10YR 6/2), pale brown (10YR 6/3), and light gray (10YR 7/2) loam; the yellowish brown material is compact and brittle and makes up about 40 percent of the horizontal cross section; weak medium subangular blocky structure; few mica flakes; strongly acid; gradual wavy boundary.

B22t—32 to 60 inches; mottled yellow (10YR 7/6), light brownish gray (10YR 6/2), pale brown (10YR 6/3), and light gray (10YR 7/2) loam; the yellow material is compact and brittle and makes up about 40 percent of the horizontal cross section; weak medium subangular blocky structure; strongly acid.

Solum thickness ranges from 60 to more than 90 inches. Reaction is strongly acid in the control section.

The A horizons have hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 or 3.

The B1 horizon has hue of 10YR, value of 6, and chroma of 2 or 3. In most pedons it is mottled with shades of red, yellow, and brown. Texture is loam or fine sandy loam.

The Bt horizons are mottled with shades of yellow, brown, red, and gray. Texture is loam or clay loam.

Cedarbluff soils are geographically associated with Cloudland, Gaylesville, Holston, Leesburg, McQueen, Waynesboro, and Wickham soils. They are more poorly drained than all of these soils except Gaylesville soils. In addition, they have more clay in the upper part of the subsoil than Cloudland soils, and they have a less clayey subsoil than Gaylesville, McQueen, and Waynesboro soils.

Chewacla series

The Chewacla series consists of deep, somewhat poorly drained, moderately permeable soils that formed in thick beds of loamy alluvium washed from uplands of shale, sandstone, and limestone. These soils are on first bottoms. Slopes range from 0 to 2 percent.

Typical pedon of Chewacla silt loam between Little Wills Creek and Interstate Highway 59 northwest of Gadsden, 300 feet south and 750 feet east of the NW corner, NW1/4SE1/4 sec. 19, T. 11 S., R. 6 E.:

A1—0 to 10 inches; brown (10YR 5/3) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak fine granular structure; very friable; few fine roots; strongly acid; gradual wavy boundary.

B1—10 to 17 inches; brown (10YR 5/3) silt loam; common fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; few medium roots; strongly acid; gradual wavy boundary.

B21—17 to 22 inches; light yellowish brown (2.5Y 6/4) loam; common medium distinct dark yellowish brown (10YR 4/4) and light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few medium roots; strongly acid; gradual wavy boundary.

B22—22 to 60 inches; mottled yellowish brown (10YR 5/4), light brownish gray (10YR 6/2), and strong brown (7.5YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; strongly acid.

Solum thickness ranges from 40 to more than 65 inches. Reaction ranges from medium acid to strongly acid.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 3 or 4.

The B1 horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. In some pedons it is mottled with shades of yellow or brown. Texture is loam or silt loam.

The B2 horizons have hue of 10YR or 2.5Y, value of 4 through 6, and chroma of 2 through 4. Most pedons are mottled with shades of yellow, gray, or brown. Texture is loam, silt loam, or silty clay loam.

The C horizons, where present, are stratified loam, sandy loam, loamy sand, and gravel. Buried B horizons with hue of 10YR occur at a depth of 40 inches or more in some pedons.

Chewacla soils are geographically associated with Choccolocco, Cloudland, Ellisville, Gaylesville, Holston, and Leadvale soils. They are more poorly drained than Ellisville, Choccolocco, Holston, Cloudland, or Leadvale soils, and they contain less clay in the subsoil than Gaylesville soils.

Choccolocco series

The Choccolocco series consists of deep, well drained, moderately permeable soils that formed in thick beds of alluvium derived from uplands of shale, sandstone, and limestone. These soils are on low stream terraces. Slope ranges from 0 to 2 percent.

Typical pedon of Choccolocco silt loam about 10 feet south of Big Wills Creek and 200 feet east of road, 350 feet east and 200 feet south of the NW corner, SE1/4NE1/4 sec. 18, T. 12 S., R. 6 E.:

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

B21t—7 to 28 inches; strong brown (7.5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; very thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

B22t—28 to 39 inches; strong brown (7.5YR 5/6) loam; common dark brown (7.5YR 4/2) stains and few fine distinct very pale brown mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; very thin patchy clay films on faces of peds; strongly acid; gradual wavy boudnary.

B31—39 to 49 inches; strong brown (7.5YR 5/6) loam; common medium distinct very pale brown (10YR 7/3) mottles; weak fine subangular blocky structure; friable; clay bridges and coatings on sand grains; strongly acid; gradual wavy boundary.

B32—49 to 54 inches; mottled brownish yellow (10YR 6/8), very pale brown (10YR 7/3), light gray (10YR 7/1), strong brown (7.5YR 5/6),

and dark brown (7.5YR 4/2) loam; weak fine subangular blocky structure; friable; clay bridges and coatings on sand grains; very strongly acid; gradual wavy boundary.

C—54 to 82 inches; mottled brownish yellow (10YR 6/8), very pale brown (10YR 7/3), light gray (10YR 7/1), and brown (7.5YR 5/4) sandy loam; massive; very friable; very strongly acid.

Solum thickness ranges from 40 to 60 inches. Reaction ranges from medium acid to very strongly acid in the control section.

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

The B2t horizons have hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. In some pedons they are mottled in the lower part with shades of yellow and brown. Texture typically is silty clay loam but ranges to clay loam, silt loam, and loam.

The B3 horizons have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 through 8. They are mottled with shades of yellow, brown, and gray.

The C horizon is mottled in the same colors as the B3 horizons. Texture is sandy loam, and some pedons contain strata of sand and gravel.

Choccolocco soils are geographically associated with Chewacla, Ellisville, Leadvale, McQueen, Toccoa, and Wickham soils. They are better drained than Chewacla and Leadvale soils, and they have a browner subsoil than McQueen and Wickham soils. They differ from Ellisville and Toccoa soils by having an argillic horizon.

Cloudland series

The Cloudland series consists of deep, moderately well drained, slowly permeable soils that formed in loamy alluvium on terraces and in upland depressions. Slope ranges from 0 to 3 percent.

Typical pedon of Cloudland loam, 0 to 3 percent slopes, in a wooded area about 1 mile west of the Coosa River, 610 feet west and 640 feet north of the SE corner, NW1/4 sec. 23, T. 13 S., R. 5 E.:

A1—0 to 6 inches; dark grayish brown (10YR 4/2) loam; weak medium granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

B2—6 to 14 inches; light yellowish brown (2.5YR 6/4) loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine and coarse roots; strongly acid; gradual wavy boundary.

B&A—14 to 21 inches; light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/6) loam; common medium distinct pale brown (10YR 6/3) mottles; weak medium subangular blocky structure; friable; few coarse roots; very strongly acid; clear wavy boundary.

Bx1—21 to 30 inches; mottled light yellowish brown (2.5Y 6/4), yellowish brown (10YR 5/8), and light brownish gray (10YR 6/2) loam; weak coarse platy structure parting to weak medium subangular blocky; firm; the yellowish brown part is compact and brittle and comprises about 70 percent of the horizontal cross section; very strongly acid; clear wavy boundary.

Bx2—30 to 62 inches; mottled yellowish brown (10YR 5/6), light yellowish brown (10YR 6/4), and light brownish gray (10YR 6/2) clay loam; weak coarse platy structure parting to weak medium subangular blocky; firm; the yellowish brown part is compact and brittle and comprises about 65 percent of the horizontal cross section; very strongly acid.

Solum thickness ranges from 60 to more than 80 inches. Content of coarse fragments in the solum ranges from 0 to about 5 percent. Reaction ranges from medium acid to very strongly acid in the control section.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4.

The B horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6. In most pedons it is mottled in the lower part with shades of yellow, brown, and gray. Texture ranges from fine sandy loam to loam.

The Bx horizons have hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 or 6, and they are mottled with shades of yellow, brown, and gray. Texture is loam, clay loam, or silty clay loam.

Cloudland soils are geographically associated with Cedarbluff, Chewacla, Conasauga, Gaylesville, Holston, Leesburg, and Stemley soils. Cloudland soils are more coarsely textured than all of these soils. Also, only Stemley soils among the associated soils have a fragipan. Cloudland soils have fewer chert fragments than Stemley soils.

Conasauga series

The Conasauga series consists of moderately deep, moderately well drained, slowly permeable soils on uplands. These soils formed in residuum weathered from shale. In some places the shale contains seams of limestone. Slope ranges from 1 to 35 percent but is dominantly 1 to 5 percent.

Typical pedon of Conasauga loam, 1 to 5 percent slopes, in a wooded area on Old Camp Siberton, 300 feet north and 330 feet west of the SE corner, NW1/4NW1/4 sec. 14, T. 12 S., R. 5 E.:

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable; many fine roots; slightly acid; clear smooth boundary.

B1—4 to 10 inches; brownish yellow (10YR 6/6) clay loam; moderate medium subangular blocky structure; firm; few fine roots; very thin patchy clay films on faces of peds; medium acid; clear wavy boundary.

B21t—10 to 19 inches; yellowish brown (10YR 5/6) clay; common medium distinct yellowish red (5YR 5/6) mottles; strong medium subangular blocky structure; firm; very thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

B22t— 19 to 23 inches; brownish yellow (10YR 6/6) clay; common medium distinct strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and light gray (10YR 7/2) mottles; strong medium angular blocky structure; firm; 10 percent shale fragments; very thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B23t—23 to 30 inches; yellowish brown (10YR 5/6) clay; few fine distinct light gray mottles; strong medium subangular blocky structure; firm; 5 percent shale fragments; very thin patchy clay films on faces of peds; medium acid; gradual wavy boundary.

B3—30 to 39 inches; mottled brownish yellow (10YR 6/6), light gray (10YR 7/1), and light yellowish brown (10YR 6/4) clay; strong medium subangular blocky structure; firm; 5 percent shale fragments; very thin patchy clay films on faces of peds; slightly acid; clear irregular boundary.

Cr—39 to 60 inches; partially weathered, fractured shale.

Solum thickness ranges from 20 to 40 inches. Reaction ranges from medium acid to very strongly acid except in limed areas. Most pedons are slightly acid just above the weathered shale. Most pedons have no shale fragments in the upper part of the B horizon, and content of shale fragments is as much as 20 percent in the lower part of the B horizon.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4.

The B1 horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 4 through 8. Texture is clay loam, silty clay loam, or silt loam.

The Bt horizons have hue of 10YR, 7.5YR, or 2.5Y; value of 5 or 6; and chroma of 5 through 8. In most pedons they are mottled in the lower part with shades of brown, gray, red, and yellow. Texture is clay or silty clay.

Conasauga soils are geographically associated with Cloudland, Firestone, Gaylesville, Holston, and Leesburg soils. They have a more clayey subsoil than Cloudland, Holston, and Leesburg soils. They have a yellower subsoil than Firestone soils, and they are better drained than Gaylesville soils.

Dewey series

The Dewey series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in beds of alluvium and colluvium underlain by several feet of limestone residuum. Slope ranges from 2 to 15 percent but is dominantly 6 to 10 percent.

Typical pedon of Dewey silt loam, 6 to 10 percent slopes, about 4 miles NE of Gadsden, 600 feet west and 550 feet north of the SE corner, SE1/4SW1/4 sec. 24, T. 11 S., R. 6 E.:

Ap—0 to 5 inches; yellowish brown (10YR 5/4) silt loam; weak fine granular structure; very friable; many fine roots; 15 percent chert fragments; medium acid; clear smooth boundary.

B1—5 to 12 inches; reddish yellow (7.5YR 6/6) silty clay loam; weak fine subangular blocky structure; friable; few fine roots; 15 percent chert fragments; strongly acid; clear wavy boundary.

B21t—12 to 17 inches; yellowish red (5YR 5/8) clay loam; strong medium subangular blocky structure; friable; 5 percent chert fragments; very thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—17 to 31 inches; yellowish red (5YR 5/8) silty clay; common medium distinct yellowish brown (10YR 5/6) and red (2.5YR 5/6) mottles; strong medium subangular blocky structure; friable; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23t—31 to 70 inches; mottled yellowish red (5YR 5/8), yellowish brown (10YR 5/6), very pale brown (10YR 7/3), and red (2.5YR 5/8) silty clay; strong medium subangular blocky structure; firm; 10 percent small chert fragments; very thin patchy clay films on faces of peds; very strongly acid.

Solum thickness ranges from 60 to more than 100 inches. Content of chert fragments ranges from 0 to 15 percent throughout the solum. Reaction is strongly acid or very strongly acid except where the soil has been limed.

The A horizon has hue of 10YR, 7.5YR, 5YR, or 2.5YR; value of 3 through 5; and chroma of 3 through 6. Texture is silt loam or silty clay loam.

The B1 horizon has hue of 7.5YR, 5YR, or 2.5YR; value of 3 through 6; and chroma of 6 or 8. Texture is clay loam or silty clay loam.

The Bt horizons have hue of 5YR or 2.5YR, value of 3 through 5, and chroma of 6 or 8. In most pedons they are mottled in the lower part with shades of red, brown, and yellow. Texture is clay loam, silty clay, or clay.

Dewey soils are geographically associated with Allen, Bodine, Minvale, and Stemley soils. They have a more clayey subsoil than all of these soils, and they contain fewer chert fragments than Bodine and Stemley soils.

Ellisville series

The Ellisville series consists of deep, well drained, moderately permeable soils that formed from alluvium weathered from uplands of sandstone and shale. These nearly level soils are on flood plains and low stream terraces. Slope ranges from 0 to 2 percent.

Typical pedon of Ellisville loam, about 2 miles northwest of Hokes Bluff Ferry, 330 feet west and 475 feet north of SE corner, sec. 5, T. 12 S., R. 7 E.:

Ap—0 to 8 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; very friable; many fine roots; few fine mica flakes; strongly acid; clear smooth boundary.

B21—8 to 20 inches; dark yellowish brown (10YR 3/4) silty clay loam; weak fine subangular blocky structure; few fine roots; few fine mica flakes; strongly acid; clear wavy boundary.

B22—20 to 60 inches; dark yellowish brown (10YR 4/4) silty clay loam; common medium distinct pale brown (10YR 6/3) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; strongly acid.

Solum thickness ranges from 45 to more than 80 inches. Reaction ranges from strongly acid to very strongly acid except in limed areas.

The A horizon has hue of 10YR, value of 4, and chroma of 4.

The B1 and B2 horizons have hue of 10YR, value of 3 or 4, and chroma of 3 or 4. The lower part of the B horizon is mottled with shades of brown and gray in most pedons. Texture is silt loam, loam, or silty clay loam.

Ellisville soils are geographically associated with Chewacla, Choccolocco, Leadvale, McQueen, Toccoa, and Wickham soils. They are better drained than Chewacla soils, and they do not have the argillic horizon of Choccolocco soils. They do not have the compact and brittle layer of the Leadvale soils, and they have a browner subsoil than McQueen and Wickham soils.

Ennis series

The Ennis series consists of deep, well drained, moderately rapidly permeable soils that formed in alluvium washed from soils derived from limestone, shale, and sandstone. These soils are on first bottoms. Slope ranges from 0 to 2 percent.

Typical pedon of Ennis cherty loam in an area of Ennis-Lobelville cherty loams, 580 feet north and 520 feet east of the SW corner, NW1/4SW1/4 sec. 33, T. 12 S., R. 7 E.:

A1—0 to 5 inches; brown (10YR 4/3) cherty loam; weak fine granular structure; very friable; 15 percent chert fragments; strongly acid; clear smooth boundary.

B1—5 to 13 inches; brown (10YR 4/3) and yellowish brown (10YR 5/4) cherty sandy loam; weak fine subangular blocky structure; friable; 15 percent chert fragments; strongly acid; clear wavy boundary.

B21—13 to 25 inches; brown (10YR 5/3) cherty loam; common medium distinct dark yellowish brown (10YR 4/4) and dark brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; friable; 15 percent chert fragments; very strongly acid; gradual wavy boundary.

B22—25 to 31 inches; brown (10YR 5/3) cherty loam; common medium distinct dark yellowish brown (10YR 4/4) and dark brown (7.5YR 4/4) mottles; weak fine subangular blocky structure; friable; 15 percent chert fragments; very strongly acid; gradual wavy boundary.

B3—31 to 60 inches; mottled dark yellowish brown (10YR 4/4), dark brown (7.5YR 4/4), and grayish brown (10YR 5/2) cherty clay loam; moderate medium subangular blocky structure; friable; 15 percent chert fragments; very strongly acid.

Solum thickness ranges from 25 to more than 60 inches. Reaction ranges from strongly acid to very strongly acid except in limed areas. The chert content ranges from 10 to 30 percent in the upper part of the solum and from 10 to 60 percent in the lower part.

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

The B horizons have hue of 10YR, value of 4 or 5, and chroma of 3 through 6. They are mottled in the lower part with shades of gray, yellow, and brown. Texture is cherty loam, cherty silty clay loam, or cherty clay loam.

Ennis soils are geographically associated with Bodine, Lobelville, Minvale, and Stemley soils. They contain fewer chert fragments than Bodine soils. They are better drained than Lobelville soils. They have a browner subsoil than Minvale soils and do not have the compact and brittle layer of Stemley soils.

Firestone series

The Firestone series consists of moderately deep, well drained, slowly permeable soils that formed from residuum weathered from shale. These gently sloping to moderately steep soils are on uplands. Slope ranges from 2 to 45 percent but is dominantly 2 to 15 percent.

Typical pedon of Firestone silt loam, 6 to 15 percent slopes, about 0.75 mile southeast of the intersection of U.S. Highways 431 and 278, 280 feet north and 200 feet east of the SW corner, SE1/4NW1/4 sec. 13, T. 12 S., R. 6 E.:

A1—0 to 3 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine roots; 5 percent sandstone pebbles; medium acid; clear smooth boundary.

B21t—3 to 14 inches; yellowish red (5YR 5/8) clay; common medium distinct strong brown (7.5YR 5/8) mottles; strong medium subangular blocky structure; firm; few fine roots; 10 percent shale fragments; strongly acid; gradual wavy boundary.

B22t—14 to 26 inches; yellowish red (5YR 5/8) clay; common medium distinct yellowish brown (10YR 5/6) mottles; strong medium subangular blocky structure; firm; few fine roots; 10 percent shale fragments; strongly acid; gradual wavy boundary.

B23t—26 to 31 inches; strong brown (7.5YR 5/8) clay; common medium distinct yellowish red (5YR 5/6) and yellowish brown (10YR 5/6) mottles; few fine distinct light gray (10YR 6/1) mottles; strong medium subangular blocky structure; firm; 15 percent shale fragments; strongly acid; gradual wavy boundary.

B3—31 to 33 inches; light olive brown (2.5Y 5/4) clay; massive; firm; 30 percent shale fragments; slightly acid; gradual irregular boundary.

Cr—33 to 60 inches; partially weathered, fractured shale.

Solum thickness ranges from 20 to 40 inches. Reaction ranges from medium acid to strongly acid except where limed.

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

The Bt horizons have hue of 7.5YR, 5YR, or 2.5YR; value of 4 through 6; and chroma of 6 or 8. In most pedons they are mottled in the lower part with shades of yellow, red, gray, or brown. Texture is clay. Content of shale fragments ranges from 0 to about 25 percent.

The B3 horizon has hue of 5YR, 7.5YR, 10YR, or 2.5Y; value of 5; and chroma of 4 through 8. In most pedons it is mottled with shades of red, yellow, brown, and gray. Texture is clay or silty clay, and shale content ranges from 10 to 30 percent.

Firestone soils are geographically associated with Conasauga, Gaylesville, and Leesburg soils. They have a subsoil with redder hue than the subsoil in Conasauga soils, and they are better drained than Gaylesville soils. They have a more clayey subsoil than Leesburg soils.

Gaylesville series

The Gaylesville series consists of deep, poorly drained, slowly permeable soils that formed in clayey alluvium from uplands of shale, sandstone, and limestone. These level soils are on low stream terraces. Slope ranges from 0 to 2 percent.

Typical pedon of Gaylesville silt loam, 1 mile northeast of Glencoe, 100 feet north and 810 feet east of the SW corner, NE1/4 sec. 19, T. 12 S., R. 7 E.:

A1—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; friable; many fine roots; extremely acid; clear smooth boundary.

B1—6 to 10 inches; mottled light gray (10YR 6/1), light brownish gray (10YR 6/2), pale brown (10YR 6/3), and yellowish brown (10YR 5/4) silty clay loam; weak medium subangular blocky structure; friable; few fine roots; extremely acid; gradual wavy boundary.

B21tg—10 to 17 inches; mottled light gray (10YR 6/1) and yellowish brown (10YR 5/6) silty clay; moderate medium subangular blocky structure; friable; few fine roots; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22tg—17 to 28 inches; light brownish gray (10YR 6/2) clay; common medium distinct yellowish brown (10YR 5/6) and strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine roots; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23tg—28 to 60 inches; mottled light brownish gray (10YR 6/2), grayish brown (10YR 5/2), and yellowish brown (10YR 5/6) clay; strong medium subangular blocky structure; firm; very strongly acid.

Solum thickness ranges from 60 to 80 inches. Reaction ranges from extremely acid to very strongly acid in the control section.

The A horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 through 4.

The B1 horizon is mottled with shades of brown and gray.

The B2tg horizons are mottled with shades of gray, brown, and yellow, or they are gray and have mottles of brown and yellow. Texture is silty clay or clay.

Gaylesville soils are geographically associated with Cedarbluff, Chewacla, Cloudland, Conasauga, Firestone, Leadvale, and McQueen soils. They are more poorly drained than all of these soils except Cedarbluff. They have a more clayey subsoil than Cedarbluff soils.

Hartsells series

The Hartsells series consists of moderately deep, well drained, moderately permeable soils on uplands. These soils formed in residuum weathered from sandstone. Slope ranges from 2 to 35 percent but is dominantly 2 to 6 percent.

Typical pedon of Hartsells fine sandy loam, 2 to 6 percent slopes, about 1 mile northeast of Mountainboro, 200 feet south and 120 feet west of the NE corner, SE1/4NW1/4 sec. 20, T. 10 S., R. 5 E.:

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

B1—6 to 11 inches; yellowish brown (10YR 5/8) loam; weak fine subangular blocky structure; friable; few fine roots; 5 percent sandstone fragments; medium acid; clear wavy boundary.

B21t—11 to 25 inches; yellowish brown (10YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; 10 percent sandstone fragments; strongly acid; gradual wavy boundary.

B22t—25 to 31 inches; yellowish brown (10YR 5/6) sandy clay loam; few fine distinct very pale brown and yellowish red mottles; moderate medium subangular blocky structure; friable; 5 percent sandstone fragments; strongly acid; gradual irregular boundary.
R—31 inches; sandstone bedrock.

Solum thickness ranges from 20 to 40 inches. Reaction ranges from extremely acid to strongly acid except where lime has been applied.

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

The B1 horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 6 or 8. Texture is sandy loam or loam.

The B2t horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4 through 8. In most pedons the lower part of the B2t horizon is mottled with shades of yellow, brown, and red. Texture is loam, sandy clay loam, or clay loam.

The B3 horizon is similar to the B2t horizon in color and texture.

Hartsells soils are geographically associated with Linker, Townley, and Wynnville soils. They have a browner subsoil than Linker soils. They have a less clayey subsoil than Townley soils and do not have the compact and brittle layer of Wynnville soils.

Holston series

The Holston series consists of deep, well drained, moderately permeable soils that formed in thick beds of alluvium and colluvium washed from uplands of sandstone and shale. These soils are on high stream terraces and toe slopes. Slope ranges from 1 to 5 percent.

Typical pedon of Holston fine sandy loam, 1 to 5 percent slopes, in a cultivated field about 0.25 mile north of the Coosa River, 650 feet west and 590 feet south of the NE corner, SE1/4 sec. 34, T. 12 S., R. 6 E.:

Ap—0 to 6 inches; yellowish brown (10YR 5/4) fine sandy loam; weak fine granular structure; very friable; medium acid; clear smooth boundary.
B1—6 to 13 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; strongly acid; clear wavy boundary.
B21t—13 to 20 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.
B22t—20 to 34 inches; yellowish brown (10YR 5/8) silty clay loam; few fine faint strong brown mottles; weak medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.
B23t—34 to 60 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), light yellowish brown (10YR 6/4), and red (2.5YR 4/6) silty clay loam; weak medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; very strongly acid.

Solum thickness ranges from 60 to more than 90 inches. Reaction ranges from strongly acid to very strongly acid except where lime has been applied.

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

The B1 and B21t horizons have hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. Texture ranges from loam to silty clay loam. The lower part of the B2t horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 through 6; and chroma of 6 or 8; it is mottled in most pedons with shades of brown, yellow, red, and gray. Texture ranges from loam to clay.

Holston soils are geographically associated with Allen, Cedarbluff, Chewacla, Cloudland, Conasauga, Holston Variant, Leesburg, Nella, and Waynesboro soils. They are better drained than Cedarbluff, Chewacla, Cloudland, and Conasauga soils. They do not have plinthite in the lower part of the subsoil, as does the Holston Variant. They contain fewer coarse fragments than Leesburg and Nella soils. They have a more yellow, less clayey subsoil than Waynesboro soils. They have a more yellow subsoil than Allen soils.

Holston Variant

The Holston Variant consists of deep, moderately well drained, moderately permeable soils that formed in thick beds of alluvium washed from uplands of sandstone and shale. These soils are on high stream terraces. Slope ranges from 2 to 6 percent.

Typical pedon of Holston Variant fine sandy loam, 2 to 6 percent slopes, in a cultivated field about 1 mile north of Bachelor Chapel Church, 200 feet south and 1,400 feet east of the NW corner, SW1/4 sec. 35, T. 11 S., R. 7 E.:

Ap—0 to 6 inches; brown (10YR 5/3) fine sandy loam; weak fine granular structure; very friable; many fine roots; 3 percent medium cherty gravel; strongly acid; abrupt smooth boundary.
B21t—6 to 13 inches; light yellowish brown (10YR 6/4) silt loam; moderate very fine subangular blocky structure; friable; common very fine roots; 3 percent medium cherty gravel; very strongly acid; clear smooth boundary.
B22t—13 to 24 inches; light yellowish brown (10YR 6/4) silt loam; many medium distinct strong brown (7.5YR 5/6) and few fine distinct very pale brown mottles; moderate fine subangular and angular blocky structure; friable in about 70 percent and brittle in about 30 percent of the mass; few fine roots; 2 percent medium cherty gravel; very strongly acid; gradual smooth boundary.
B23t—24 to 37 inches; mottled very pale brown (10YR 7/3), brownish yellow (10YR 6/6), and strong brown (7.5YR 5/6) loam; moderate fine subangular blocky and angular blocky structure; firm; very strongly acid; diffuse smooth boundary.
B24t—37 to 70 inches; mottled red (2.5YR 4/6) and strong brown (7.5YR 5/6) clay loam; light brownish gray (10YR 6/2) vertical seams; moderate fine and medium subangular blocky structure; firm in 75 percent and compact and brittle in 25 percent of the mass; 4 percent red plinthite; medium acid.

Thickness of solum and depth to rock is more than 60 inches. Reaction ranges from very strongly acid to medium acid.

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

The B2t horizon has matrix colors in hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 8. The amount of mottles increases with depth. Mottles are in shades of red, yellow, brown, and gray. Texture is silt loam, loam, or clay laom. Plinthite content in the lower part of the B2t horizon ranges from 0 to 5 percent.

This soil varies from the Holston series in that it contains small amounts of plinthite in the lower part of the B2 horizon and has gray mottles at a shallower depth.

The Holston Variant is geographically associated with Allen, Cedarbluff, Cloudland, Conasauga, Holston, Leesburg, Nella, and Waynesboro soils. These soils differ from the associated soils by having small amounts of plinthite in the lower part of the subsoil. In addition, they have a more yellow subsoil than Allen and Waynesboro soils; they are better drained than Cedarbluff, Cloudland, and Conasauga soils; and they have fewer coarse fragments than Leesburg and Nella soils.

Leadvale series

The Leadvale series consists of deep, moderately well drained, slowly permeable soils that formed in thick beds of alluvium washed from uplands of sandstone, limestone, and shale. These soils are on high stream terraces. Slope ranges from 1 to 5 percent.

Typical pedon of Leadvale silt loam, 1 to 5 percent slopes, in a field about 6 miles east of Gadsden, 600 feet east and 600 feet north of the SW corner, NW1/4 sec. 9, T. 12 S., R. 7 E.:

Ap—0 to 8 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; strongly acid; clear smooth boundary.

B21t—8 to 15 inches; yellowish brown (10YR 5/6) silty clay loam; weak fine subangular blocky structure; friable; very thin patchy clay films on faces of peds; strongly acid; clear wavy boundary.

B22t—15 to 21 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; 15 percent manganese concretions; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Bx1—21 to 34 inches; light yellowish brown (2.5Y 6/4) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and light gray (2.5Y 7/2) mottles; vertical streaks of light gray about 1 inch wide; weak coarse blocky structure parting to coarse platy; firm and brittle in about 80 percent of the mass; 15 percent manganese concretions; very strongly acid; gradual irregular boundary.

Bx2—34 to 60 inches; mottled olive yellow (2.5Y 6/6), light gray (2.5Y 7/2), strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and red (2.5YR 4/8) silty clay loam; vertical streaks of light gray as much as 1 inch wide; weak coarse blocky structure parting to coarse platy; firm and brittle in about 80 percent of the mass; 20 percent manganese concretions; very strongly acid.

Solum thickness ranges from 50 to more than 90 inches. Depth to the fragipan ranges from 17 to 30 inches. Content of coarse fragments in the solum ranges from 0 to 10 percent, and content of manganese concretions ranges to as much as 30 percent in the fragipan. Mica flakes are in many pedons.

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

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 4 through 8. It is mottled in some pedons in shades of brown, red, and yellow. Texture is silty clay loam or loam.

The Bx horizon is mottled with shades of yellow, brown, red, and gray. Texture is silt loam or silty clay loam.

Leadvale soils are geographically associated with Chewacla, Choccolocco, Ellisville, Gaylesville, and McQueen soils. Leadvale soils contain a fragipan, and none of the associated soils contains a fragipan.

Leesburg series

The Leesburg series consists of deep, well drained, moderately permeable soils that formed in thick beds of alluvium and colluvium washed from upland sandstone and shale. These soils are on high stream terraces and hillsides. Slope ranges from 2 to 45 percent but is dominantly 2 to 6 percent.

Typical pedon of Leesburg gravelly sandy loam, 2 to 6 percent slopes, about 120 feet north of the junction of Keeling Road and New York Avenue in East Gadsden, 660 feet north and 730 feet west of the SE corner, NW1/4 sec. 24, T. 12 S., R. 6 E.:

Ap—0 to 6 inches; brown (10YR 4/3) gravelly sandy loam; weak fine granular structure; very friable; few fine and medium roots; 75 percent gravel on the surface and 25 percent in horizon; strongly acid; clear smooth boundary.

B1—6 to 10 inches; yellowish brown (10YR 5/6) gravelly loam; weak medium subangular blocky structure; friable; few fine and medium roots; 20 percent gravel; clay bridging and coatings on sand grains; very strongly acid; gradual wavy boundary.

B21t—10 to 23 inches; yellowish brown (10YR 5/6) gravelly loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; 25 percent gravel; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—23 to 30 inches; strong brown (7.5YR 5/6) gravelly loam; few fine distinct yellowish brown and light yellowish brown mottles; strong medium subangular blocky structure; friable; few fine and medium roots; 25 percent gravel; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23t—30 to 45 inches; mottled pale brown (10YR 6/3), yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), yellowish red (5YR 5/6), and red (2.5YR 4/6) gravelly clay loam; strong medium subangular blocky structure; firm; 35 to 40 percent gravel; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B3—45 to 60 inches; mottled strong brown (7.5YR 5/8), red (2.5YR 4/8), yellowish red (5YR 5/8), brownish yellow (10YR 6/6), and light gray (10YR 7/2) gravelly loam; moderate medium subangular blocky structure; firm; 25 percent gravel; very thin patchy clay films on faces of peds; very strongly acid.

Solum thickness ranges from 60 to more than 90 inches. Reaction ranges from strongly acid to very strongly acid except where lime has been applied. Gravel content in each horizon ranges from 10 to 30 percent, but it is higher in the lower horizons in some pedons.

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

The B2t horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 or 8. In most pedons it is mottled in the lower part with shades of yellow, red, brown, and in some pedons, gray. Texture is gravelly clay loam, gravelly sandy clay loam, or gravelly silty clay loam.

The B3 horizon is mottled with shades of red, yellow, brown, and gray.

Leesburg soils are geographically associated with Allen, Cedarbluff, Cloudland, Conasauga, Firestone, Holston Variant, Holston, Nella, Townley, and Waynesboro soils. They contain more gravel than all of these soils except Nella, and they have a yellower subsoil than Nella soils.

Linker series

The Linker series consists of moderately deep, well drained, moderately permeable soils that formed in residuum weathered from sandstone. These soils are on upland plateaus and mountainsides. Slope ranges from 2 to 30 percent but is dominantly 6 to 15 percent.

Typical pedon of Linker fine sandy loam, 6 to 15 percent slopes, about 13 miles north of Hokes Bluff on Lookout Mountain, 100 feet east and 200 feet north of the SW corner, NE1/4SW1/4 sec. 1, T. 10 S., R. 7 E.:

Ap—0 to 5 inches; brown (7.5YR 5/4) fine sandy loam; weak fine granular structure; very friable; few fine roots; strongly acid; clear smooth boundary.

B1—5 to 11 inches; strong brown (7.5YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few fine roots; clay bridges and coatings on sand grains; 5 percent gravel; very strongly acid; gradual wavy boundary.

B21t—11 to 23 inches; yellowish red (5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; very thin patchy clay films on faces of peds; 10 percent gravel; very strongly acid; clear smooth boundary.

B22t—23 to 38 inches; yellowish red (5YR 5/8) clay loam; common medium distinct yellowish brown (10YR 5/6) and brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; very thin patchy clay films on faces of peds; 15 percent gravel; very strongly acid; abrupt smooth boundary.

R—38 inches; sandstone bedrock.

Solum thickness and depth to bedrock ranges from 20 to 40 inches. Reaction ranges from strongly acid to very strongly acid except in limed areas. Gravel content in each horizon ranges from 0 to about 15 percent.

The A horizon has hue of 10YR or 7.5YR, value of 4 through 6, and chroma of 4.

The B1 horizon has hue of 7.5YR, value of 4 or 5, and chroma of 4 or 6.

The B2t horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8. In most pedons it is mottled in the lower part with shades of yellow or brown. Texture is loam, sandy clay loam, or clay loam.

Linker soils are geographically associated with Hartsells, Townley, and Wynnville soils. They have a subsoil with redder hue than the subsoil in Hartsells soils, and they have a less clayey subsoil than Townley soils. They do not have the fragipan common to Wynnville soils.

Lobelville series

The Lobelville series consists of deep, moderately well drained, moderately permeable soils that formed in alluvium washed from soils derived from limestone, shale, and sandstone. These soils are on first bottoms. Slope ranges from 0 to 1 percent.

Typical pedon of Lobelville cherty loam in an area of Ennis-Lobelville cherty loams, about 580 feet north and 520 feet east of the SW corner, NW1/4SW1/4 sec. 33, T. 12 S., R. 7 E.:

Ap—0 to 6 inches; dark yellowish brown (10YR 4/4) cherty loam; weak fine granular structure; very friable; 30 percent chert fragments; very strongly acid; clear smooth boundary.

B21—6 to 16 inches; mottled yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) cherty loam; weak fine subangular blocky structure; friable; 15 percent chert fragments; very strongly acid; clear wavy boundary.

B22—16 to 30 inches; mottled dark yellowish brown (10YR 4/4), grayish brown (10YR 5/2), and brown (7.5YR 4/4) cherty loam; weak fine and medium subangular blocky structure; friable; 15 percent chert fragments; very strongly acid; gradual wavy boundary.

C—30 to 60 inches; mottled light brownish gray (10YR 6/2), pale brown (10YR 6/3), yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and brown (7.5YR 4/4) cherty sandy loam; massive; loose; 15 percent chert fragments; very strongly acid.

Solum thickness ranges from 30 to more than 60 inches. Reaction ranges from strongly acid to very strongly acid except in limed areas. Chert content ranges from 10 to 30 percent in the upper part of the solum and from 10 to 60 percent in the lower part.

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

The B horizons are mottled with shades of yellow, brown, and gray. Texture is cherty loam, cherty silt loam, or cherty sandy loam.

The C horizon has the same color and texture range as the B horizons.

Lobelville soils are geographically associated with Bodine, Ennis, Minvale, and Stemley soils. They have fewer chert fragments than Bodine soils, and they are more poorly drained than Ennis soils. They have a browner subsoil than Minvale soils but do not have the compact and brittle layer of Stemley soils.

McQueen series

The McQueen series consists of deep, well drained, slowly permeable soils that formed in thick beds of alluvium. These level to gently undulating soils are on low stream terraces. Slope ranges from 0 to 6 percent but is dominantly 2 to 5 percent.

Typical pedon of McQueen fine sandy loam, 2 to 6 percent slopes, about 200 feet south and 250 feet west of the NE corner, SE1/4SE1/4 sec. 36, T. 12 S., R. 6 E.:

Ap—0 to 6 inches; brown (10YR 4/3) fine sandy loam; weak fine granular structure; very friable; common fine mica flakes; slightly acid; clear smooth boundary.

B21t—6 to 13 inches; yellowish red (5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; clay bridges and coatings on sand grains; common fine mica flakes; slightly acid; gradual wavy boundary.

B22t—13 to 19 inches; yellowish red (5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; clay bridges and coatings on sand grains; common fine flakes of mica; slightly acid; gradual wavy boundary.

B23t—19 to 43 inches; strong brown (7.5YR 5/6) clay loam; few medium distinct yellowish red and brown mottles; moderate medium subangular blocky structure; friable; few thin patchy clay films on faces of peds; common fine flakes of mica; strongly acid; gradual wavy boundary.

B3—43 to 57 inches; mottled strong brown (7.5YR 5/8), brown (7.5YR 4/4), and yellowish brown (10YR 5/6) silty clay loam; weak medium subangular blocky structure; firm; very thin patchy clay films on faces of peds; common fine flakes of mica; very strongly acid; gradual wavy boundary.

C—57 to 80 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct yellowish brown and brownish yellow mottles; massive; friable; common fine flakes of mica; strongly acid.

Solum thickness ranges from 50 to 70 inches. Reaction is strongly acid or very strongly acid except where the soil has been limed.

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

The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 through 8. In most pedons it is mottled in the lower part with shades of red, brown, and yellow. Texture is clay loam, silty clay loam, or clay.

The B3 horizon is mottled with shades of red, brown, and yellow. Texture is sandy clay loam or silty clay loam.

The C horizon has colors similar to those of the B horizon. Textures are sandy loam or sandy clay loam.

McQueen soils are geographically associated with Cedarbluff, Choccolocco, Ellisville, Gaylesville, Leadvale, and Wickham soils. They are better drained than Cedarbluff, Gaylesville, and Leadvale soils. They have a subsoil with redder hue than the subsoil in Choccolocco and Ellisville soils. They have a more clayey subsoil than Wickham soils.

Minvale series

The Minvale series consists of deep, well drained, moderately permeable soils on uplands that formed in residuum weathered from cherty limestone. Slope ranges from 2 to 45 percent but is dominantly 6 to 15 percent.

Typical pedon of Minvale cherty loam, 6 to 15 percent slopes, about 930 feet east and 600 feet north of the SW corner, NW1/4 sec. 27, T. 12 S., R. 7 E.:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) cherty loam; weak fine granular structure; very friable; many fine roots; 15 percent chert fragments; medium acid; clear smooth boundary.

A2—5 to 10 inches; light yellowish brown (10YR 6/4) cherty silt loam; weak fine granular structure; very friable; many fine roots; 15 percent chert fragments; very strongly acid; clear smooth boundary.

B1—10 to 18 inches; reddish yellow (7.5YR 6/8) cherty loam; weak fine subangular blocky structure; friable; few fine roots; 15 percent chert fragments; very strongly acid; clear wavy boundary.

B21t—18 to 25 inches; yellowish red (5YR 5/8) cherty silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; 15 percent chert fragments; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—25 to 58 inches; yellowish red (5YR 5/8) cherty silty clay loam; common medium distinct red (2.5YR 5/8) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; 15 percent chert fragments; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B23t—58 to 70 inches; yellowish red (5YR 5/8) cherty silty clay loam; common medium distinct red (2.5YR 5/8) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; 25 percent chert fragments; very thin patchy clay films on faces of peds; very strongly acid.

Solum thickness ranges from 60 to more than 100 inches. Chert content ranges from 15 to 30 percent throughout the solum. Reaction is strongly acid to very strongly acid except where the soil has been limed.

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

The B1 horizon, where present, has hue of 10YR, 7.5YR, or 5YR; value of 5 or 6; and chroma of 4 through 8.

The Bt horizon has hue of 5YR, 7.5YR, or 10YR; value of 5 or 6; and chroma of 6 or 8. In most pedons it is mottled with shades of red, yellow, and brown. Texture is cherty silty clay loam, cherty clay loam, or cherty silty clay.

Minvale soils are geographically associated with Allen, Bodine, Dewey, Ennis, Lobelville, and Stemley soils. They contain more chert fragments than Allen soils and fewer chert fragments than Bodine soils. They have a less clayey subsoil than Dewey soils. They have a subsoil with redder hue than the subsoil in Ennis soils, and they are better drained than Lobelville and Stemley soils.

Nella series

The Nella series consists of deep, well drained, moderately permeable soils on uplands. These soils formed in loamy alluvium and colluvium underlain by limestone, sandstone, or shale. Slope ranges from 2 to 25 percent but is dominantly 2 to 10 percent.

Typical pedon of Nella cobbly loam, 2 to 10 percent slopes, about 100 feet south and 130 feet west of the NE corner, SE1/4SE1/4 sec. 28, T. 12 S., R. 6 E.:

Ap—0 to 5 inches; dark brown (7.5YR 3/2) cobbly loam; weak fine granular structure; very friable; many fine roots; 45 percent gravel and cobbles; medium acid; clear wavy boundary.

B1—5 to 9 inches; yellowish red (5YR 4/6) and reddish brown (5YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; few fine roots; 15 percent gravel; sand grains are bridged and coated with clay; very strongly acid; gradual wavy boundary.

B21t—9 to 20 inches; yellowish red (5YR 4/6) gravelly loam; moderate medium subangular blocky structure; friable; few fine roots; 20 percent gravel; very thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

B22t—20 to 65 inches; yellowish red (5YR 4/8) gravelly loam; moderate medium subangular blocky structure; friable; few medium roots; 10 percent gravel; very thin patchy clay films on faces of peds; very strongly acid.

Solum thickness ranges from 60 to more than 100 inches. Reaction is strongly acid or very strongly acid except where the soil has been limed. In each horizon gravel content ranges from about 10 to 35 percent.

The A horizon has hue of 10YR, 7.5YR, or 5YR; value of 4 or 5; and chroma of 2 through 6. Texture is cobbly loam or gravelly sandy loam.

The B1 horizon, where present, has hue of 5YR, value of 4 or 5, and chroma of 4 through 8.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is mottled in the lower part of most pedons with shades of red, yellow, brown, and gray. Texture ranges from gravelly or cobbly loam to gravelly or cobbly clay loam.

Nella soils are geographically associated with Allen, Holston, Leesburg, Townley, and Waynesboro soils. They contain more coarse fragments than Allen or Holston soils. They have a subsoil with redder hue than the subsoil in Leesburg soils. They have a less clayey subsoil than Townley and Waynesboro soils.

Palmerdale series

The Palmerdale series consists of deep, somewhat excessively drained, moderately rapidly permeable soils that formed in mine spoil material left after strip mining. These soils contain large amounts of shale and sandstone fragments. Slope ranges from 2 to 60 percent.

Typical pedon of Palmerdale very shaly loam in an area of Palmerdale soils, 2 to 60 percent slopes, 1 mile southeast of Altoona, 100 feet west and 300 feet north of the SW corner, NW1/4SE1/4 sec. 3. T. 11 S., R. 3 E.:

Ap—0 to 9 inches; brown (10YR 4/3), dark gray (10YR 4/1), and strong brown (7.5YR 5/6) very shaly loam; weak medium granular structure; friable; few fine and medium roots; approximately 80 percent randomly oriented coarse fragments, mostly angular sandstone and shale; medium acid; clear wavy boundary.

C1—9 to 34 inches; brown (10YR 4/3), dark yellowish brown (10YR 4/4), and light olive brown (2.5Y 5/4) very shaly loam and silt loam; weak medium granular structure; friable; few fine and medium roots; approximately 75 percent randomly oriented coarse fragments of sandstone and shale; very strongly acid; gradual wavy boundary.

C2—34 to 80 inches; brown (10YR 4/3), dark yellowish brown (10YR 4/4), and strong brown (7.5YR 5/6) very shaly loam; weak medium granular structure; friable; approximately 75 percent randomly oriented coarse fragments, mostly sandstone and shale; very strongly acid.

Thickness of the mine spoil material is more than 60 inches. Reaction ranges from extremely acid to medium acid. Coarse fragment content ranges from about 60 to 80 percent; the fragments range mostly from about 1/8 inch to as much as 6 inches across.

The A horizon has hue of 10YR and 7.5YR, value of 4 or 5, and chroma of 1 through 6. The fine earth fraction is loam or sandy loam.

The C horizon has hue of 10YR, 7.5YR, or 2.5Y; value of 4 through 6; and chroma of 3 through 8. The fine earth fraction is loam, silt loam, silty clay loam, or sandy loam.

Palmerdale soils are in the mine spoil material where coal seams have been stripped from interbedded sand-

stone and shale parent materials. The original associated soils in these areas are Hartsells, Linker, and Townley soils.

Stemley series

The Stemley series consists of deep, moderately well drained, slowly permeable soils that formed in residuum weathered from cherty limestone. These soils are in drainageways and on toe slopes. Slope ranges from 1 to 5 percent.

Typical pedon of Stemley cherty loam, 1 to 5 percent slopes, 50 feet north and 100 feet east of the SW corner, SE1/4SE1/4 sec. 1, T. 13 S., R. 6 E.:

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) cherty loam; weak fine granular structure; very friable; few fine roots; 15 percent chert fragments; strongly acid; clear smooth boundary.

B2—4 to 16 inches; yellowish brown (10YR 5/4) cherty loam; few fine faint yellowish brown mottles; weak medium subangular blocky structure; friable; few fine roots; 15 percent chert fragments; strongly acid; gradual wavy boundary.

Bx1—16 to 25 inches; mottled yellowish brown (10YR 5/4, 5/6), strong brown (7.5YR 5/6), and yellowish red (5YR 5/6) cherty clay loam; very coarse prismatic structure parting to moderate medium subangular blocky; about 65 percent of the horizontal cross section is firm and brittle; 80 percent chert fragments; very strongly acid; gradual wavy boundary.

Bx2—25 to 60 inches; mottled yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) cherty clay loam; very coarse prismatic structure parting to moderate medium subangular blocky; about 80 percent of the horizontal cross section is firm and brittle; 30 percent chert fragments; gray material is in vertical veins in a polygonal network; few manganese stains; very strongly acid.

Solum thickness exceeds 60 inches. Reaction is strongly acid or very strongly acid except where the soil has been limed. Depth to the fragipan is 15 to 35 inches. Chert content is 15 to 35 percent above the fragipan and 30 to 80 percent in the fragipan.

The A horizon has hue of 10YR, value of 3 through 5, and chroma of 2 through 4.

The B2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 8. Texture is cherty loam, clay loam, or silty clay loam.

The Bx horizon is mottled in shades of gray, yellow, brown, and red. Texture is cherty loam or clay loam.

Stemley soils are geographically associated with Bodine, Cloudland, Dewey, Ennis, Lobelville, and Minvale soils. They contain a fragipan, and none of the associated soils except Cloudland soils have a fragipan. Stemley soils have higher chert content than Cloudland soils.

Toccoa series

The Toccoa series consists of deep, well drained, moderately rapidly permeable soils that formed in thick beds of sandy alluvium. The soils are on first bottoms. Slope ranges from 0 to 2 percent.

Typical pedon of Toccoa sandy loam, about 700 feet east and 300 feet north of the SW corner SE1/4 sec. 10, T. 12 S., R. 7 E.:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) sandy loam; weak fine granular structure; very friable; few fine roots; common flakes of mica; medium acid; clear smooth boundary.

C1—5 to 16 inches; very dark grayish brown (10YR 3/2) sandy loam; massive; very friable; few fine roots; common flakes of mica; medium acid; gradual wavy boundary.

C2—16 to 28 inches; dark brown (10YR 3/3) sandy loam; few medium faint dark yellowish brown (10YR 3/4) mottles; massive; very friable; common flakes of mica; medium acid; gradual wavy boundary.

C3—28 to 60 inches; brown (10YR 4/3) sandy loam; few medium faint dark brown (10YR 3/3), grayish brown (10YR 5/2), and yellowish brown (10YR 5/4) mottles; massive; very friable; common flakes of mica; slightly acid.

Reaction is slightly acid to medium acid in the control section. Flakes of mica are throughout the solum.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 through 4.

The C horizon has hue of 10YR, value of 3 through 5, and chroma of 2 through 6. In most pedons the C horizon is mottled in the lower part with shades of yellow or brown. Texture is sandy loam, loamy sand, or sand.

A buried B horizon, in hue of 10YR, is at a depth of 40 inches or more in some pedons.

Toccoa soils are geographically associated with Choccolocco, Ellisville, and Wickham soils. They contain less clay in the upper part of the subsoil than any of these soils.

Townley series

The Townley series consists of moderately deep, well drained, slowly permeable soils on uplands. These soils formed over shale bedrock or interbedded shale and sandstone. Slope ranges from 3 to 12 percent but is dominantly 6 to 10 percent.

Typical pedon of Townley silt loam, 3 to 12 percent slopes, 100 feet south and 200 feet west of the NE corner, NW1/4SW1/4 sec. 2, T. 10 S., R. 7 E.:

Ap—0 to 5 inches; brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine roots; 10 percent sandstone fragments; medium acid; clear smooth boundary.

B1—5 to 9 inches; strong brown (7.5YR 5/8) silty clay loam; weak fine subangular blocky structure; friable; few fine and medium roots; 10 percent shale and sandstone fragments; medium acid; clear wavy boundary.

B21—9 to 15 inches; yellowish red (5YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; few fine roots; 10 percent shale fragments; very thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B22t—15 to 30 inches; yellowish red (5YR 5/6) silty clay loam; few medium distinct red (2.5YR 4/6) mottles; strong medium subangular blocky structure; firm; 15 percent fragments; very thin patchy clay films on faces of peds; strongly acid; gradual wavy boundary.

B3—30 to 36 inches; mottled reddish yellow (7.5YR 6/6), pinkish gray (7.5YR 7/2), yellowish red (5YR 5/8), and light gray (10YR 7/1) silty clay; moderate medium subangular blocky structure; firm; 40 percent shale fragments; few thin patchy clay films on faces of peds; very strongly acid; gradual wavy boundary.

Cr—36 to 45 inches; partially weathered shale.

Solum thickness ranges from 20 to 40 inches, and depth to shale or interbedded shale and sandstone bedrock ranges from 25 to 40 inches. Reaction is strongly acid to very strongly acid except where the soil has been limed. Content of sandstone and shale fragments in the A and B1 horizons is 10 to 20 percent. Content of shale fragments in the B2t and B3 horizons is 10 to 35 percent.

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

The B1 horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 4 through 8. Texture is loam, clay loam, or silty clay loam.

The B2t horizon has hue of 7.5YR or 5YR, value of 4 through 6, and chroma of 6 or 8. In most pedons it is mottled in the lower part with shades of red, brown, yellow, or gray. Texture is silty clay loam or silty clay.

The B3 horizon is mottled with shades of red, brown, yellow, or gray. Texture is silty clay, clay, or silty clay loam.

Townley soils are geographically associated with Hartsells, Linker, Leesburg, and Nella soils. They have a subsoil with redder hue than Hartsells or Leesburg soils. They have a more clayey subsoil than Hartsells, Leesburg, Linker, or Nella soils.

Waynesboro series

The Waynesboro series consists of deep, well drained, moderately permeable soils that formed in thick beds of alluvium. These soils are on high terraces. Slope ranges from 2 to 15 percent but is dominantly 2 to 6 percent.

Typical pedon of Waynesboro silt loam, 2 to 6 percent slopes, 50 feet south and 800 feet east of the NE corner, SW1/4SE1/4 sec. 36, T. 12 S., R. 6 E.:

Ap—0 to 9 inches; dark yellowish brown (10YR 4/4) silt loam; weak fine granular structure; very friable; common fine flakes of mica; slightly acid; clear smooth boundary.

B1—9 to 12 inches; strong brown (7.5YR 5/6) silty clay loam; weak medium subangular blocky structure; friable; clay coatings on sand grains; common fine flakes of mica; slightly acid; gradual wavy boundary.

B21t—12 to 23 inches; yellowish red (5YR 5/8) clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; clay coatings on sand grains; common fine flakes of mica; very strongly acid; gradual wavy boundary.

B22t—23 to 70 inches; mottled yellowish red (5YR 5/6), red (2.5YR 4/6), and brownish yellow (10YR 6/6) clay; moderate medium subangular blocky structure; firm; few very thin patchy clay films on faces of peds; common fine flakes of mica; very strongly acid.

Solum thickness is 50 to more than 90 inches. Reaction ranges from strongly acid to very strongly acid except in limed areas. Content of coarse fragments in each horizon is 0 to 15 percent, by volume. There are no to common fine flakes of mica throughout the profile.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 through 6.

The B1 horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8. Texture is silty clay loam, sandy clay loam, or clay loam.

The B2t horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. In most pedons it is mottled with shades of brown, red, or yellow. Texture is clay, clay loam, or sandy clay.

Waynesboro soils are geographically associated with Allen, Cedarbluff, Dewey, Holston, Holston Variant, Leesburg, and Nella soils. They have a more clayey subsoil than Allen soils. They are better drained than Cedarbluff soils. They have higher sand content than Dewey soils. They have a subsoil with redder hue than the subsoil in Holston, Holston Variant, and Leesburg soils. They contain less gravel than Leesburg and Nella soils.

Wickham series

The Wickham series consists of deep, well drained, moderately permeable soils that formed in beds of alluvium. These soils are on low stream terraces. Slope ranges from 2 to 6 percent.

Typical pedon of Wickham fine sandy loam, 2 to 6 percent slopes, 100 feet north and 200 feet west of the SE corner, SW1/4SE1/4 sec. 9, T. 12 S., R. 7 E.:

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

B2t—8 to 29 inches; yellowish red (5YR 4/8) sandy clay loam; weak moderate subangular blocky structure; friable; few fine roots; clay bridging and coatings on sand grains; common flakes of mica; medium acid; gradual wavy boundary.

B3—29 to 41 inches; yellowish red (5YR 4/8) loam; common medium distinct strong brown (7.5YR 5/8) and pale brown (10YR 6/3) mottles; weak fine granular structure; friable; few fine roots; clay bridging and coatings on sand grains; common flakes of mica; few manganese stains; strongly acid; gradual wavy boundary.

C—41 to 60 inches; mottled yellowish red (5YR 4/8), strong brown (7.5YR 5/6), and yellowish brown (10YR 5/6) sandy loam; massive; friable; common flakes of mica; very strongly acid.

Solum thickness ranges from 40 to more than 60 inches. There are few to common flakes of mica throughout all horizons. Reaction is strongly acid or very strongly acid except where the soil has been limed.

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

The B1 horizon, where present, has hue of 7.5YR, value of 4 or 5, and chroma of 4 or 6.

The B2t horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8. It is mottled in the lower part in some pedons with shades of red, brown, and yellow.

The B3 and C horizons have the same color ranges as the B2t horizon, or they are mottled in shades of brown, yellow, and red. Texture of the B3 and C horizons is sandy loam or loam.

Wickham soils are geographically associated with Cedarbluff, Choccolocco, Ellisville, McQueen, and Toccoa soils. They are better drained than Cedarbluff soils. They have a subsoil with redder hue than Choccolocco or Ellisville soils. They have a less clayey subsoil than McQueen soils and a more clayey subsoil than Toccoa soils.

Wynnville series

The Wynnville series consists of deep, moderately well drained soils that formed in residuum from sandstone and shale. These soils are moderately permeable above the fragipan and moderately slowly permeable in the fragipan. They are on terraces and uplands. Slope ranges from 2 to 6 percent.

Typical pedon of Wynnville fine sandy loam, 2 to 6 percent slopes, 250 feet south and 400 feet east of the NW corner, SE1/4 sec. 14, T. 10 S., R. 4 E.:

Ap—0 to 8 inches; yellowish brown (10YR 5/4) fine sandy loam; weak very fine granular structure; very friable; many fine and medium roots; slightly acid; abrupt smooth boundary.

B21—8 to 14 inches; yellowish brown (10YR 5/6) sandy clay loam; weak fine subangular blocky structure; very friable; few fine and medium roots; very strongly acid; gradual wavy boundary.

B22—14 to 21 inches; yellowish brown (10YR 5/8) sandy clay loam; few fine faint very pale brown mottles; weak fine subangular blocky structure; friable; clay bridging and coatings on sand grains; very strongly acid; gradual irregular boundary.

Bx1&A'2—21 to 40 inches; yellowish brown (10YR 5/8) sandy clay loam (Bx1 part); tongues and pockets of white (10YR 8/2) sandy clay loam (A'2 part); weak medium subangular blocky structure; yel-

lowish brown part is compact and brittle and makes up about 60 percent of the mass; common vesicular pores; white part is friable; clay bridging and coatings on the sand grains; very strongly acid; gradual irregular boundary.

Bx2—40 to 49 inches; mottled yellowish brown (10YR 5/8), strong brown (7.5YR 5/6), and light gray (10YR 7/1) sandy loam; weak medium platy structure parting to weak medium subangular blocky; compact and brittle in 70 percent of the matrix; clay bridging and coatings on the sand grains; 5 percent sandstone fragments; very strongly acid; gradual irregular boundary.

B2t—49 to 64 inches; strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; clay bridging and coatings on the sand grains; very strongly acid; abrupt smooth boundary.

R—64 inches; hard sandstone bedrock.

Solum thickness ranges from 42 to 70 inches. Reaction is very strongly acid to strongly acid in the control section except where the soil has been limed.

The A horizon has hue of 10YR or 2.5Y, value of 5, and chroma of 3 or 4.

The B1 horizon, where present, has hue of 10YR, value of 5 or 6, and chroma of 6. Texture is sandy loam or loam.

The B2 horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 4 through 8. In some pedons it is mottled with shades of brown. Texture is sandy clay loam or loam.

The Bx horizon is mottled with shades of brown, gray, yellow, and white. Texture is sandy clay loam, loam, or sandy loam.

The B2t horizon, below the fragipan, has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 6 or 8. In some pedons it is mottled with shades of brown and gray.

Wynnville soils are geographically associated with Hartsells, Linker, and Townley soils. None of these associated soils has a fragipan.

Classification of the soils

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965. Readers interested in further details about the system should refer to "Soil taxonomy" (*10*).

The system of classification has six categories. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 19, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to 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 moist, 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 expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Hapludults (*Hapl*, meaning simple horizons, plus *udult*, the suborder of Ultisols that has a udic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups 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 is thought to typify the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, thermic, Typic Hapludults.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Formation of the soils

In this section the major factors of soil formation are described and related to the soils of Etowah County.

Soil results from several factors that influence geologic landforms. These factors are parent material, climate, flora and fauna, relief, and time. They are interrelated to some degree, and the importance of any one factor varies from one location to another.

Parent material .—Parent material is the unconsolidated mass from which a soil forms. Parent material

contributes greatly to the chemical and mineral composition of a soil. The parent material of the soil in Etowah County is predominantly of two kinds: (1) material that is residual from the weathering of rocks in place, and (2) material transported by water or gravity and laid down as unconsolidated deposits of clay, silt, and sand.

Sandstone, shale, and limestone that weathered in place belong to several geologic formations.

Sand, silt, and clay were deposited along the larger streams. These deposits consist of material originally formed on uplands. Soils on first bottoms still receive new soil material and therefore have a weakly developed profile. Soils on terraces, however, having been in place for long periods of time, have distinct horizons. Narrow drainageways in the uplands contain strips of alluvium that has not been modified by soil forming processes.

Climate .—Temperature and precipitation are the two primary climatic factors that affect the physical, chemical, and biological components of the soil. Water dissolves minerals, supports biological activity, and transports mineral and organic residues through the soil profile. Percolation through the soil depends mainly on the amount and intensity of rainfall, relative humidity, and the length of the frost-free period. Physiographic position and permeability also affect the downward percolation rate through the soil. To a great degree the temperature influences the species, distribution, and growth of flora and fauna in and on the soils. The rate of physical and chemical reactions in the soil is also influenced by temperature. Etowah County has a temperate, humid climate.

Flora and fauna .—Trees, grass, earthworms, fungi, bacteria, and other forms of plant and animal life on and in the soil are agents in the soil forming process. Plant and animal populations are largely determined by soil parent material, relief, and length of time that the parent material has been in place. Also climate, population, pressure, natural and manmade barriers, introductions, and cultural practices have influenced the plant and animal population.

The native vegetation in the county was a forest of deciduous trees. Pines were abundant on exposed xeric sites in the mountainous regions. The dominant overstory vegetation on well drained soils on uplands was oak and hickory, and in the drainageways, yellow-poplar, sweetgum, white oak, and red maple. On the better drained soils on bottom lands, the dominant overstory consisted of white oak, birch, ash, maple, yellow-poplar, and loblolly pine. Sweetgum, water oak, willow, and willow oak were dominant on the poorly drained soils on bottom lands. Loblolly pine and shortleaf pines were the dominant pines.

Animals help mix the soil material. Microbes are active in the decay of organic matter, the fixing of nitrogen, and the weathering of parent rock.

Relief .—Relief influences soil formation by its effect on runoff, erosion, movement of water within the soil, plant cover, and to some extent soil temperature. Relief of the county is determined mostly by bedrock and carved stream formations. Etowah County ranges from nearly level to steep; as slopes increase, runoff increases, and less water enters and moves through the soil. The hazard of erosion also increases with increased slope.

In Etowah County soils such as Allen, Holston, and Dewey have slopes of less than 15 percent and have deep, well developed profiles. In the steeper areas soil material is removed about as fast as it accumulates.

Time .—Time is required for the formation of soils that have distinct horizons. Other soil forming factors determine the length of time needed for the development of a soil profile. Usually, less time is required for a soil to develop in a humid, warm region than in a dry or cold region. Fine-textured parent material develops into soil more slowly than coarse-textured material.

The soils of Etowah County range from very young to very old. A young soil lacks well developed, genetically related horizons but often has some characteristics of its parent material. The young soils in Etowah County are on first bottoms and steep hillsides. Ellisville, Toccoa, and Chewacla soils are examples of young soils formed on first bottoms. Material is still being deposited on these soils. They have not been changed enough by the soil forming process to have developed well defined, genetically related horizons.

An old soil is one that has been in place for a long time and is considered to have reached equilibrium with its environment. It has a well developed profile of genetically related horizons. Allen, Dewey, and Nella soils are examples of old soils in Etowah County.

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Glossary

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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

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

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Base saturation. The degree to which material having base exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the 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 frequent flooding.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

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. Synonyms: clay coat, clay skin.

Coarse fragments. Mineral or rock particles up to 3 inches (2 millimeters to 7.5 centimeters) in diameter.

Coarse textured (light textured) soil. Sand or loamy sand.

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

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the bases of steep slopes.

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

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

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.

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 (or contour farming). 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 40 or 80 inches (1 or 2 meters).

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. Bedrock at a depth that adversely affects 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 for 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, as for example in "hillpeats" and "climatic moors."

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

Erosion. The wearing away of the land surface by running 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, for example, fire, that exposes a bare surface.

Excess fines. Excess silt and clay. The soil does not provide a source of gravel or sand for construction purposes.

Favorable. Favorable soil features for the specified use.

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 (heavy textured) soil. Sandy clay, silty clay, and clay.

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

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

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

Foot slope. The inclined surface at the base of a hill.

Forage. Plant material used as feed by domestic animals. Forage can be grazed or cut for hay.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Gleyed soil. A soil having one or more neutral gray horizons as a result of waterlogging and lack of oxygen. The term "gleyed" also designates gray horizons and horizons having yellow and gray mottles as a result of intermittent waterlogging.

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.

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.

Habitat. The natural abode of a plant or animal; refers to the kind of environment in which a plant or animal normally lives, as opposed to the range or geographical distribution.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming 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.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks 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 from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock 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, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Large stones. Rock fragments 10 inches (25 centimeters) or more across. Large stones adversely affect the specified use.

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

Light textured soil. Sand and loamy sand.

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. Inadequate strength for supporting loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is greater than that of organic soil.

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

Miscellaneous areas. Areas that have little or no natural soil, are too nearly inaccessible for orderly examination, or cannot otherwise be feasibly classified.

Moderately coarse textured (moderately light textured) soil. Sandy loam and fine sandy loam.

Moderately fine textured (moderately heavy textured) soil. Clay loam, sandy clay loam, and silty clay loam.

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 single 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.

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

Phase, soil. A subdivision of a soil series or other unit in the soil classification system based on differences in the soil that affect its management. A soil series, for example, may be divided into phases on the bases of differences in slope, stoniness, thickness, or some other characteristic that affects management. These differences are too small to justify separate series.

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

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

Plastic limit. The moisture content at which a soil changes from a semisolid to a plastic state.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents that commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on exposure to repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade, whereas ironstone cannot be cut but can be broken or shattered with a spade. Plinthite is one form of the material that has been called laterite.

Poorly graded. Refers to soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets. Surface or subsurface drainage outlets difficult or expensive to install.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of 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 degree of acidity or alkalinity is expressed as—

	pH
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 accumulates over disintegrating rock.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth. Shallow root zone. The soil is shallow over a layer that greatly restricts roots. See Root zone.

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

Runoff. The precipitation discharged in stream channels from a drainage area. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils, formed from a particular type of parent material, having horizons that, except for the texture of the A or surface horizon, are similar in all profile characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineralogical and chemical composition.

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

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Sinkhole. A depression in a landscape where limestone has been locally dissolved.

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.

Slow refill. The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones. Rock fragments 3 to 10 inches (7.5 to 25 centimeters) in diameter. Small stones adversely affect the specified use.

Soil. A natural, three-dimensional body at the earth's surface that 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 of separates recognized in the United States are as follows: *very coarse sand* (2.0 millimeters to 1.0 millimeter); *coarse sand* (1.0 to 0.5 millimeter); *medium sand* (0.5 to 0.25 millimeter); *fine sand* (0.25 to 0.10 millimeter); *very fine sand* (0.10 to 0.05 millimeter); *silt* (0.005 to 0.002 millimeter); and *clay* (less than 0.002 millimeter).

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stratified. Arranged in strata, or layers. The term refers to geologic material. Layers in soils that result from the processes of soil formation are called horizons; those inherited from the parent material are called strata.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates that are separated from adjoining aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular. Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Surface soil. 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 across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, 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."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil (engineering). Presumably a fertile soil or soil material, or one that responds to fertilization, ordinarily rich in organic matter, used to topdress roadbanks, lawns, and gardens.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Illustrations

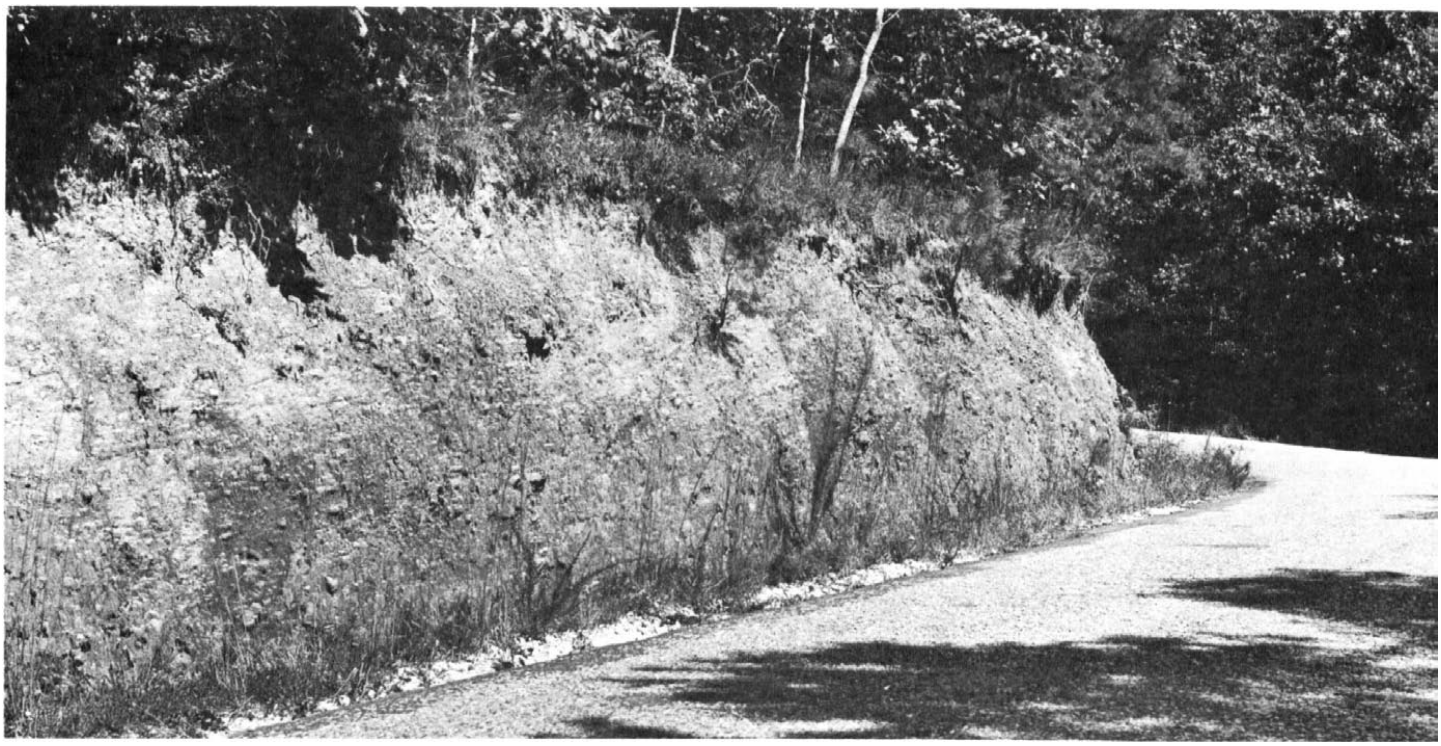

Figure 1.—This road cut has exposed pebbles and cobbles in a profile of Nella cobbly loam, 2 to 10 percent slopes, in an area of the Nella-Allen-Rock outcrop unit on the general soil map.

Figure 2.—Coastal bermudagrass on an area of Holston fine sandy loam, 1 to 5 percent slopes, in an area of the Holston-Cloudland-Cedarbluff unit on the general soil map.

Figure 3.—The high volume of chert fragments in Bodine cherty silt loam, 6 to 15 percent slopes, makes root penetration difficult.

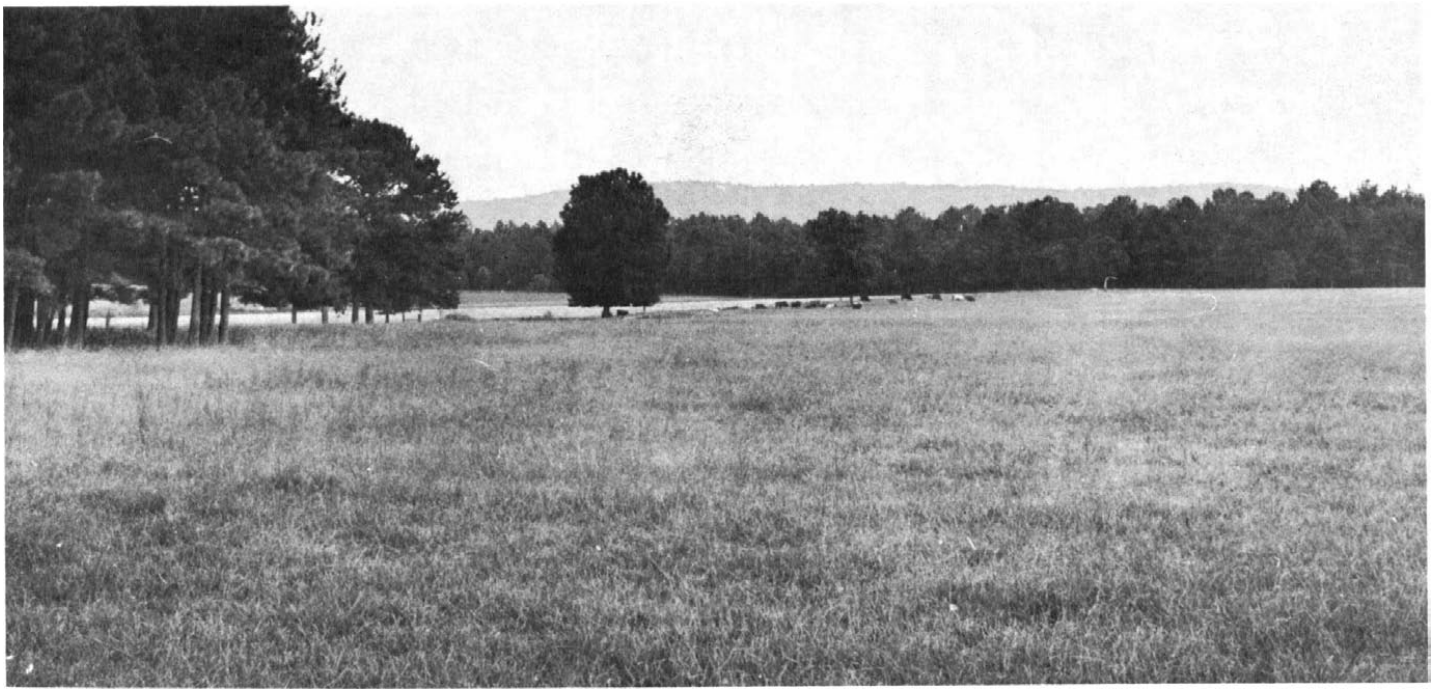

Figure 4.—Fescue pasture on an area of Conasauga loam, 1 to 5 percent slopes.

Figure 5.—Conasauga loam, 1 to 5 percent slopes, has good potential for hay and pasture.

Figure 6.—Holston fine sandy loam, 1 to 5 percent slopes, has good potential for cotton.

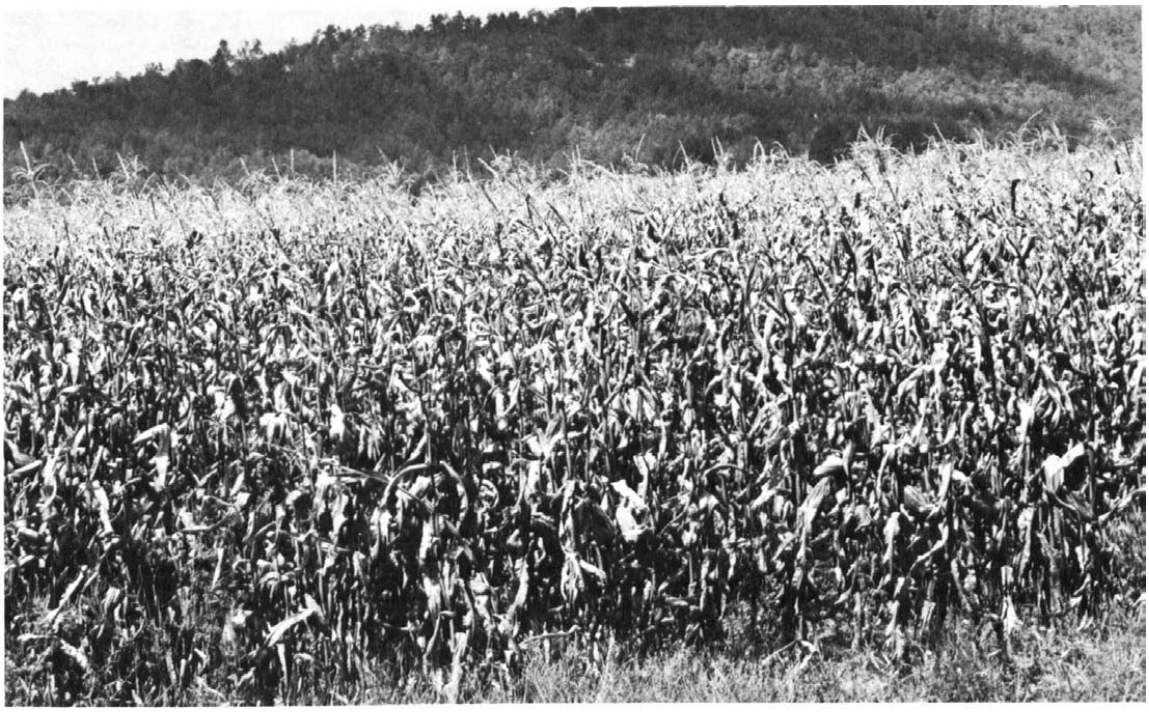

Figure 7.—Corn on Holston Variant fine sandy loam, 2 to 6 percent slopes. The area in the background is Minvale-Bodine association, steep.

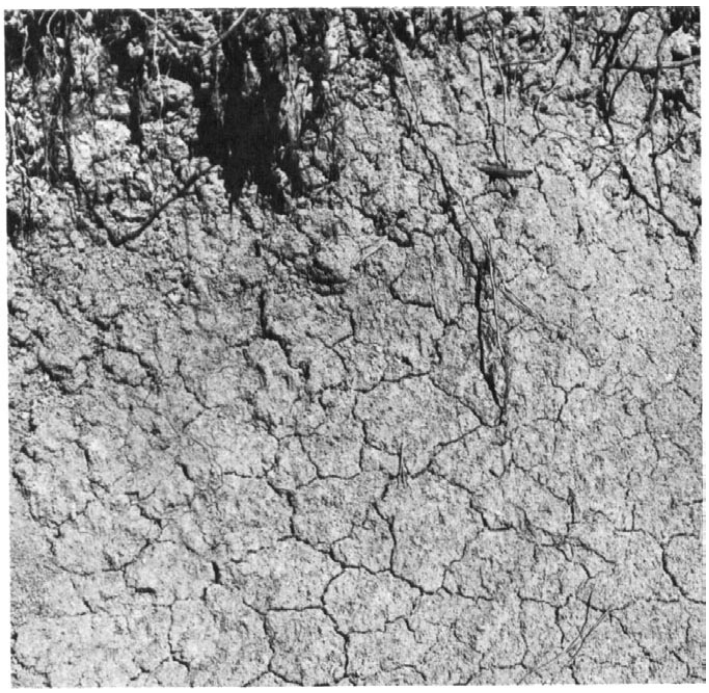

Figure 8.—The cracks in this profile of Firestone silt loam, 6 to 15 percent slopes, show the high shrink-swell potential of the soil.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION DATA

Month	Temperature[1]						Precipitation[1]				
	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[2]	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	51.7	31.7	41.7	73	6	24	5.16	3.11	6.99	8	.7
February	56.0	33.8	44.9	77	12	71	4.92	2.66	6.75	7	.4
March	64.1	40.0	51.9	83	20	159	5.65	3.76	7.37	8	.0
April	74.8	49.4	62.2	88	30	366	5.66	3.68	7.45	7	.0
May	81.9	56.4	69.2	94	38	595	4.36	2.17	6.14	7	.0
June	87.4	63.6	75.5	98	47	765	3.77	1.94	5.26	6	.0
July	90.2	67.3	78.8	99	55	893	4.50	2.44	6.17	8	.0
August	90.2	66.4	78.3	99	54	877	3.13	1.33	4.59	5	.0
September	85.0	60.9	73.0	98	40	690	3.16	.98	4.89	5	.0
October	74.6	48.4	61.5	89	27	357	2.55	1.19	3.68	4	.0
November	63.1	38.7	50.9	81	19	82	3.88	2.53	5.10	6	.0
December	54.4	33.6	44.0	74	13	56	5.52	2.95	7.61	7	.0
Year	72.8	49.2	61.0	101	5	4,935	52.26	44.83	59.38	78	1.1

[1]Recorded in the period 1953-74 at Gadsden, Alabama.

[2]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 F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

Probability	Temperature[1]		
	24 F or lower	28 F or lower	32 F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 29	April 6	April 20
2 years in 10 later than--	March 21	April 1	April 16
5 years in 10 later than--	March 7	March 21	April 7
First freezing temperature in fall:			
1 year in 10 earlier than--	October 30	October 25	October 19
2 years in 10 earlier than--	November 5	October 29	October 23
5 years in 10 earlier than--	November 15	November 6	October 30

[1]Recorded in the period 1953-74 at Gadsden, Alabama.

TABLE 3.--GROWING SEASON LENGTH

Probability	Daily minimum temperature during growing season[1]		
	Higher than 24 F	Higher than 28 F	Higher than 32 F
	Days	Days	Days
9 years in 10	227	211	189
8 years in 10	236	217	195
5 years in 10	253	229	206
2 years in 10	270	241	217
1 year in 10	279	247	222

[1]Recorded in the period 1953-74 at Gadsden, Alabama.

TABLE 4.--POTENTIALS AND LIMITATIONS OF MAP UNITS ON THE GENERAL SOIL MAP FOR SPECIFIED USES

Map unit	Extent of area	Cultivated farm crops	Specialty crops	Woodland	Urban uses	Intensive recreation areas	Extensive recreation areas
	Pct						
1. Nella-Allen-Rock outcrop	11	Poor: slope, large stones.	Poor: slope, large stones.	Fair: slope, large stones.	Poor: slope, large stones.	Poor: slope, large stones.	Good.
2. Townley-Leesburg-Palmerdale.	1	Fair: slope.	Poor: slope.	Fair: slope.	Poor: slope, depth to rock.	Poor: slope, small stones.	Good.
3. Minvale-Bodine-Townley--	2	Poor: slope.	Poor: slope.	Good----------	Poor: slope.	Poor: slope.	Good.
4. Hartsells-Linker-Townley	28	Good to fair: slope, depth to rock.	Fair: slope, depth to rock.	Fair: depth to rock.	Poor: depth to rock.	Fair: slope.	Good.
5. Minvale-Bodine----------	8	Poor: slope, small stones.	Poor: slope.	Good----------	Poor: slope.	Poor: slope, small stones.	Good.
6. Minvale-Dewey-Bodine----	10	Fair: slope, small stones.	Poor: slope, small stones.	Good----------	Fair: slope.	Good----------	Good.
7. Allen-Dewey----------	2	Fair: slope, small stones.	Poor: slope, small stones.	Good----------	Good to fair: slope, low strength.	Fair: slope, small stones.	Good.
8. Conasauga-Firestone-----	19	Fair: slope, depth to rock.	Poor: slope, depth to rock.	Fair: too clayey.	Poor: low strength, shrink-swell, percs slowly.	Poor: wetness, percs slowly.	Fair: too clayey.
9. Holston-Cloudland-Cedarbluff.	10	Good----------	Fair: wetness.	Good----------	Good to poor: floods, wetness.	Good----------	Good.
10. Chewacla-Choccolocco---	8	Fair to good: floods.	Poor: floods, wetness.	Good----------	Poor: floods, wetness.	Fair: floods, wetness.	Fair: wetness.
11. Chewacla-Ennis-Stemley	1	Fair to poor: floods, wetness.	Poor: floods, wetness.	Good----------	Poor: floods, wetness.	Poor: floods, wetness, small stones.	Fair: wetness.

TABLE 5.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
1	Allen fine sandy loam, 2 to 6 percent slopes	1,500	0.4
2	Allen fine sandy loam, 6 to 10 percent slopes	1,200	0.3
3	Allen gravelly fine sandy loam, 2 to 6 percent slopes	800	0.2
4	Allen gravelly fine sandy loam, 6 to 10 percent slopes	2,000	0.6
5	Allen sandy clay loam, 2 to 10 percent slopes, eroded	2,400	0.7
6	Allen-Rock outcrop association, steep	7,950	2.2
7	Bodine cherty silt loam, 6 to 15 percent slopes	3,350	0.9
8	Cedarbluff fine sandy loam	5,750	1.6
9	Chewacla silt loam	16,150	4.5
10	Choccolocco silt loam	3,850	1.1
11	Cloudland loam, 0 to 3 percent slopes	8,500	2.4
12	Conasauga loam, 1 to 5 percent slopes	25,000	7.0
13	Conasauga loam, 5 to 15 percent slopes	610	0.2
14	Conasauga-Firestone loams, 15 to 30 percent slopes	2,350	0.7
15	Conasauga-Rock outcrop complex, 2 to 6 percent slopes	1,100	0.3
16	Conasauga-Rock outcrop complex, 6 to 25 percent slopes	2,000	0.6
17	Conasauga-Urban land complex, 2 to 15 percent slopes	5,800	1.6
18	Dewey silt loam, 2 to 6 percent slopes	3,450	1.0
19	Dewey silt loam, 6 to 10 percent slopes	1,600	0.5
20	Dewey silty clay loam, 6 to 15 percent slopes, eroded	1,800	0.5
21	Ellisville loam	1,950	0.5
22	Ennis-Lobelville cherty loams	4,750	1.3
23	Firestone loam, 2 to 6 percent slopes	4,400	1.2
24	Firestone silt loam, 6 to 15 percent slopes	6,500	1.8
25	Firestone-Leesburg complex, 15 to 45 percent slopes	1,400	0.4
26	Gaylesville silt loam	7,800	2.2
27	Hartsells fine sandy loam, 2 to 6 percent slopes	16,250	4.6
28	Hartsells fine sandy loam, 6 to 15 percent slopes	24,700	7.0
29	Hartsells-Rock outcrop complex, 2 to 10 percent slopes	6,700	1.9
30	Hartsells-Urban land complex, 2 to 15 percent slopes	1,140	0.3
31	Hartsells-Rock outcrop association, steep	4,050	1.1
32	Holston fine sandy loam, 1 to 5 percent slopes	11,750	3.3
33	Holston-Urban land complex, 2 to 15 percent slopes	5,450	1.5
34	Holston Variant fine sandy loam, 2 to 6 percent slopes	1,900	0.5
35	Leadvale silt loam, 1 to 5 percent slopes	1,700	0.5
36	Leesburg gravelly sandy loam, 2 to 6 percent slopes	790	0.2
37	Leesburg gravelly sandy loam, 6 to 15 percent slopes	3,300	0.9
38	Linker fine sandy loam, 2 to 6 percent slopes	580	0.2
39	Linker fine sandy loam, 6 to 15 percent slopes	3,350	0.9
40	Linker-Townley complex, 15 to 30 percent slopes	28,000	8.0
41	Linker-Urban land complex, 15 to 30 percent slopes	650	0.2
42	McQueen fine sandy loam, 2 to 6 percent slopes	1,570	0.4
43	Minvale cherty loam, 2 to 6 percent slopes	4,550	1.3
44	Minvale cherty loam, 6 to 15 percent slopes	13,750	3.9
45	Minvale-Bodine complex, 15 to 30 percent slopes	17,500	4.9
46	Minvale-Urban land complex, 2 to 15 percent slopes	1,250	0.4
47	Minvale-Urban land complex, 15 to 45 percent slopes	550	0.2
48	Minvale-Bodine association, steep	9,400	2.6
49	Minvale-Townley association, steep	3,100	0.9
50	Nella gravelly sandy loam, 10 to 25 percent slopes	700	0.2
51	Nella cobbly loam, 2 to 10 percent slopes	390	0.1
52	Nella association, steep	4,150	1.2
53	Nella-Allen association, steep	6,750	1.9
54	Nella-Rock outcrop association, steep	11,300	3.2
55	Nella-Townley association, steep	9,300	2.6
56	Palmerdale soils, 2 to 60 percent slopes	820	0.2
57	Pits	1,300	0.4
58	Stemley cherty loam, 1 to 5 percent slopes	4,150	1.2
59	Toccoa sandy loam	740	0.2
60	Townley silt loam, 3 to 12 percent slopes	8,400	2.4
61	Townley association, steep	920	0.3
62	Townley-Leesburg association, steep	2,700	0.8
63	Urban land	2,900	0.8
64	Waynesboro silt loam, 2 to 6 percent slopes	1,060	0.3
65	Waynesboro silt loam, 6 to 15 percent slopes	1,540	0.4
66	Wickham fine sandy loam, 2 to 6 percent slopes	790	0.2
67	Wynnville fine sandy loam, 2 to 6 percent slopes	2,950	0.8
	Water	8,400	2.4
	Total	355,200	100.0

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE

[All yields were estimated for a high level of management in 1976. Absence of a yield figure indicates the crop is seldom grown or is not suited]

Soil name and map symbol	Cotton lint	Corn	Soybeans	Improved bermuda-grass	Grass hay	Grass-clover	Corn silage
	Lb	Bu	Bu	AUM*	Ton	AUM*	Ton
1---------- Allen	800	85	35	9.0	4.8	8.0	20
2---------- Allen	650	75	30	8.0	4.0	6.5	17
3---------- Allen	750	75	30	8.5	4.5	7.5	17
4---------- Allen	600	70	27	7.5	3.8	6.0	15
5---------- Allen	600	70	25	7.5	3.5	6.0	15
6**: Allen----------	---	---	---	---	---	---	---
Rock outcrop.							
7---------- Bodine	---	---	---	5.0	2.5	4.0	---
8---------- Cedarbluff	---	50	25	---	3.8	6.5	---
9---------- Chewacla	---	80	30	---	4.5	7.0	---
10---------- Choccolocco	850	95	35	10.0	7.0	7.5	22
11---------- Cloudland	700	75	25	7.0	4.5	7.5	17
12---------- Conasauga	750	60	30	---	3.8	6.0	12
13---------- Conasauga	---	---	---	---	3.5	5.0	---
14---------- Conasauga	---	---	---	---	---	4.0	---
15---------- Conasauga	---	---	---	---	---	5.0	---
16---------- Conasauga	---	---	---	---	---	---	---
17---------- Conasauga	---	---	---	---	---	---	---
18---------- Dewey	850	80	32	9.5	5.0	8.5	20
19---------- Dewey	800	70	28	9.0	4.8	8.0	18
20---------- Dewey	700	50	25	7.5	4.5	7.2	15
21---------- Ellisville	750	100	40	10.0	7.0	7.5	24

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Cotton lint	Corn	Soybeans	Improved bermuda-grass	Grass hay	Grass-clover	Corn silage
	Lb	Bu	Bu	AUM*	Ton	AUM*	Ton
22---------- Ennis	---	70	28	---	3.4	6.5	17
23---------- Firestone	500	50	25	7.0	5.0	8.0	12
24---------- Firestone	---	---	---	6.0	4.5	7.0	---
25---------- Firestone	---	---	---	---	---	---	---
26---------- Gaylesville	---	50	25	---	3.8	6.5	---
27---------- Hartsells	900	85	35	8.0	4.5	8.0	18
28---------- Hartsells	750	75	25	6.5	3.0	7.0	15
29---------- Hartsells	---	---	---	---	---	---	---
30---------- Hartsells	---	---	---	---	---	---	---
31**: Hartsells---------- Rock outcrop.	---	---	---	---	---	---	---
32---------- Holston	1,000	90	38	10.0	6.0	7.5	22
33---------- Holston	---	---	---	---	---	---	---
34---------- Holston Variant	900	85	35	9.0	6.0	7.5	20
35---------- Leadvale	750	75	33	8.0	5.2	7.0	15
36---------- Leesburg	700	70	25	8.0	5.5	6.5	16
37---------- Leesburg	600	60	22	7.0	4.5	5.5	14
38---------- Linker	900	85	35	8.0	4.5	8.0	18
39---------- Linker	700	75	25	6.5	3.0	7.0	15
40---------- Linker	---	---	---	---	---	---	---
41---------- Linker	---	---	---	---	---	---	---
42---------- McQueen	900	80	35	10.0	5.5	9.5	17
43---------- Minvale	700	70	30	8.5	5.2	6.5	16
44---------- Minvale	650	65	25	8.0	5.0	6.0	14

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Cotton lint	Corn	Soybeans	Improved bermuda-grass	Grass hay	Grass-clover	Corn silage
	Lb	Bu	Bu	AUM*	Ton	AUM*	Ton
45---------- Minvale	---	---	---	---	---	---	---
46---------- Minvale	---	---	---	---	---	---	---
47---------- Minvale	---	---	---	---	---	---	---
48**: Minvale----------	---	---	---	---	---	---	---
Bodine----------	---	---	---	---	---	---	---
49**: Minvale----------	---	---	---	---	---	---	---
Townley----------	---	---	---	---	---	---	---
50---------- Nella	---	---	---	---	---	6.0	---
51---------- Nella	---	---	---	---	---	5.5	12
52**---------- Nella	---	---	---	---	---	---	---
53**: Nella----------	---	---	---	---	---	---	---
Allen----------	---	---	---	---	---	---	---
54**: Nella---------- Rock outcrop.	---	---	---	---	---	---	---
55**: Nella----------	---	---	---	---	---	---	---
Townley----------	---	---	---	---	---	---	---
56---------- Palmerdale	---	---	---	---	---	5.5	---
57**. Pits							
58---------- Stemley	---	55	22	6.0	4.0	6.0	12
59---------- Toccoa	600	80	25	---	4.0	6.5	18
60---------- Townley	450	40	25	---	3.5	5.5	10
61**---------- Townley	---	---	---	---	---	---	---
62**: Townley---------- Leesburg.	---	---	---	---	---	---	---
63**. Urban land							

See footnotes at end of table.

TABLE 6.--YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Cotton lint	Corn	Soybeans	Improved bermuda-grass	Grass hay	Grass-clover	Corn silage
	Lb	Bu	Bu	AUM*	Ton	AUM*	Ton
64---------- Waynesboro	800	90	35	10.0	6.0	9.5	22
65---------- Waynesboro	700	80	33	9.0	5.5	8.5	20
66---------- Wickham	800	100	35	10.0	6.0	8.0	22
67---------- Wynnville	750	75	35	8.0	4.0	8.0	17

* 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 a period of 30 days.

** See mapping unit description for the composition and behavior of the mapping unit.

TABLE 7.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Soils suitable for production of commercial trees are listed in this table. Absence of an entry in a column means the information was not available. Site index was calculated at age 30 for eastern cottonwood, at age 35 for American sycamore, and at age 50 for all other species]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
1, 2, 3, 4--------- Allen	3o	Slight	Slight	Slight	Slight	Yellow-poplar------- Shortleaf pine------ Virginia pine------- Southern red oak----	87 72 73 71	Yellow-poplar, loblolly pine.
5---------- Allen	4c	Moderate	Severe	Severe	Slight	Shortleaf pine------ Virginia pine------- Eastern redcedar----	65 68 50	Virginia pine, loblolly pine.
6*: Allen----------	3r	Moderate	Moderate	Slight	Slight	Yellow-poplar------- Virginia pine------- Southern red oak---- Shortleaf pine------	87 73 71 71	Yellow-poplar, loblolly pine.
Rock outcrop.								
7---------- Bodine	3f	Slight	Moderate	Moderate	Slight	Shortleaf pine------ Yellow-poplar------- Southern red oak---- Black oak----------	60 90 70 70	Loblolly pine.
8---------- Cedarbluff	2w	Slight	Moderate	Slight	Moderate	Loblolly pine------- Sweetgum---------- Yellow-poplar-------	75 80 90	Yellow-poplar, loblolly pine.
9---------- Chewacla	1w	Slight	Moderate	Moderate	Moderate	Loblolly pine------- Yellow-poplar------- American sycamore--- Sweetgum---------- Water oak---------- Eastern cottonwood-- Green ash---------- Southern red oak----	96 104 90 97 86 100 97 90	Loblolly pine, American sycamore, yellow-poplar, sweetgum, green ash.
10---------- Choccolocco	3o	Slight	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ Southern red oak---- Virginia pine-------	80 70 70 70	Loblolly pine, Virginia pine, yellow-poplar.
11---------- Cloudland	3o	Slight	Slight	Slight	Slight	Loblolly pine------- Shortleaf pine------ Yellow-poplar-------	77 66 100	Loblolly pine, yellow-poplar.
12, 13---------- Conasauga	3c	Slight	Slight	Moderate	Moderate	Shortleaf pine------ Virginia pine------- Loblolly pine------- Eastern redcedar----	72 60 72 50	Loblolly pine.
14*: Conasauga---------	3c	Slight	Slight	Moderate	Moderate	Shortleaf pine------ Virginia pine------- Loblolly pine------- Eastern redcedar----	72 60 72 50	Loblolly pine.
Firestone---------	4c	Slight	Slight	Moderate	Slight	Loblolly pine------- Shortleaf pine------ Virginia pine-------	70 60 70	Loblolly pine.

See footnote at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
15*, 16*:								
Conasauga	3c	Slight	Slight	Moderate	Moderate	Shortleaf pine	72	Loblolly pine.
						Virginia pine	60	
						Loblolly pine	72	
						Eastern redcedar	50	
Rock outcrop.								
17*:								
Conasauga	3c	Slight	Slight	Moderate	Moderate	Shortleaf pine	72	Loblolly pine.
						Virginia pine	60	
						Loblolly pine	72	
						Eastern redcedar	50	
Urban land.								
18, 19 Dewey	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Yellow-poplar, black walnut, loblolly pine.
						White oak	70	
						Southern red oak	70	
						Shortleaf pine	73	
						Virginia pine	70	
						Loblolly pine	78	
20 Dewey	4c	Moderate	Severe	Moderate	Slight	Loblolly pine	70	Loblolly pine, eastern redcedar.
						Virginia pine	60	
						Eastern redcedar	40	
21 Ellisville	1o	Slight	Slight	Slight	Slight	Water oak	100	Water oak, yellow-poplar, sweetgum, loblolly pine.
						Yellow-poplar	110	
						Sweetgum	100	
						Loblolly pine	90	
22*:								
Ennis	2o	Slight	Slight	Slight	Slight	Yellow-poplar	100	Yellow-poplar, black walnut, loblolly pine.
						White oak	80	
						Loblolly pine	90	
						Black walnut	---	
Lobelville	2w	Slight	Moderate	Slight	Slight	Yellow-poplar	94	Yellow-poplar, black walnut, loblolly pine.
						Southern red oak	76	
						Loblolly pine	90	
						Black walnut	---	
						White oak	---	
23, 24 Firestone	4o	Slight	Slight	Slight	Slight	Loblolly pine	70	Loblolly pine.
						Shortleaf pine	60	
						Virginia pine	70	
25*:								
Firestone	4c	Slight	Slight	Slight	Slight	Loblolly pine	70	Loblolly pine, Virginia pine.
						Shortleaf pine	60	
						Virginia pine	70	
Leesburg	3r	Slight	Moderate	Slight	Slight	Yellow-poplar	90	Yellow-poplar, loblolly pine, Virginia pine.
						Loblolly pine	85	
						Virginia pine	70	
						Shortleaf pine	70	
26 Gaylesville	3w	Slight	Moderate	Slight	Moderate	Yellow-poplar	90	Yellow-poplar, loblolly pine.
						Sweetgum	80	
						Loblolly pine	70	
27, 28 Hartsells	4o	Slight	Slight	Slight	Slight	Loblolly pine	70	Loblolly pine, Virginia pine.
						Shortleaf pine	60	
						Virginia pine	60	

See footnote at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
29*:								
Hartsells	4o	Slight	Slight	Slight	Slight	Loblolly pine	70	Loblolly pine,
						Shortleaf pine	60	Virginia pine.
						Virginia pine	60	
Rock outcrop.								
30*:								
Hartsells	4o	Slight	Slight	Slight	Slight	Loblolly pine	70	Loblolly pine,
						Shortleaf pine	60	Virginia pine.
						Virginia pine	60	
Urban land.								
31*:								
Hartsells	4o	Slight	Slight	Slight	Slight	Loblolly pine	70	Loblolly pine,
						Shortleaf pine	60	Virginia pine.
						Virginia pine	60	
Rock outcrop.								
32 Holston	3o	Slight	Slight	Slight	Slight	Yellow-poplar	86	Loblolly pine,
						Northern red oak	78	Virginia pine.
						Shortleaf pine	69	
						Loblolly pine	85	
						Virginia pine	73	
33*:								
Holston	3o	Slight	Slight	Slight	Slight	Yellow-poplar	86	Loblolly pine,
						Northern red oak	78	Virginia pine.
						Shortleaf pine	69	
						Loblolly pine	85	
						Virginia pine	73	
Urban land.								
34 Holston Variant	3o	Slight	Slight	Slight	Slight	Loblolly pine	85	Loblolly pine,
						Upland oaks	80	Virginia pine,
						Yellow-poplar	85	yellow-poplar,
						Shortleaf pine	70	black walnut.
						Virginia pine	70	
35 Leadvale	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Loblolly pine,
						White oak	70	Virginia pine.
						Loblolly pine	80	
						Shortleaf pine	70	
						Virginia pine	70	
36, 37 Leesburg	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Yellow-poplar,
						Loblolly pine	85	loblolly pine,
						Virginia pine	70	Virginia pine,
						Shortleaf pine	70	shortleaf pine.
38, 39 Linker	4o	Slight	Slight	Slight	Slight	Loblolly pine	65	Loblolly pine,
						Shortleaf pine	65	Virginia pine.
						Virginia pine	70	
40*:								
Linker	4o	Slight	Slight	Slight	Slight	Loblolly pine	65	Loblolly pine,
						Shortleaf pine	65	Virginia pine.
						Virginia pine	70	
Townley	4r	Moderate	Moderate	Slight	Slight	Loblolly pine	70	Loblolly pine,
						Virginia pine	65	Virginia pine.
						Shortleaf pine	60	

See footnote at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
41*:								
Linker	4o	Slight	Slight	Slight	Slight	Loblolly pine	65	Loblolly pine, Virginia pine.
						Shortleaf pine	65	
						Virginia pine	70	
Urban land.								
42 McQueen	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Yellow-poplar, loblolly pine.
						Loblolly pine	80	
						Shortleaf pine	70	
						Sweetgum	80	
43, 44 Minvale	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Yellow-poplar, black walnut, loblolly pine.
						Shortleaf pine	70	
						Loblolly pine	80	
						Virginia pine	70	
						Upland oaks	60	
						Black walnut	---	
45*:								
Minvale	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Yellow-poplar, black walnut, loblolly pine.
						Shortleaf pine	70	
						Loblolly pine	80	
						Virginia pine	70	
						White oak	60	
						Black walnut	---	
Bodine	3f	Slight	Moderate	Moderate	Slight	Shortleaf pine	60	Loblolly pine.
						Yellow-poplar	90	
						Red oaks	70	
						Black oak	70	
46*, 47*:								
Minvale	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Yellow-poplar, black walnut, loblolly pine.
						Shortleaf pine	70	
						Loblolly pine	80	
						Virginia pine	70	
						White oak	60	
						Black walnut	---	
Urban land.								
48*:								
Minvale	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Yellow-poplar, black walnut, loblolly pine.
						Shortleaf pine	70	
						Loblolly pine	80	
						Virginia pine	70	
						White oak	60	
						Black walnut	---	
Bodine	3f	Slight	Moderate	Moderate	Slight	Shortleaf pine	60	Loblolly pine.
						Yellow-poplar	90	
						Red oaks	70	
						Black oak	70	
49*:								
Minvale	3o	Slight	Slight	Slight	Slight	Yellow-poplar	90	Yellow-poplar, black walnut, loblolly pine.
						Shortleaf pine	70	
						Loblolly pine	80	
						Virginia pine	70	
						White oak	60	
						Black walnut	---	
Townley	4r	Moderate	Moderate	Slight	Slight	Loblolly pine	70	Loblolly pine, Virginia pine.
						Virginia pine	65	
						Shortleaf pine	60	

See footnote at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
50, 51, 52*-------- Nella	3x	Slight	Moderate	Slight	Slight	Yellow-poplar------- Shortleaf pine------ Virginia pine------- Northern red oak---- Eastern redcedar---- White ash---------- Black walnut--------	87 71 73 71 61 --- ---	Yellow-poplar, Virginia pine, loblolly pine, black walnut.
53*: Nella----------	3x	Slight	Moderate	Slight	Slight	Yellow-poplar------- Shortleaf pine------ Virginia pine------- Northern red oak---- Eastern redcedar---- White ash---------- Black walnut--------	87 71 73 71 61 --- ---	Yellow-poplar, Virginia pine, loblolly pine, black walnut.
Allen----------	3r	Moderate	Moderate	Slight	Slight	Yellow-poplar------- Virginia pine------- Upland oaks--------- Eastern redcedar----	87 73 71 61	Yellow-poplar, loblolly pine, Virginia pine.
54*: Nella----------	3x	Slight	Moderate	Slight	Slight	Yellow-poplar------- Shortleaf pine------ Virginia pine------- Northern red oak---- Eastern redcedar---- White ash---------- Black walnut--------	87 71 73 71 61 --- ---	Yellow-poplar, Virginia pine, loblolly pine, black walnut.
Rock outcrop.								
55*: Nella----------	3x	Slight	Moderate	Slight	Slight	Yellow-poplar------- Shortleaf pine------ Virginia pine------- Northern red oak---- Eastern redcedar---- White ash---------- Black walnut--------	87 71 73 71 61 --- ---	Yellow-poplar, Virginia pine, loblolly pine. black walnut.
Townley----------	4r	Moderate	Moderate	Slight	Slight	Loblolly pine------- Virginia pine------- Shortleaf pine------	70 65 60	Loblolly pine, Virginia pine.
56*--------------- Palmerdale	3x	Severe	Severe	Moderate	Slight	Yellow-poplar------- Shortleaf pine------ Loblolly pine------- Virginia pine------- Red oaks---------- American sycamore---	90 70 80 70 70 ---	Yellow-poplar, loblolly pine, Virginia pine, American sycamore.
58--------------- Stemley	3o	Slight	Slight	Slight	Moderate	Yellow-poplar------- White oak---------- Shortleaf pine------ Loblolly pine-------	90 70 72 78	Yellow-poplar, black walnut, loblolly pine.
59--------------- Toccoa	1o	Slight	Slight	Slight	Slight	Loblolly pine------- Yellow-poplar------- Sweetgum---------- Red oaks----------	90 107 100 90	Loblolly pine, yellow-poplar, American sycamore, cherrybark oak.
60--------------- Townley	4o	Slight	Slight	Slight	Slight	Loblolly pine------- Virginia pine------- Shortleaf pine------	70 65 60	Loblolly pine, Virginia pine.

See footnote at end of table.

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

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	
61*---------- Townley	4r	Moderate	Moderate	Slight	Slight	Loblolly pine-------	70	Loblolly pine,
						Virginia pine-------	65	Virginia pine.
						Shortleaf pine------	60	
62*:								
Townley----------	4r	Moderate	Moderate	Slight	Slight	Loblolly pine-------	70	Loblolly pine,
						Virginia pine-------	65	Virginia pine.
						Shortleaf pine------	60	
Leesburg----------	3r	Slight	Moderate	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar,
						Loblolly pine-------	85	loblolly pine,
						Virginia pine-------	70	Virginia pine.
						Shortleaf pine------	70	
64, 65---------- Waynesboro	3o	Slight	Slight	Slight	Slight	Yellow-poplar-------	90	Yellow-poplar,
						White oak----------	75	black walnut,
						Loblolly pine-------	80	loblolly pine,
						Shortleaf pine------	70	Virginia pine.
						Virginia pine-------	75	
66---------- Wickham	2o	Slight	Slight	Slight	Slight	Loblolly pine-------	90	Loblolly pine,
						Slash pine----------	90	yellow-poplar.
						Yellow-poplar-------	100	
						Southern red oak----	---	
67---------- Wynnville	3o	Slight	Slight	Slight	Slight	Loblolly pine-------	76	Loblolly pine,
						Shortleaf pine------	70	yellow-poplar.
						Yellow-poplar-------	90	
						Southern red oak----	70	

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 8.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1---------- Allen	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight.
2---------- Allen	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
3---------- Allen	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight.
4---------- Allen	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
5---------- Allen	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight.
6*: Allen----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
7---------- Bodine	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
8---------- Cedarbluff	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
9---------- Chewacla	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
10---------- Choccolocco	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
11---------- Cloudland	Moderate: wetness, floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: low strength, floods.
12---------- Conasauga	Moderate: depth to rock.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength, depth to rock.	Moderate: shrink-swell, low strength.	Severe: low strength.
13---------- Conasauga	Moderate: slope, depth to rock.	Moderate: shrink-swell, low strength, slope.	Moderate: shrink-swell, low strength, slope.	Severe: slope.	Severe: low strength.
14*: Conasauga--------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Firestone--------	Severe: slope, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell, slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
15*:					
Conasauga	Moderate: depth to rock.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength, depth to rock.	Moderate: shrink-swell, low strength, slope.	Severe: low strength.
Rock outcrop.					
16*:					
Conasauga	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Rock outcrop.					
17*:					
Conasauga	Moderate: slope, depth to rock.	Moderate: shrink-swell, low strength, slope.	Moderate: shrink-swell, low strength, slope.	Severe: slope.	Severe: low strength.
Urban land.					
18--- Dewey	Severe: too clayey.	Slight	Slight	Moderate: slope, low strength.	Moderate: low strength.
19, 20--- Dewey	Severe: too clayey.	Moderate: slope, low strength.	Moderate: low strength, slope.	Severe: slope.	Moderate: slope, low strength.
21--- Ellisville	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
22*:					
Ennis	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
Lobelville	Severe: floods, wetness.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods.
23--- Firestone	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.
24--- Firestone	Severe: too clayey.	Severe: low strength, shrink-swell.	Severe: low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell.
25*:					
Firestone	Severe: slope, too clayey.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: slope, low strength, shrink-swell.	Severe: low strength, shrink-swell, slope.
Leesburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
26--- Gaylesville	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.
27--- Hartsells	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
28---------- Hartsells	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.
29*: Hartsells-------- Rock outcrop.	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
30*: Hartsells-------- Urban land.	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock.
31*: Hartsells-------- Rock outcrop.	Severe: depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Severe: slope.
32---------- Holston	Moderate: too clayey.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.
33*: Holston---------- Urban land.	Moderate: slope, too clayey.	Moderate: slope, low strength.	Moderate: slope, low strength.	Severe: slope.	Moderate: slope, low strength.
34---------- Holston Variant	Slight----------	Slight----------	Moderate: wetness.	Moderate: slope.	Moderate: low strength.
35---------- Leadvale	Moderate: floods, wetness.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
36---------- Leesburg	Moderate: small stones.	Slight----------	Slight----------	Moderate: slope, low strength.	Slight.
37---------- Leesburg	Moderate: slope, small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
38---------- Linker	Severe: depth to rock.	Moderate: depth to rock.	Slight----------	Severe: depth to rock.	Moderate: depth to rock.
39---------- Linker	Severe: depth to rock.	Moderate: slope, depth to rock.	Slight----------	Severe: slope, depth to rock.	Moderate: slope, depth to rock.
40*: Linker---------- Townley----------	Severe: slope, depth to rock. Severe: slope.	Severe: slope. Severe: slope.	Severe: slope, depth to rock. Severe: slope.	Severe: slope, depth to rock. Severe: slope.	Severe: slope. Severe: low strength, slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
41*:					
Linker	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.
Urban land.					
42--McQueen	Moderate: floods, too clayey.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, shrink-swell, low strength.
43--Minvale	Moderate: small stones.	Slight	Slight	Moderate: slope.	Moderate: low strength.
44--Minvale	Moderate: small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
45*:					
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bodine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
46*:					
Minvale	Moderate: small stones.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: low strength.
Urban land.					
47*:					
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.					
48*:					
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bodine	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
49*:					
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Townley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
50--Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
51--Nella	Moderate: small stones.	Slight	Slight	Moderate: slope.	Moderate: low strength.
52*--Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
53*:					
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Allen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 8.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
54*:					
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
55*:					
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Townley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
56* Palmerdale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
57*. Pits					
58 Stemley	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods, low strength.
59 Toccoa	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Severe: floods.
60 Townley	Moderate: depth to rock.	Moderate: low strength, shrink-swell.	Moderate: depth to rock, low strength, shrink-swell.	Moderate: depth to rock, slope, low strength.	Severe: low strength.
61* Townley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
62*:					
Townley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.
Leesburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
63*. Urban land					
64 Waynesboro	Moderate: too clayey.	Slight	Slight	Moderate: slope.	Moderate: low strength, shrink-swell.
65 Waynesboro	Moderate: slope, too clayey.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength, shrink-swell.
66 Wickham	Moderate: floods.	Severe: floods.	Severe: floods.	Severe: floods.	Moderate: floods.
67 Wynnville	Severe: wetness.	Moderate: wetness.	Moderate: wetness, depth to rock.	Moderate: wetness, slope.	Moderate: low strength.

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 9.--SANITARY FACILITIES

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "good," "fair," and other terms used to rate soils. Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1--- Allen	Slight	Moderate: slope, seepage.	Slight	Slight	Fair: too clayey.
2--- Allen	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: too clayey.
3--- Allen	Slight	Moderate: slope, seepage.	Slight	Slight	Fair: too clayey.
4--- Allen	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.	Fair: too clayey.
5--- Allen	Slight	Moderate: slope, seepage.	Slight	Slight	Fair: too clayey.
6*: Allen---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
7--- Bodine	Moderate: slope.	Severe: seepage, small stones.	Severe: seepage.	Severe: seepage, slope.	Poor: small stones.
8--- Cedarbluff	Severe: floods, percs slowly, wetness.	Slight	Severe: floods.	Severe: floods.	Good.
9--- Chewacla	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Good.
10--- Choccolocco	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods.	Good.
11--- Cloudland	Severe: percs slowly.	Slight	Severe: wetness.	Moderate: floods.	Good.
12--- Conasauga	Severe: percs slowly, depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Slight	Poor: thin layer, too clayey.
13--- Conasauga	Severe: percs slowly, depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, too clayey.
14*: Conasauga---	Severe: slope, percs slowly, depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, too clayey.
Firestone---	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock, too clayey, slope.	Severe: slope.	Poor: slope, too clayey.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
15*:					
Conasauga	Severe: percs slowly, depth to rock.	Moderate: depth to rock, slope.	Severe: depth to rock.	Slight	Poor: thin layer, too clayey.
Rock outcrop.					
16*:					
Conasauga	Severe: slope, percs slowly, depth to rock.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope, thin layer, too clayey.
Rock outcrop.					
17*:					
Conasauga	Severe: percs slowly, depth to rock.	Severe: slope.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, too clayey.
Urban land.					
18 Dewey	Slight	Moderate: slope, seepage.	Severe: too clayey.	Slight	Poor: too clayey.
19, 20 Dewey	Moderate: slope.	Severe: slope.	Severe: too clayey.	Moderate: slope.	Poor: too clayey.
21 Ellisville	Severe: floods.	Moderate: seepage.	Severe: floods.	Severe: floods.	Good.
22*:					
Ennis	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Fair: small stones, too clayey.
Lobelville	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: small stones.
23 Firestone	Severe: percs slowly.	Moderate: slope.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey.
24 Firestone	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey.
25*:					
Firestone	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock, too clayey, slope.	Severe: slope.	Poor: slope, too clayey.
Leesburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
26 Gaylesville	Severe: floods, percs slowly, wetness.	Slight	Severe: floods, wetness.	Severe: floods, wetness.	Poor: too clayey, wetness.
27 Hartsells	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, area reclaim.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28--Hartsells	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer, area reclaim.
29*: Hartsells	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer, area reclaim.
Rock outcrop.					
30*: Hartsells	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: thin layer, area reclaim.
Urban land.					
31*: Hartsells	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Rock outcrop.					
32--Holston	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
33*: Holston	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
Urban land.					
34--Holston Variant	Moderate: wetness.	Moderate: slope.	Severe: wetness.	Slight	Good.
35--Leadvale	Severe: percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Fair: too clayey, hard to pack.
36--Leesburg	Slight	Moderate: slope, small stones.	Moderate: too clayey.	Slight	Fair: too clayey, small stones.
37--Leesburg	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, small stones, too clayey.
38--Linker	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Slight	Fair: thin layer.
39--Linker	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Fair: slope, thin layer.
40*: Linker	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Townley	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
41*:					
Linker	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope.
Urban land.					
42 McQueen	Severe: percs slowly.	Slight	Severe: too clayey.	Moderate: floods.	Poor: too clayey.
43 Minvale	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: small stones.
44 Minvale	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: small stones.
45*:					
Minvale	Severe: slope.	Severe: slope.	Moderate: too clayey.	Severe: slope.	Poor: slope.
Bodine	Severe: slope.	Severe: seepage, small stones.	Severe: seepage, slope.	Severe: slope.	Poor: small stones.
46*:					
Minvale	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: small stones.
Urban land.					
47*:					
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Urban land.					
48*:					
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Bodine	Severe: slope.	Severe: seepage, small stones.	Severe: slope.	Severe: slope.	Poor: small stones.
49*:					
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Townley	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Poor: slope.
50 Nella	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.	Poor: slope.
51 Nella	Slight	Moderate: slope, seepage, small stones.	Slight	Slight	Fair: small stones.
52* Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
53*:					
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
53*:					
Allen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
54*:					
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Rock outcrop.					
55*:					
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Townley	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Poor: slope.
56* Palmerdale	Severe: slope.	Severe: slope, seepage.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, seepage, slope.
57*. Pits					
58 Stemley	Severe: floods, wetness, percs slowly.	Severe: floods.	Severe: floods, wetness.	Severe: floods, wetness.	Fair: small stones.
59 Toccoa	Severe: floods.	Severe: floods, seepage.	Severe: floods, seepage.	Severe: floods, seepage.	Good.
60 Townley	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Slight	Poor: too clayey.
61* Townley	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Poor: slope.
62*:					
Townley	Severe: depth to rock, slope, percs slowly.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Poor: slope.
Leesburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
63*. Urban land					
64 Waynesboro	Slight	Moderate: slope, seepage.	Moderate: too clayey.	Slight	Fair: too clayey.
65 Waynesboro	Moderate: slope.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: too clayey, slope.
66 Wickham	Moderate: floods.	Severe: floods.	Moderate: floods.	Moderate: floods.	Good.

See footnote at end of table.

TABLE 9.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
67---------- Wynnville	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock, wetness.	Severe: wetness.	Fair: thin layer.

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 10.--CONSTRUCTION MATERIALS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor," and "unsuited." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
1---------- Allen	Good----------	Unsuited: excess fines.	Unsuited: excess fines.	Good.
2---------- Allen	Good----------	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
3---------- Allen	Good----------	Unsuited: excess fines.	Unsuited: excess fines.	Good.
4---------- Allen	Good----------	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
5---------- Allen	Good----------	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
6*: Allen----------	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Rock outcrop.				
7---------- Bodine	Good----------	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
8---------- Cedarbluff	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
9---------- Chewacla	Poor: wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
10---------- Choccolocco	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
11---------- Cloudland	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
12, 13---------- Conasauga	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
14*: Conasauga----------	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
Firestone----------	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, too clayey.
15*: Conasauga----------	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Rock outcrop.				
16*: Conasauga----------	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
17*:				
Conasauga	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer.
Urban land.				
18, 19, 20---------- Dewey	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
21---------- Ellisville	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
22*:				
Ennis----------	Fair: low strength.	Poor: excess fines.	Poor: excess fines.	Poor: small stones.
Lobelville----------	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
23, 24---------- Firestone	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
25*:				
Firestone----------	Poor: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, too clayey.
Leesburg----------	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
26---------- Gaylesville	Poor: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, wetness.
27---------- Hartsells	Good----------	Poor: excess fines.	Unsuited: excess fines.	Fair: too clayey.
28---------- Hartsells	Good----------	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey.
29*:				
Hartsells----------	Good----------	Poor: excess fines.	Unsuited: excess fines.	Fair: too clayey.
Rock outcrop.				
30*:				
Hartsells----------	Good----------	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey.
Urban land.				
31*:				
Hartsells----------	Fair: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
Rock outcrop.				
32---------- Holston	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
33*:				
Holston	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, too clayey.
Urban land.				
34---- Holston Variant	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
35---- Leadvale	Fair: low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
36, 37---- Leesburg	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
38---- Linker	Fair: low strength, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Fair: thin layer.
39---- Linker	Fair: low strength, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer.
40*:				
Linker	Fair: low strength, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
Townley	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
41*:				
Linker	Fair: low strength, thin layer.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
Urban land.				
42---- McQueen	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
43, 44---- Minvale	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
45*:				
Minvale	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Bodine	Fair: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.
46*, 47*:				
Minvale	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Urban land.				
48*:				
Minvale	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Bodine	Poor: slope.	Unsuited: excess fines.	Poor: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
49*:				
Minvale	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
Townley	Poor: low strength, thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
50 Nella	Fair: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
51 Nella	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
52* Nella	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
53*:				
Nella	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Allen	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
54*:				
Nella	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Rock outcrop.				
55*:				
Nella	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, small stones.
Townley	Poor: low strength, thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
56* Palmerdale	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones, thin layer, slope.
57*. Pits				
58 Stemley	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
59 Toccoa	Good	Poor: excess fines.	Unsuited: excess fines.	Good.
60 Townley	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
61* Townley	Poor: low strength, thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.

See footnote at end of table.

TABLE 10.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
62*:				
Townley	Poor: low strength, thin layer, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: thin layer, too clayey.
Leesburg	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: small stones.
63*. Urban land				
64 Waynesboro	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey, thin layer.
65 Waynesboro	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope, thin layer, too clayey.
66 Wickham	Good	Unsuited: excess fines.	Unsuited: excess fines.	Fair: thin layer.
67 Wynnville	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 11.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
1, 2, 3, 4, 5----- Allen	Seepage---------	Favorable-------	No water--------	Not needed------	Favorable-------	Favorable.
6*: Allen----------	Seepage---------	Favorable-------	No water--------	Not needed------	Slope, erodes easily.	Slope, erodes easily.
Rock outcrop.						
7----------- Bodine	Seepage---------	Favorable-------	No water--------	Not needed------	Slope, small stones.	Slope, small stones.
8----------- Cedarbluff	Favorable-------	Low strength----	No water--------	Favorable, percs slowly.	Not needed------	Not needed.
9----------- Chewacla	Seepage---------	Piping----------	Deep to water	Poor outlets, floods.	Not needed------	Not needed.
10---------- Choccolocco	Seepage---------	Low strength, piping, erodes easily.	Deep to water	Not needed------	Not needed------	Not needed.
11---------- Cloudland	Favorable-------	Low strength----	No water--------	Favorable-------	Favorable-------	Favorable.
12---------- Conasauga	Depth to rock	Thin layer------	No water--------	Not needed------	Depth to rock	Droughty.
13---------- Conasauga	Depth to rock	Thin layer------	No water--------	Not needed------	Slope, depth to rock.	Droughty.
14*: Conasauga--------	Depth to rock	Thin layer------	No water--------	Not needed------	Slope, depth to rock.	Droughty.
Firestone--------	Depth to rock	Low strength, thin layer.	No water--------	Not needed------	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
15*: Conasauga--------	Depth to rock	Thin layer------	No water--------	Not needed------	Depth to rock	Droughty.
Rock outcrop.						
16*: Conasauga--------	Depth to rock	Thin layer------	No water--------	Not needed------	Slope, depth to rock.	Droughty.
Rock outcrop.						
17*: Conasauga--------	Depth to rock	Thin layer------	No water--------	Not needed------	Slope, depth to rock.	Droughty.
Urban land.						
18, 19, 20-------- Dewey	Seepage---------	Compressible----	No water--------	Not needed------	Complex slope, erodes easily.	Erodes easily, slope.
21---------- Ellisville	Seepage---------	Low strength----	No water--------	Floods----------	Not needed------	Not needed.
22*: Ennis----------	Seepage---------	Unstable fill, piping.	No water--------	Not needed------	Favorable-------	Favorable.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
22*: Lobelville	Seepage	Piping, compressible.	No water	Floods	Not needed	Floods.
23 Firestone	Depth to rock	Low strength, thin layer.	No water	Not needed	Percs slowly, erodes easily.	Erodes easily, percs slowly.
24 Firestone	Depth to rock	Low strength, thin layer.	No water	Not needed	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
25*: Firestone	Depth to rock	Low strength, thin layer.	No water	Not needed	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Leesburg	Seepage	Low strength, compressible.	No water	Slope	Slope	Slope.
26 Gaylesville	Favorable	Low strength	No water	Floods, wetness, poor outlets.	Poor outlets, percs slowly.	Wetness, percs slowly.
27 Hartsells	Depth to rock	Low strength	No water	Not needed	Favorable	Favorable.
28 Hartsells	Depth to rock	Low strength	No water	Not needed	Slope	Slope.
29*: Hartsells	Depth to rock	Low strength	No water	Not needed	Favorable	Favorable.
Rock outcrop.						
30*: Hartsells	Depth to rock	Low strength	No water	Not needed	Favorable	Favorable.
Urban land.						
31*: Hartsells	Depth to rock	Low strength	No water	Not needed	Slope	Slope.
Rock outcrop.						
32 Holston	Seepage	Favorable	No water	Not needed	Favorable	Favorable.
33*: Holston	Seepage	Favorable	No water	Not needed	Slope	Slope.
Urban land.						
34 Holston Variant	Seepage	Favorable	No water	Not needed	Favorable	Favorable.
35 Leadvale	Favorable	Piping	No water	Percs slowly	Favorable	Favorable.
36 Leesburg	Seepage	Low strength, compressible.	No water	Favorable	Favorable	Favorable.
37 Leesburg	Seepage	Low strength, compressible.	No water	Slope	Slope	Slope.
38, 39 Linker	Depth to rock	Thin layer, compressible.	No water	Not needed	Slope, depth to rock, erodes easily.	Erodes easily, slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
40*: Linker	Depth to rock	Thin layer, compressible.	No water	Not needed	Slope, depth to rock, erodes easily.	Erodes easily, slope.
Townley	Depth to rock	Thin layer, hard to pack.	No water	Not needed	Depth to rock, slope, percs slowly.	Droughty, slope, percs slowly.
41*: Linker	Depth to rock	Thin layer, compressible.	No water	Not needed	Slope, depth to rock, erodes easily.	Erodes easily, slope.
Urban land.						
42---- McQueen	Seepage	Hard to pack, piping.	No water	Not needed	Complex slope, poor outlets, percs slowly.	Favorable.
43---- Minvale	Seepage	Piping, compressible.	No water	Not needed	Favorable	Favorable.
44---- Minvale	Seepage	Piping, compressible.	No water	Not needed	Slope	Favorable.
45*: Minvale	Seepage	Piping, compressible.	No water	Not needed	Slope	Slope.
Bodine	Seepage	Favorable	No water	Not needed	Slope, small stones.	Slope, small stones.
46*: Minvale	Seepage	Piping, compressible.	No water	Not needed	Slope	Favorable.
Urban land.						
47*: Minvale	Seepage	Piping, compressible.	No water	Not needed	Slope	Slope.
Urban land.						
48*: Minvale	Seepage	Piping, compressible.	No water	Not needed	Slope	Slope.
Bodine	Seepage	Favorable	No water	Not needed	Slope, small stones.	Slope, small stones.
49*: Minvale	Seepage	Piping, compressible.	No water	Not needed	Slope	Slope.
Townley	Depth to rock	Thin layer, hard to pack.	No water	Not needed	Depth to rock, slope, percs slowly.	Droughty, slope, percs slowly.
50---- Nella	Seepage	Favorable	No water	Not needed	Slope	Slope.
51---- Nella	Seepage	Favorable	No water	Not needed	Favorable	Favorable.
52*---- Nella	Seepage	Favorable	No water	Not needed	Slope	Slope.

See footnote at end of table.

TABLE 11.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
53*:						
Nella	Seepage	Favorable	No water	Not needed	Slope	Slope.
Allen	Seepage	Favorable	No water	Not needed	Slope, erodes easily.	Slope, erodes easily.
54*:						
Nella	Seepage	Favorable	No water	Not needed	Slope	Slope.
Rock outcrop.						
55*:						
Nella	Seepage	Favorable	No water	Not needed	Slope	Slope.
Townley	Depth to rock	Thin layer, hard to pack.	No water	Not needed	Depth to rock, slope, percs slowly.	Droughty, slope, percs slowly.
56* Palmerdale	Seepage	Unstable fill	No water	Not needed	Complex slope, slope.	Droughty, slope.
57*. Pits						
58 Stemley	Seepage	Piping, low strength.	No water	Floods, percs slowly.	Rooting depth	Droughty, rooting depth.
59 Toccoa	Seepage	Piping	Deep to water	Not needed	Not needed	Not needed.
60, 61* Townley	Depth to rock	Thin layer, hard to pack.	No water	Not needed	Depth to rock, slope, percs slowly.	Droughty, slope, percs slowly.
62*:						
Townley	Depth to rock	Thin layer, hard to pack.	No water	Not needed	Depth to rock, slope, percs slowly.	Droughty, slope, percs slowly.
Leesburg	Seepage	Low strength, compressible.	No water	Slope	Slope	Slope.
63*. Urban land						
64 Waynesboro	Seepage	Favorable	No water	Not needed	Favorable	Slope.
65 Waynesboro	Seepage	Favorable	No water	Not needed	Slope	Slope.
66 Wickham	Seepage	Favorable	Deep to water	Not needed	Favorable	Favorable.
67 Wynnville	Depth to rock, seepage.	Piping	No water	Slope	Wetness	Slope.

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 12.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
1 Allen	Slight	Slight	Moderate: slope.	Slight.
2 Allen	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
3 Allen	Slight	Slight	Moderate: slope.	Slight.
4 Allen	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
5 Allen	Moderate: too clayey.	Moderate: too clayey.	Severe: slope.	Moderate: too clayey.
6*: Allen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				
7 Bodine	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
8 Cedarbluff	Moderate: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, percs slowly.	Moderate: wetness.
9 Chewacla	Severe: floods, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
10 Choccolocco	Moderate: floods.	Slight	Slight	Slight.
11 Cloudland	Slight	Slight	Slight	Slight.
12 Conasauga	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly, slope.	Slight.
13 Conasauga	Moderate: wetness, percs slowly, slope.	Moderate: wetness, slope.	Severe: slope.	Slight.
14*: Conasauga	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Firestone	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
15*: Conasauga	Moderate: wetness, percs slowly.	Moderate: wetness.	Moderate: wetness, percs slowly, slope.	Slight.
Rock outcrop.				

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
16*:				
Conasauga	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Rock outcrop.				
17*:				
Conasauga	Moderate: wetness, percs slowly, slope.	Moderate: wetness, slope.	Severe: slope.	Slight.
Urban land.				
18 Dewey	Slight	Slight	Moderate: slope.	Moderate: too clayey.
19 Dewey	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: too clayey.
20 Dewey	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
21 Ellisville	Moderate: floods, too clayey.	Moderate: floods, too clayey.	Moderate: too clayey.	Moderate: too clayey.
22*:				
Ennis	Severe: floods.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
Lobelville	Severe: floods.	Moderate: floods.	Severe: floods.	Moderate: small stones.
23 Firestone	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly, depth to rock.	Slight.
24 Firestone	Moderate: slope, percs slowly.	Moderate: slope.	Severe: slope.	Slight.
25*:				
Firestone	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Leesburg	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
26 Gaylesville	Severe: floods.	Moderate: wetness, too clayey, floods.	Severe: floods, wetness.	Moderate: floods, wetness.
27 Hartsells	Slight	Slight	Moderate: slope.	Slight.
28 Hartsells	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
29*:				
Hartsells	Slight	Slight	Severe: slope.	Slight.
Rock outcrop.				

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
30*:				
Hartsells	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Urban land.				
31*:				
Hartsells	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Rock outcrop.				
32--- Holston	Slight	Slight	Moderate: slope.	Slight.
33*:				
Holston	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Urban land.				
34--- Holston Variant	Slight	Slight	Moderate: slope.	Slight.
35--- Leadvale	Moderate: percs slowly.	Slight	Moderate: slope, percs slowly.	Slight.
36--- Leesburg	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Moderate: small stones.
37--- Leesburg	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: small stones.
38--- Linker	Slight	Slight	Moderate: slope.	Slight.
39--- Linker	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
40*:				
Linker	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Townley	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
41*:				
Linker	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Urban land.				
42--- McQueen	Moderate: percs slowly.	Slight	Moderate: slope.	Slight.
43--- Minvale	Slight	Slight	Moderate: slope, small stones.	Slight.
44--- Minvale	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
45*:				
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
45*:				
Bodine	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones, slope.
46*:				
Minvale	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Urban land.				
47*:				
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Urban land.				
48*:				
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Bodine	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
49*:				
Minvale	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Townley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
50 Nella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope, small stones.
51 Nella	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Moderate: small stones.
52* Nella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
53*:				
Nella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Allen	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
54*:				
Nella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Rock outcrop.				
55*:				
Nella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Townley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 12.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
56* Palmerdale	Severe: small stones, slope.	Severe: small stones, slope.	Severe: small stones, slope.	Severe: slope.
57*. Pits				
58 Stemley	Moderate: percs slowly, wetness, small stones.	Moderate: small stones.	Moderate: slope, wetness, small stones.	Moderate: small stones.
59 Toccoa	Severe: floods.	Moderate: floods.	Moderate: floods.	Slight.
60 Townley	Moderate: percs slowly.	Slight	Severe: slope.	Slight.
61* Townley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
62*: Townley	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Leesburg	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
63*. Urban land				
64 Waynesboro	Slight	Slight	Moderate: slope.	Slight.
65 Waynesboro	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
66 Wickham	Slight	Slight	Moderate: slope.	Slight.
67 Wynnville	Moderate: wetness.	Slight	Moderate: slope, wetness, small stones.	Slight.

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 13.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1----- Allen	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
2----- Allen	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
3----- Allen	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
4, 5----- Allen	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
6*: Allen-----	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
7----- Bodine	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
8----- Cedarbluff	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
9----- Chewacla	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
10----- Choccolocco	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
11----- Cloudland	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
12----- Conasauga	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
13----- Conasauga	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
14*: Conasauga-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Firestone-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
15*: Conasauga-----	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Rock outcrop.										
16*: Conasauga-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
17*: Conasauga-----	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	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
17*: Urban land.										
18---------- Dewey	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
19---------- Dewey	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
20---------- Dewey	Fair	Good	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
21---------- Ellisville	Good	Good	Good	Good	Good	Fair	Good	Good	Good	Fair.
22*: Ennis----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Lobelville---------	Fair	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
23---------- Firestone	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
24---------- Firestone	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
25*: Firestone----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Leesburg----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
26---------- Gaylesville	Poor	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
27---------- Hartsells	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
28---------- Hartsells	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
29*: Hartsells----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Rock outcrop.										
30*: Hartsells----------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
31*: Hartsells----------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
32---------- Holston	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	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
33*: Holston	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
34--- Holston Variant	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
35--- Leadvale	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
36--- Leesburg	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
37--- Leesburg	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
38--- Linker	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
39--- Linker	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
40*: Linker	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Townley	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
41*: Linker	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Urban land.										
42--- McQueen	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
43--- Minvale	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
44--- Minvale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
45*: Minvale	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Bodine	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
46*: Minvale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Urban land.										
47*: Minvale	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Urban land.										

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	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
48*:										
Minvale	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Bodine	Very poor.	Very poor.	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
49*:										
Minvale	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Townley	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
50--- Nella	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
51--- Nella	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
52*--- Nella	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
53*:										
Nella	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Allen	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
54*:										
Nella	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Rock outcrop.										
55*:										
Nella	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
Townley	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
56*--- Palmerdale	Very poor.	Very poor.	Poor	Fair	Fair	Very poor.	Very poor.	Very poor.	Poor	Very poor.
57*. Pits										
58--- Stemley	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
59--- Toccoa	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
60--- Townley	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
61*--- Townley	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
62*:										
Townley	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 13.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	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
62*: Leesburg	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
63*. Urban land										
64 Waynesboro	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
65 Waynesboro	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
66 Wickham	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
67 Wynnville	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1, 2---------- Allen	0-11	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4	0-5	90-100	75-100	65-98	40-80	<26	NP-7
	11-64	Clay loam, sandy clay loam, loam.	CL-ML, CL	A-4, A-6, A-7-6	0-10	85-100	75-100	65-98	50-80	22-43	5-19
3, 4---------- Allen	0-11	Gravelly fine sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4	0-8	75-90	60-75	45-70	25-65	<26	NP-7
	11-64	Clay loam, sandy clay loam, loam.	CL-ML, CL	A-4, A-6, A-7-6	0-10	85-100	75-100	65-98	50-80	22-43	5-19
5---------- Allen	0-11	Sandy clay loam	CL-ML, CL, SM-SC, SC	A-4, A-6	0-10	90-100	90-100	80-98	35-80	22-39	5-20
	11-64	Clay loam, sandy clay loam, loam.	CL-ML, CL	A-4, A-6, A-7-6	0-10	85-100	75-100	65-98	50-80	22-43	5-19
6*: Allen----------	0-11	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4	0-5	90-100	75-100	65-98	40-80	<26	NP-7
	11-64	Clay loam, sandy clay loam, loam.	CL-ML, CL	A-4, A-6, A-7-6	0-10	85-100	75-100	65-98	50-80	22-43	5-19
Rock outcrop.											
7---------- Bodine	0-17	Cherty silt loam	ML, CL-ML, GM, SM	A-4, A-2, A-1-B	5-25	30-90	20-75	20-67	20-62	<30	NP-7
	17-70	Cherty silty clay loam, cherty clay loam, very cherty silty clay loam.	GC, GM, SC, SM	A-2	20-55	20-70	15-65	15-45	12-35	26-42	8-16
8----------	0-12	Fine sandy loam	ML, SM	A-4	0	100	100	85-90	40-65	<30	NP
Cedarbluff	12-60	Clay loam, loam, clay.	CL, CH, MH	A-6	0	100	100	70-100	65-95	25-60	11-35
9---------- Chewacla	0-17	Silt loam--------	ML	A-4, A-5, A-6, A-7	0	98-100	95-100	70-100	55-90	36-50	4-18
	17-22	Sandy clay loam, loam, sandy loam.	SM, CL-ML, SM-SC, ML	A-4	0	96-100	95-100	60-80	36-70	<35	NP-7
	22-60	Silt loam, clay loam, silty clay loam.	ML, MH	A-4, A-5, A-6, A-7	0	96-100	95-100	80-100	51-98	32-61	4-30

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
10----------	0-7	Silt loam-------	ML	A-4	0	95-100	95-100	70-98	50-90	28-40	NP-8
Choccolocco	7-39	Silty clay loam, silt loam, loam.	ML	A-4, A-6, A-7	0	95-100	95-100	85-98	60-95	35-45	7-14
	39-82	Sandy loam, loam	SM, ML, SM-SC, CL-ML	A-2, A-4	0	95-100	95-100	60-95	30-75	<35	NP-7
11----------	0-21	Loam------------	CL-ML, ML	A-4	0	95-100	90-100	75-90	50-80	20-30	4-7
Cloudland	21-62	Loam, clay loam, silty clay loam.	CL, ML	A-6	0	95-100	90-100	80-95	60-75	25-40	11-20
12, 13----------	0-4	Loam------------	CL-ML, ML, CL	A-4	0	90-100	85-100	75-95	65-85	<30	NP-8
Conasauga	4-10	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-85	65-80	22-40	4-15
	10-39	Clay, silty clay	CL, CH, MH	A-7	0	90-100	85-100	85-95	80-90	48-70	25-40
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
14*:											
Conasauga---------	0-4	Loam------------	CL-ML, ML, CL	A-4	0	90-100	85-100	75-95	65-85	<30	NP-8
	4-10	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-85	65-80	22-40	4-15
	10-39	Clay, silty clay	CL, CH, MH	A-7	0	90-100	85-100	85-95	80-90	48-70	25-40
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Firestone---------	0-3	Loam------------	ML, CL-ML, CL	A-4, A-6	0-10	76-100	70-100	60-80	55-80	20-40	4-15
	3-33	Clay, silty clay	MH, CH	A-7	0	98-100	95-100	80-100	70-100	55-95	25-50
	33-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
15*, 16*:											
Conasauga---------	0-4	Loam------------	CL-ML, ML, CL	A-4	0	90-100	85-100	75-95	65-85	<30	NP-8
	4-10	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-85	65-80	22-40	4-15
	10-39	Clay, silty clay	CL, CH, MH	A-7	0	90-100	85-100	85-95	80-90	48-70	25-40
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
17*:											
Conasauga---------	0-4	Loam------------	CL-ML, ML, CL	A-4	0	90-100	85-100	75-95	65-85	<30	NP-8
	4-10	Silt loam, silty clay loam, clay loam.	CL-ML, CL	A-4, A-6	0	90-100	85-100	75-85	65-80	22-40	4-15
	10-39	Clay, silty clay	CL, CH, MH	A-7	0	90-100	85-100	85-95	80-90	48-70	25-40
	39-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
18, 19---------- Dewey	0-5	Silt loam-------	CL-ML, CL	A-4, A-6	0	90-100	80-100	75-95	65-80	24-30	5-11
	5-17	Clay, silty clay, silty clay loam.	CL	A-6	0	90-100	80-100	75-95	70-85	27-40	12-20
	17-70	Clay, silty clay	CH, CL, MH, ML	A-6, A-7	0-5	85-100	75-100	70-95	65-85	38-68	12-34
20---------- Dewey	0-5	Silty clay loam	CL	A-6	0	90-100	80-100	75-95	70-80	25-39	12-20
	5-17	Clay, silty clay, silty clay loam.	CL	A-6	0	90-100	80-100	75-95	70-85	27-40	12-20
	17-70	Clay, silty clay	CH, CL, MH, ML	A-6, A-7	0-5	85-100	75-100	70-95	65-85	38-68	12-34
21---------- Ellisville	0-8	Loam----------	CL, CL-ML, SC, SM-SC	A-6, A-4	0	100	100	55-100	40-100	18-38	4-15
	8-60	Silt loam, silty clay loam.	CL	A-6, A-4	0	100	100	80-100	65-100	23-38	8-15
22*:											
Ennis----------	0-5	Cherty loam-----	CL-ML, ML, SM, GM	A-4, A-6	0-5	55-85	50-85	40-80	35-70	20-35	3-15
	5-60	Cherty silt loam, cherty loam, cherty clay loam.	ML, SM, GM, CL-ML	A-4, A-6, A-2	0-5	55-95	40-85	40-80	30-70	<35	NP-15
Lobelville--------	0-6	Cherty loam-----	ML, CL-ML, GM, GM-GC	A-4	0-5	65-90	55-80	50-75	45-65	<30	NP-7
	6-60	Cherty silt loam, cherty loam, cherty sandy loam.	ML, CL-ML, GM, GM-GC	A-4, A-2, A-6	0-10	50-80	25-70	20-70	15-65	25-35	4-12
23---------- Firestone	0-3	Loam----------	ML, CL-ML, CL	A-4, A-6	0-10	76-100	70-100	60-80	55-80	20-40	4-15
	3-33	Clay, silty clay	MH, CH	A-7	0	98-100	95-100	80-100	70-100	55-95	25-50
	33-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
24---------- Firestone	0-3	Silt loam-------	ML, CL-ML, CL	A-4, A-6	0-10	76-100	70-100	60-80	55-80	20-40	4-15
	3-33	Clay, silty clay	MH, CH	A-7	0	98-100	95-100	80-100	70-100	55-95	25-50
	33-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
25*:											
Firestone---------	0-3	Loam----------	ML, CL-ML, CL	A-4, A-6	0-10	76-100	70-100	60-80	55-80	20-40	4-15
	3-33	Clay, silty clay	MH, CH	A-7	0	98-100	95-100	80-100	70-100	55-95	25-50
	33-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
25*:											
Leesburg	0-10	Gravelly sandy loam.	SM, GM, ML	A-2, A-4, A-1	0-15	50-85	55-90	40-65	15-48	<20	NP
	10-23	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	SM, ML, CL-ML, CL	A-4	0-15	55-85	50-85	45-70	40-60	<30	NP-10
	23-60	Gravelly clay loam, gravelly silty clay loam, gravelly sandy clay loam.	SC, CL	A-4, A-6	0-15	55-85	50-85	35-80	40-65	26-40	8-20
26 Gaylesville	0-10	Silt loam	CL, ML	A-4, A-6, A-7	0	100	95-100	95-100	85-95	30-45	8-15
	10-28	Silty clay, clay	CL, ML	A-6, A-7	0	100	95-100	95-100	85-95	35-50	11-20
1	28-60	Silty clay, clay	CL, CH	A-7	0	100	95-100	95-100	85-95	45-60	20-35
27 Hartsells	0-11	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-5	85-100	75-100	70-95	36-75	<30	NP-7
	11-31	Fine sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-5	85-100	75-100	60-100	40-75	<35	NP-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
28 Hartsells	0-11	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-5	85-100	75-100	70-95	36-75	<30	NP-7
	11-31	Fine sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-5	85-100	75-100	60-100	40-75	<35	NP-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
29*:											
Hartsells	0-11	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-5	85-100	75-100	70-95	36-75	<30	NP-7
	11-31	Fine sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-5	85-100	75-100	60-100	40-75	<35	NP-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
30*:											
Hartsells	0-11	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-5	85-100	75-100	70-95	36-75	<30	NP-7
	11-31	Fine sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-5	85-100	75-100	60-100	40-75	<35	NP-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
30*:											
Urban land.											
31*:											
Hartsells	0-11	Fine sandy loam	SM, ML, SM-SC, CL-ML	A-4	0-5	85-100	75-100	70-95	36-75	<30	NP-7
	11-31	Fine sandy loam, loam, sandy clay loam.	SM-SC, SC, CL-ML, CL	A-4, A-6	0-5	85-100	75-100	60-100	40-75	<35	NP-15
	31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
32 Holston	0-13	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4, A-2	0-5	80-100	75-100	65-100	30-75	<22	NP-6
	13-20	Loam, clay loam, sandy clay loam.	ML, CL-ML, SM, SM-SC	A-4, A-2	0-5	80-100	75-100	50-100	30-80	21-35	5-10
	20-60	Clay loam, loam, gravelly clay loam.	ML, CL, GC, SC	A-4, A-6, A-7, A-2	0-15	60-100	55-100	50-100	30-80	31-52	5-22
33*:											
Holston	0-13	Fine sandy loam	ML, CL-ML, SM, SM-SC	A-4, A-2	0-5	80-100	75-100	65-100	30-75	<22	NP-6
	13-20	Loam, clay loam, sandy clay loam.	ML, CL-ML, SM, SM-SC	A-4, A-2	0-5	80-100	75-100	50-100	30-80	21-35	5-10
	20-70	Clay loam, loam, gravelly clay loam.	ML, CL, GC, SC	A-4, A-6, A-7, A-2	0-15	60-100	55-100	50-100	30-80	31-52	5-22
Urban land.											
34 Holston Variant	0-6	Fine sandy loam	SM, ML	A-4	0	98-100	97-100	90-98	40-65	<30	NP-5
	6-37	Loam, clay loam, sandy clay loam.	CL-ML, CL	A-4, A-6	0	98-100	95-100	90-98	55-75	23-31	5-12
	37-70	Loam, clay loam, clay.	CL, ML, CL-ML	A-4, A-6, A-7	0	95-100	90-100	90-98	50-75	25-45	6-22
35 Leadvale	0-8	Silt loam	ML, CL-ML, CL	A-4	0	100	95-100	85-95	65-85	18-32	2-10
	8-21	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6	0	100	95-100	90-98	75-90	24-36	5-14
	21-60	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6, A-7	0	100	95-100	80-98	70-90	24-42	5-18

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
36, 37---------- Leesburg	0-10	Gravelly sandy loam.	SM, GM, ML	A-2, A-4, A-1	0-15	50-85	55-90	40-65	15-48	<20	NP
	10-23	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	SM, ML, CL-ML, CL	A-4	0-15	55-85	50-85	45-70	40-60	<30	NP-10
	23-60	Gravelly clay loam, gravelly silty clay loam, gravelly sandy clay loam.	SC, CL	A-4, A-6	0-15	55-85	50-85	35-80	40-65	26-40	8-20
38, 39---------- Linker	0-5	Fine sandy loam	SM, ML, GM	A-2, A-4	0-5	65-100	60-100	55-100	25-70	<30	NP-7
	5-38	Fine sandy loam, sandy clay loam, loam.	CL, SC, SM, ML	A-4, A-6	0-10	90-100	80-100	70-100	40-80	<40	NP-18
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
40*: Linker----------	0-5	Fine sandy loam	SM, ML, GM	A-2, A-4	0-5	65-100	60-100	55-100	25-70	<30	NP-7
	5-38	Fine sandy loam, sandy clay loam, loam.	CL, SC, SM, ML	A-4, A-6	0-10	90-100	80-100	70-100	40-80	<40	NP-18
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Townley----------	0-5	Silt loam-------	ML, CL, CL-ML	A-4	0-2	80-98	70-95	65-90	50-65	15-35	NP-10
	5-36	Silty clay loam, silty clay, clay.	CL, CH, ML, MH	A-6, A-7	0-2	75-95	65-80	60-80	55-75	30-65	12-35
	36-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
41*: Linker----------	0-5	Fine sandy loam	SM, ML, GM	A-2, A-4	0-5	65-100	60-100	55-100	25-70	<30	NP-7
	5-38	Fine sandy loam, sandy clay loam, loam.	CL, SC, SM, ML	A-4, A-6	0-10	90-100	80-100	70-100	40-80	<40	NP-18
	38	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Urban land.											
42---------- McQueen	0-6	Fine sandy loam	ML, CL-ML	A-4	0	95-100	95-100	85-100	70-95	<40	NP-10
	6-13	Silty clay, clay loam, clay.	ML, CL	A-7, A-6	0	95-100	95-100	90-100	85-98	30-50	10-25
	13-57	Clay loam, silty clay loam, sandy clay loam.	ML, CL	A-6, A-4	0	95-100	95-100	90-100	60-90	28-40	8-20
	57-80	Sandy clay loam, clay loam, sandy loam.	CL, SM-SC, SC, ML	A-2, A-4, A-6	0	95-100	95-100	50-100	15-65	<35	NP-20
43, 44---------- Minvale	0-18	Cherty loam-----	ML, CL, GM, GC	A-4	0-5	55-80	50-75	40-70	36-60	<30	NP-10
	18-70	Cherty silty clay loam, cherty silty clay, cherty clay.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	50-75	50-75	40-70	36-65	20-30	5-15

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
45*:											
Minvale	0-18	Cherty loam	ML, CL, GM, GC	A-4	0-5	55-80	50-75	40-70	36-60	<30	NP-10
	18-70	Cherty silty clay loam, cherty silty clay, cherty clay.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	50-75	50-75	40-70	36-65	20-30	5-15
Bodine	0-17	Cherty silt loam	ML, CL-ML, GM, SM	A-4, A-2, A-1-B	5-25	30-90	20-75	20-67	20-62	<30	NP-7
	17-70	Cherty silty clay loam, cherty clay loam, very cherty silty clay loam.	GC, GM, SC, SM	A-2	20-55	20-70	15-65	15-45	12-35	26-42	8-16
46*, 47*:											
Minvale	0-18	Cherty loam	ML, CL, GM, GC	A-4	0-5	55-80	50-75	40-70	36-60	<30	NP-10
	18-70	Cherty silty clay loam, cherty silty clay, cherty clay.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	50-75	50-75	40-70	36-65	20-30	5-15
Urban land.											
48*:											
Minvale	0-18	Cherty loam	ML, CL, GM, GC	A-4	0-5	55-80	50-75	40-70	36-60	<30	NP-10
	18-70	Cherty silty clay loam, cherty silty clay, cherty clay.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	50-75	50-75	40-70	36-65	20-30	5-15
Bodine	0-17	Cherty silt loam	ML, CL-ML, GM, SM	A-4, A-2, A-1-B	5-25	30-90	20-75	20-67	20-62	<30	NP-7
	17-70	Cherty silty clay loam, cherty clay loam, very cherty silty clay loam.	GC, GM, SC, SM	A-2	20-55	20-70	15-65	15-45	12-35	26-42	8-16
49*:											
Minvale	0-18	Cherty loam	ML, CL, GM, GC	A-4	0-5	55-80	50-75	40-70	36-60	<30	NP-10
	18-70	Cherty silty clay loam, cherty silty clay, cherty clay.	CL, CL-ML, GC, GM-GC	A-4, A-6	0-5	50-75	50-75	40-70	36-65	20-30	5-15
Townley	0-5	Silt loam	ML, CL, CL-ML	A-4	0-2	80-98	70-95	65-90	50-65	15-35	NP-10
	5-36	Silty clay loam, silty clay, clay.	CL, CH, ML, MH	A-6, A-7	0-2	75-95	65-80	60-80	55-75	30-65	12-35
	36-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
50---------- Nella	0-9	Gravelly sandy loam.	ML, CL, GM, SM	A-4, A-2	0-10	65-90	60-80	55-65	30-55	<30	NP-8
	9-65	Cobbly clay loam, gravelly clay loam, cobbly sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6, A-2	0-30	75-95	60-90	45-70	30-60	25-40	6-20
51, 52*---------- Nella	0-9	Cobbly loam-----	ML, CL, SM, SC	A-4	10-25	90-100	85-90	65-75	36-55	<30	NP-8
	9-65	Cobbly clay loam, gravelly clay loam, cobbly sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6, A-2	0-30	75-95	60-90	45-70	30-60	25-40	6-20
53*: Nella----------	0-9	Gravelly sandy loam.	ML, CL, GM, SM	A-4, A-2	0-10	65-90	60-80	55-65	30-55	<30	NP-8
	9-65	Cobbly clay loam, gravelly clay loam, cobbly sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6, A-2	0-30	75-95	60-90	45-70	30-60	25-40	6-20
Allen----------	0-11	Gravelly fine sandy loam.	ML, CL-ML, SM, SM-SC	A-2, A-4	0-8	75-90	60-75	45-70	25-65	<26	NP-7
	11-64	Clay loam, sandy clay loam, loam.	CL-ML, CL	A-4, A-6, A-7-6	0-10	85-100	75-100	65-98	50-80	22-43	5-19
54*: Nella----------	0-9	Gravelly sandy loam.	ML, CL, GM, SM	A-4, A-2	0-10	65-90	60-80	55-65	30-55	<30	NP-8
	9-65	Cobbly clay loam, gravelly clay loam, cobbly sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6, A-2	0-30	75-95	60-90	45-70	30-60	25-40	6-20
Rock outcrop.											
55*: Nella----------	0-9	Gravelly sandy loam.	ML, CL, GM, SM	A-4, A-2	0-10	65-90	60-80	55-65	30-55	<30	NP-8
	9-65	Cobbly clay loam, gravelly clay loam, cobbly sandy clay loam.	CL, SC, CL-ML, SM-SC	A-4, A-6, A-2	0-30	75-95	60-90	45-70	30-60	25-40	6-20
Townley----------	0-5	Silt loam-------	ML, CL, CL-ML	A-4	0-2	80-98	70-95	65-90	50-65	15-35	NP-10
	5-36	Silty clay loam, silty clay, clay.	CL, CH, ML, MH	A-6, A-7	0-2	75-95	65-80	60-80	55-75	30-65	12-35
	36-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
56*---------- Palmerdale	0-80	Very shaly loam	ML, CL, GM, SC	A-4, A-6	0-10	60-85	55-80	50-75	45-60	25-40	3-16
57*. Pits											

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
58---------- Stemley	0-16	Cherty loam-----	ML, SM, CL-ML, GM	A-4, A-2	0-5	55-80	50-75	40-70	20-55	<30	NP-7
	16-60	Cherty loam, cherty clay loam, cherty silty clay loam.	SC, CL, GC	A-6, A-2	0-5	65-85	50-75	45-75	30-55	25-35	12-20
59---------- Toccoa	0-60	Sandy loam------	SM, ML	A-2, A-4	0	98-100	95-100	85-100	25-60	<30	NP-4
60, 61*---------- Townley	0-5	Silt loam-------	ML, CL, CL-ML	A-4	0-2	80-98	70-95	65-90	50-65	15-35	NP-10
	5-36	Silty clay loam, silty clay, clay.	CL, CH, ML, MH	A-6, A-7	0-2	75-95	65-80	60-80	55-75	30-65	12-35
	36-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
62*:											
Townley----------	0-5	Silt loam-------	ML, CL, CL-ML	A-4	0-2	80-98	70-95	65-90	50-65	15-35	NP-10
	5-36	Silty clay loam, silty clay, clay.	CL, CH, ML, MH	A-6, A-7	0-2	75-95	65-80	60-80	55-75	30-65	12-35
	36-45	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Leesburg----------	0-10	Gravelly sandy loam.	SM, GM, ML	A-2, A-4, A-1	0-15	50-85	55-90	40-65	15-48	<20	NP
	10-23	Gravelly loam, gravelly clay loam, gravelly silty clay loam.	SM, ML, CL-ML, CL	A-4	0-15	55-85	50-85	45-70	40-60	<30	NP-10
	23-70	Gravelly clay loam, gravelly silty clay loam, gravelly sandy clay loam.	SC, CL	A-4, A-6	0-15	55-85	50-85	35-80	40-65	26-40	8-20
63*. Urban land											
64---------- Waynesboro	0-9	Silt loam-------	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	80-98	70-90	22-35	5-15
	9-12	Clay loam, loam, sandy clay loam.	CL, ML, SC	A-4, A-6, A-7	0-5	90-100	85-100	75-95	45-75	30-41	9-17
	12-70	Clay loam, sandy clay, clay.	MH, CL, ML	A-4, A-6, A-7	0-5	90-100	80-100	70-98	55-75	38-68	9-28
65---------- Waynesboro	0-9	Silt loam-------	CL-ML, CL	A-4, A-6	0-5	95-100	95-100	80-98	70-90	22-35	5-15
	9-12	Clay loam, loam, sandy clay loam.	CL, ML, SC	A-4, A-6, A-7	0-5	90-100	85-100	75-95	45-75	30-41	9-17
	12-70	Clay loam, sandy clay, clay.	MH, CL, ML	A-4, A-6, A-7	0-5	90-100	80-100	70-98	55-75	38-68	9-28
66---------- Wickham	0-8	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0	95-100	90-100	70-100	45-80	<25	NP-7
	8-41	Sandy clay loam, clay loam, loam.	CL-ML, CL, SC, SM-SC	A-2, A-4, A-6, A-7-6	0	95-100	90-100	75-100	30-70	20-41	5-15
	41-60	Variable--------	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 14.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
67---------- Wynnville	0-8	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-4	0-5	85-100	85-100	70-100	40-90	<25	NP-7
	8-64	Loam, sandy clay loam, silt loam.	SM-SC, SC, CL-ML, CL	A-4	0-5	85-100	85-100	70-100	36-90	15-30	3-10

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 15.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
1, 2	0-11	0.6-2.0	0.14-0.19	4.5-5.5	Low	Low	Moderate	0.24	5
Allen	11-64	0.6-2.0	0.12-0.17	4.5-5.5	Low	Low	Moderate	0.20	
3, 4	0-11	0.6-2.0	0.12-0.17	4.5-5.5	Low	Low	Moderate	0.24	5
Allen	11-64	0.6-2.0	0.12-0.17	4.5-5.5	Low	Low	Moderate	0.20	
5	0-11	0.6-2.0	0.15-0.18	4.5-5.5	Low	Low	Moderate	0.20	5
Allen	11-64	0.6-2.0	0.12-0.17	4.5-5.5	Low	Low	Moderate	0.20	
6*:									
Allen	0-11	0.6-2.0	0.14-0.19	4.5-5.5	Low	Low	Moderate	0.24	5
	11-64	0.6-2.0	0.12-0.17	4.5-5.5	Low	Low	Moderate	0.20	
Rock outcrop.									
7	0-17	2.0-6.0	0.07-0.12	3.6-5.5	Low	Low	High	0.28	5
Bodine	17-70	2.0-6.0	0.05-0.10	3.6-5.5	Low	Low	High	0.28	
8	0-12	2.0-6.0	0.11-0.15	5.1-6.0	Low	High	Moderate	0.28	---
Cedarbluff	12-60	0.06-0.2	0.12-0.16	5.5-5.5	Moderate	High	Moderate	0.32	
9	0-17	0.6-2.0	0.15-0.24	4.5-6.5	Low	High	Moderate	0.28	---
Chewacla	17-22	0.6-2.0	0.12-0.20	4.5-6.5	Low	High	Moderate	0.28	
	22-60	0.6-2.0	0.15-0.24	4.5-6.5	Low	High	Moderate	0.32	
10	0-7	0.6-2.0	0.12-0.18	5.6-6.5	Low	Moderate	Low	0.32	---
Choccolocco	7-39	0.6-2.0	0.15-0.20	4.5-6.0	Low	Moderate	Moderate	0.37	
	39-82	2.0-6.0	0.10-0.16	4.5-6.0	Low	Moderate	Moderate	0.32	
11	0-21	0.6-2.0	0.14-0.18	4.5-6.0	Low	Moderate	High	0.37	---
Cloudland	21-62	0.06-0.2	0.06-0.09	4.5-5.5	Low	Moderate	High	0.32	
12, 13	0-4	0.6-2.0	0.16-0.20	3.6-6.0	Low	High	High	0.43	2
Conasauga	4-10	0.06-0.2	0.12-0.18	3.6-6.0	Moderate	High	High	0.32	
	10-39	0.06-0.2	0.08-0.15	3.6-6.5	Moderate	High	High	0.32	
	39-60	---	---	---	---	---	---	---	
14*:									
Conasauga	0-4	0.6-2.0	0.16-0.20	3.6-6.0	Low	High	High	0.43	2
	4-10	0.06-0.2	0.12-0.18	3.6-6.0	Moderate	High	High	0.32	
	10-39	0.06-0.2	0.08-0.15	3.6-6.5	Moderate	High	High	0.32	
	39-60	---	---	---	---	---	---	---	
Firestone	0-3	0.6-2.0	0.13-0.19	4.5-5.5	Low	Moderate	Moderate	0.37	3
	3-33	0.06-0.2	0.11-0.16	4.5-5.5	High	Moderate	Moderate	0.32	
	33-60	---	---	---	---	---	---	---	
15*, 16*:									
Conasauga	0-4	0.6-2.0	0.16-0.20	3.6-6.0	Low	High	High	0.43	2
	4-10	0.06-0.2	0.12-0.18	3.6-6.0	Moderate	High	High	0.32	
	10-39	0.06-0.2	0.08-0.15	3.6-6.5	Moderate	High	High	0.32	
	39-60	---	---	---	---	---	---	---	
Rock outcrop.									
17*:									
Conasauga	0-4	0.6-2.0	0.16-0.20	3.6-6.0	Low	High	High	0.43	2
	4-10	0.06-0.2	0.12-0.18	3.6-6.0	Moderate	High	High	0.32	
	10-39	0.06-0.2	0.08-0.15	3.6-6.5	Moderate	High	High	0.32	
	39-60	---	---	---	---	---	---	---	
Urban land.									

See footnote at end of table.

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

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
18, 19----------	0-5	0.6-2.0	0.18-0.20	4.5-5.5	Low--------	Low----------	Moderate-------	0.32	5
Dewey	5-17	0.6-2.0	0.12-0.18	4.5-5.5	Moderate	High----------	Moderate-------	0.24	
	17-70	0.6-2.0	0.12-0.17	4.5-5.5	Moderate	High----------	Moderate-------	0.24	
20----------	0-5	0.6-2.0	0.14-0.19	4.5-5.5	Low--------	Moderate------	Moderate-------	0.24	5
Dewey	5-17	0.6-2.0	0.12-0.18	4.5-5.5	Moderate	High----------	Moderate-------	0.24	
	17-70	0.6-2.0	0.12-0.17	4.5-5.5	Moderate	High----------	Moderate-------	0.24	
21----------	0-8	0.6-2.0	0.12-0.22	5.1-5.5	Low--------	Moderate------	Moderate-------	0.37	---
Ellisville	8-60	0.6-2.0	0.18-0.22	4.5-5.5	Low--------	Moderate------	Moderate-------	0.32	
22*:									
Ennis----------	0-5	2.0-6.0	0.10-0.15	4.5-6.0	Low--------	Low----------	Moderate-------	0.28	---
	5-60	2.0-6.0	0.08-0.15	4.5-6.0	Low--------	Low----------	Moderate-------	0.28	
Lobelville--------	0-6	0.6-2.0	0.10-0.15	4.5-6.0	Low--------	Moderate------	Moderate-------	0.28	---
	6-60	0.6-2.0	0.06-0.14	4.5-6.0	Low--------	High----------	Moderate-------	0.28	
23, 24----------	0-3	0.6-2.0	0.13-0.19	4.5-5.5	Low--------	Moderate------	Moderate-------	0.37	3
Firestone	3-33	0.06-0.2	0.11-0.16	4.5-5.5	High-------	Moderate------	Moderate-------	0.32	
	33-60	---	---	---	----------	----------	----------	---	
25*:									
Firestone----------	0-3	0.6-2.0	0.13-0.19	4.5-5.5	Low--------	Moderate------	Moderate-------	0.37	3
	3-33	0.06-0.2	0.11-0.16	4.5-5.5	High-------	Moderate------	Moderate-------	0.32	
	33-60	---	---	---	----------	----------	----------	---	
Leesburg----------	0-10	2.0-6.0	0.08-0.16	4.5-5.5	Low--------	Low----------	Moderate-------	0.24	5
	10-23	0.6-2.0	0.09-0.18	4.5-5.5	Low--------	Low----------	Moderate-------	0.32	
	23-60	0.6-2.0	0.09-0.18	4.5-5.5	Low--------	Low----------	Moderate-------	0.32	
26----------	0-10	0.06-0.6	0.16-0.19	3.6-5.5	Moderate	High----------	High----------	0.37	4
Gaylesville	10-28	0.06-0.2	0.14-0.19	3.6-5.5	Moderate	High----------	High----------	0.28	
	28-60	0.06-0.2	0.14-0.17	3.6-5.5	Moderate	High----------	High----------	0.28	
27----------	0-11	2.0-6.0	0.12-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.28	2
Hartsells	11-31	0.6-2.0	0.13-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.32	
	31	---	---	---	----------	----------	----------	---	
28----------	0-11	2.0-6.0	0.12-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.28	2
Hartsells	11-31	0.6-2.0	0.13-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.32	
	31	---	---	---	----------	----------	----------	---	
29*:									
Hartsells----------	0-11	2.0-6.0	0.12-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.28	2
	11-31	0.6-2.0	0.13-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.32	
	31	---	---	---	----------	----------	----------	---	
Rock outcrop.									
30*:									
Hartsells----------	0-11	2.0-6.0	0.12-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.28	2
	11-31	0.6-2.0	0.13-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.32	
	31	---	---	---	----------	----------	----------	---	
Urban land.									
31*:									
Hartsells----------	0-11	2.0-6.0	0.12-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.28	2
	11-31	0.6-2.0	0.13-0.18	3.6-5.5	Low--------	Moderate------	High----------	0.32	
	31	---	---	---	----------	----------	----------	---	
Rock outcrop.									
32----------	0-13	0.6-2.0	0.15-0.20	4.5-5.5	Low--------	Low----------	High----------	0.32	5
Holston	13-20	0.6-2.0	0.13-0.20	4.5-5.5	Low--------	Moderate------	High----------	0.32	
	20-60	0.6-2.0	0.10-0.18	4.5-5.5	Low--------	Moderate------	High----------	0.32	

See footnote at end of table.

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

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
33*:									
Holston	0-13	0.6-2.0	0.15-0.20	4.5-5.5	Low	Low	High	0.32	5
	13-20	0.6-2.0	0.13-0.20	4.5-5.5	Low	Moderate	High	0.32	
	20-70	0.6-2.0	0.10-0.18	4.5-5.5	Low	Moderate	High	0.32	
Urban land.									
34	0-6	0.6-2.0	0.10-0.16	4.5-6.0	Low	Moderate	Moderate	0.24	5
Holston Variant	6-37	0.6-2.0	0.12-0.18	4.5-6.0	Low	High	Moderate	0.37	
	37-70	0.6-2.0	0.11-0.17	4.5-6.0	Low	High	Moderate	0.32	
35	0-8	0.6-2.0	0.17-0.22	4.5-5.5	Low	Moderate	Moderate	0.43	3
Leadvale	8-21	0.6-2.0	0.17-0.20	4.5-5.5	Low	Moderate	Moderate	0.43	
	21-60	0.06-0.6	0.06-0.11	4.5-5.5	Low	Moderate	Moderate	0.43	
36, 37	0-10	2.0-6.0	0.08-0.16	4.5-5.5	Low	Low	Moderate	0.24	5
Leesburg	10-23	0.6-2.0	0.09-0.18	4.5-5.5	Low	Low	Moderate	0.32	
	23-60	0.6-2.0	0.09-0.18	4.5-5.5	Low	Low	Moderate	0.32	
38, 39	0-5	0.6-2.0	0.11-0.17	3.6-5.5	Low	Low	High	0.28	3
Linker	5-38	0.6-2.0	0.11-0.20	3.6-5.5	Low	Low	High	---	
	38	---	---	---	---	---	---	---	
40*:									
Linker	0-5	0.6-2.0	0.11-0.17	3.6-5.5	Low	Low	High	0.28	3
	5-38	0.6-2.0	0.11-0.20	3.6-5.5	Low	Low	High	---	
	38	---	---	---	---	---	---	---	
Townley	0-5	0.6-2.0	0.12-0.14	4.2-5.5	Low	Moderate	High	0.37	3
	5-36	0.06-0.2	0.12-0.18	4.2-5.5	Moderate	Moderate	High	---	
	36-45	---	---	---	---	---	---	---	
41*:									
Linker	0-5	0.6-2.0	0.11-0.17	3.6-5.5	Low	Low	High	0.28	3
	5-38	0.6-2.0	0.11-0.20	3.6-5.5	Low	Low	High	---	
	38	---	---	---	---	---	---	---	
Urban land.									
42	0-6	0.6-2.0	0.12-0.16	6.1-6.5	Low	Moderate	Moderate	0.37	4
McQueen	6-13	0.06-0.2	0.14-0.18	4.5-5.5	Moderate	Moderate	Moderate	0.37	
	13-57	0.2-0.6	0.14-0.18	4.5-5.5	Low	Moderate	Moderate	0.37	
	57-80	0.2-0.6	0.14-0.18	4.5-5.5	Low	Moderate	Moderate	0.32	
43, 44	0-18	2.0-6.0	0.10-0.15	4.5-5.5	Low	Moderate	Low	0.34	4
Minvale	18-70	0.6-2.0	0.09-0.14	4.5-5.5	Low	Moderate	Low	0.28	
45*:									
Minvale	0-18	2.0-6.0	0.10-0.15	4.5-5.5	Low	Moderate	Low	0.34	4
	18-70	0.6-2.0	0.09-0.14	4.5-5.5	Low	Moderate	Low	0.28	
Bodine	0-17	2.0-6.0	0.07-0.12	3.6-5.5	Low	Low	High	0.28	5
	17-70	2.0-6.0	0.05-0.10	3.6-5.5	Low	Low	High	0.28	
46*, 47*:									
Minvale	0-18	2.0-6.0	0.10-0.15	4.5-5.5	Low	Moderate	Low	0.34	4
	18-70	0.6-2.0	0.09-0.14	4.5-5.5	Low	Moderate	Low	0.28	
Urban land.									
48*:									
Minvale	0-18	2.0-6.0	0.10-0.15	4.5-5.5	Low	Moderate	Low	0.34	4
	18-70	0.6-2.0	0.09-0.14	4.5-5.5	Low	Moderate	Low	0.28	
Bodine	0-17	2.0-6.0	0.07-0.12	3.6-5.5	Low	Low	High	0.28	5
	17-70	2.0-6.0	0.05-0.10	3.6-5.5	Low	Low	High	0.28	

See footnote at end of table.

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

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
49*:									
Minvale	0-18	2.0-6.0	0.10-0.15	4.5-5.5	Low	Moderate	Low	0.34	4
	18-70	0.6-2.0	0.09-0.14	4.5-5.5	Low	Moderate	Low	0.28	
Townley	0-5	0.6-2.0	0.12-0.14	4.2-5.5	Low	Moderate	High	0.37	3
	5-36	0.06-0.2	0.12-0.18	4.2-5.5	Moderate	Moderate	High	---	
	36-45	---	---	---	---	---	---	---	
50	0-9	0.6-2.0	0.08-0.15	4.5-5.5	Low	Low	Moderate	0.20	5
Nella	9-65	0.6-2.0	0.07-0.14	4.5-5.5	Low	Moderate	Moderate	0.17	
51, 52*	0-9	0.6-2.0	0.08-0.15	4.5-5.5	Low	Low	Moderate	0.20	5
Nella	9-65	0.6-2.0	0.07-0.14	4.5-5.5	Low	Moderate	Moderate	0.17	
53*:									
Nella	0-9	0.6-2.0	0.08-0.15	4.5-5.5	Low	Low	Moderate	0.20	5
	9-65	0.6-2.0	0.07-0.14	4.5-5.5	Low	Moderate	Moderate	0.17	
Allen	0-11	0.6-2.0	0.12-0.17	4.5-5.5	Low	Low	Moderate	0.24	5
	11-64	0.6-2.0	0.12-0.17	4.5-5.5	Low	Low	Moderate	0.20	
54*:									
Nella	0-9	0.6-2.0	0.08-0.15	4.5-5.5	Low	Low	Moderate	0.20	5
	9-65	0.6-2.0	0.07-0.14	4.5-5.5	Low	Moderate	Moderate	0.17	
Rock outcrop.									
55*:									
Nella	0-9	0.6-2.0	0.08-0.15	4.5-5.5	Low	Low	Moderate	0.20	5
	9-65	0.6-2.0	0.07-0.14	4.5-5.5	Low	Moderate	Moderate	0.17	
Townley	0-5	0.6-2.0	0.12-0.14	4.2-5.5	Low	Moderate	High	0.37	3
	5-36	0.06-0.2	0.12-0.18	4.2-5.5	Moderate	Moderate	High	---	
	36-45	---	---	---	---	---	---	---	
56*	0-80	2.0-6.0	0.06-0.13	3.6-5.5	Low	Moderate	High	0.24	5
Palmerdale									
57*.									
Pits									
58	0-16	0.6-2.0	0.10-0.15	5.1-6.5	Low	Moderate	High	0.24	3
Stemley	16-60	0.6-2.0	0.10-0.15	3.6-5.5	Low	Moderate	High	0.28	
59	0-60	2.0-6.0	0.09-0.12	5.1-6.5	Low	Low	Moderate	0.10	4
Toccoa									
60, 61*	0-5	0.6-2.0	0.12-0.14	4.2-5.5	Low	Moderate	High	0.37	3
Townley	5-36	0.06-0.2	0.12-0.18	4.2-5.5	Moderate	Moderate	High	---	
	36-45	---	---	---	---	---	---	---	
62*:									
Townley	0-5	0.6-2.0	0.12-0.14	4.2-5.5	Low	Moderate	High	0.37	3
	5-36	0.06-0.2	0.12-0.18	4.2-5.5	Moderate	Moderate	High	---	
	36-45	---	---	---	---	---	---	---	
Leesburg	0-10	2.0-6.0	0.08-0.16	4.5-5.5	Low	Low	Moderate	0.24	5
	10-23	0.6-2.0	0.09-0.18	4.5-5.5	Low	Low	Moderate	0.32	
	23-70	0.6-2.0	0.09-0.18	4.5-5.5	Low	Low	Moderate	0.32	
63*.									
Urban land									
64	0-9	0.6-2.0	0.16-0.20	4.5-5.5	Low	Low	High	0.24	5
Waynesboro	9-12	0.6-2.0	0.15-0.19	4.5-5.5	Low	Moderate	High	0.28	
	12-70	0.6-2.0	0.12-0.16	4.5-5.5	Moderate	High	High	0.28	

See footnote at end of table.

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

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Risk of corrosion		Erosion factors	
						Uncoated steel	Concrete	K	T
	In	In/hr	In/in	pH					
65----------	0-9	0.6-2.0	0.16-0.20	4.5-5.5	Low--------	Low----------	High----------	0.24	5
Waynesboro	9-12	0.6-2.0	0.15-0.19	4.5-5.5	Low--------	Moderate------	High----------	0.28	
	12-60	0.6-2.0	0.12-0.16	4.5-5.5	Moderate	High----------	High----------	0.28	
66----------	0-8	2.0-6.0	0.11-0.16	4.5-6.0	Low--------	Moderate------	High----------	0.20	5
Wickham	8-41	0.6-2.0	0.12-0.17	4.5-6.0	Low--------	Moderate------	High----------	0.24	
	41-60	---	---	---	----------	----------	----------	---	
67----------	0-8	0.6-2.0	0.15-0.20	3.6-5.5	Low--------	Moderate------	High----------	0.24	3
Wynnville	8-64	0.6-2.0	0.15-0.20	3.6-5.5	Low--------	Moderate------	High----------	0.24	

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See text for descriptions of symbols and such terms as "rare," "brief," and "perched." The symbol < means less than; > means greater than]

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
1, 2, 3, 4, 5--- Allen	B	None	---	---	>6.0	---	---	>60	---
6*:									
Allen	B	None	---	---	>6.0	---	---	>60	---
Rock outcrop.									
7--- Bodine	B	None	---	---	>6.0	---	---	>60	---
8--- Cedarbluff	C	Frequent	Brief	Nov-Apr	0.5-1.0	Apparent	Nov-Mar	>60	---
9--- Chewacla	C	Frequent	Brief	Nov-Apr	0.5-1.5	Apparent	Nov-Apr	>60	---
10--- Choccolocco	B	Occasional	Very brief	Nov-Mar	>6.0	---	---	>60	---
11--- Cloudland	C	Rare	---	---	2.0-3.0	Perched	Nov-Mar	>60	---
12, 13--- Conasauga	C	None	---	---	>6.0	---	---	20-40	Rippable
14*:									
Conasauga	C	None	---	---	>6.0	---	---	20-40	Rippable
Firestone	C	None	---	---	>6.0	---	---	20-40	Rippable
15*, 16*:									
Conasauga	C	None	---	---	>6.0	---	---	20-40	Rippable
Rock outcrop.									
17*:									
Conasauga	C	None	---	---	>6.0	---	---	20-40	Rippable
Urban land.									
18, 19, 20--- Dewey	B	None	---	---	>6.0	---	---	>60	---
21--- Ellisville	B	Occasional	Very brief	Nov-Mar	>6.0	---	---	>60	---
22*:									
Ennis	B	Rare to occasional.	Very brief	Dec-Mar	>6.0	---	---	>60	---
Lobelville	C	None to occasional.	Very brief	Dec-Apr	1.0-3.0	Apparent	Dec-Apr	>60	---
23, 24--- Firestone	C	None	---	---	>6.0	---	---	20-40	Rippable
25*:									
Firestone	C	None	---	---	>6.0	---	---	20-40	Rippable
Leesburg	B	None	---	---	>6.0	---	---	>60	---

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
26---------- Gaylesville	D	Frequent----	Very long	Nov-Mar	0-0.5	Apparent	Nov-Mar	>60	---
27, 28---------- Hartsells	B	None--------	---	---	>6.0	---	---	20-40	Hard
29*: Hartsells--------	B	None--------	---	---	>6.0	---	---	20-40	Hard
Rock outcrop.									
30*: Hartsells--------	B	None--------	---	---	>6.0	---	---	20-40	Hard
Urban land.									
31*: Hartsells--------	B	None--------	---	---	>6.0	---	---	20-40	Hard
Rock outcrop.									
32---------- Holston	B	None--------	---	---	>6.0	---	---	>60	---
33*: Holston----------	B	None--------	---	---	>6.0	---	---	>60	---
Urban land.									
34---------- Holston Variant	B	None--------	---	---	5.0-6.0	Apparent	Jan-Feb	>60	---
35---------- Leadvale	C	Rare--------	Very brief	Jan-Apr	2.0-3.0	Perched	Jan-Apr	>60	Rippable
36, 37---------- Leesburg	B	None--------	---	---	>6.0	---	---	>60	---
38, 39---------- Linker	B	None--------	---	---	>6.0	---	---	20-40	Hard
40*: Linker----------	B	None--------	---	---	>6.0	---	---	20-40	Hard
Townley----------	C	None--------	---	---	>6.0	---	---	25-40	Rippable
41*: Linker----------	B	None--------	---	---	>6.0	---	---	20-40	Hard
Urban land.									
42---------- McQueen	C	Rare--------	Brief-----	Jan-Mar	>6.0	---	---	>60	---
43, 44---------- Minvale	B	None--------	---	---	>6.0	---	---	>60	---
45*: Minvale----------	B	None--------	---	---	>6.0	---	---	>60	---
Bodine----------	B	None--------	---	---	>6.0	---	---	>60	---
46*, 47*: Minvale----------	B	None--------	---	---	>6.0	---	---	>60	---
Urban land.									

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness
					Ft			In	
48*:									
Minvale	B	None	---	---	>6.0	---	---	>60	---
Bodine	B	None	---	---	>6.0	---	---	>60	---
49*:									
Minvale	B	None	---	---	>6.0	---	---	>60	---
Townley	C	None	---	---	>6.0	---	---	25-40	Rippable
50, 51, 52* Nella	B	None	---	---	>6.0	---	---	>60	---
53*:									
Nella	B	None	---	---	>6.0	---	---	>60	---
Allen	B	None	---	---	>6.0	---	---	>60	---
54*:									
Nella	B	None	---	---	>6.0	---	---	>60	---
Rock outcrop.									
55*:									
Nella	B	None	---	---	>6.0	---	---	>60	---
Townley	C	None	---	---	>6.0	---	---	25-40	Rippable
56* Palmerdale	B	None	---	---	>6.0	---	---	>60	---
57*. Pits									
58 Stemley	C	Occasional	Brief	Nov-Mar	2.5-4.5	Apparent	Nov-Mar	>60	---
59 Toccoa	B	Frequent	Brief	Jan-Dec	2.5-5.0	Apparent	Dec-Apr	>60	---
60, 61* Townley	C	None	---	---	>6.0	---	---	25-40	Rippable
62*:									
Townley	C	None	---	---	>6.0	---	---	25-40	Rippable
Leesburg	B	None	---	---	>6.0	---	---	>60	---
63*. Urban land									
64, 65 Waynesboro	B	None	---	---	>6.0	---	---	>60	---
66 Wickham	B	Rare	---	---	>6.0	---	---	>60	---
67 Wynnville	C	None	---	---	1.5-2.5	Perched	Dec-Feb	>60	Hard

* See mapping unit description for the composition and behavior of the mapping unit.

TABLE 17.--PHYSICAL AND CHEMICAL ANALYSES OF SELECTED SOILS

Soil name and sample number	Depth	Horizon	Particle-size distribution			Extractable bases			Extractable acidity	Base saturation	Reaction	Cation exchange capacity
			Sand (2.0-0.05 mm)	Silt (0.05-0.002 mm)	Clay (<0.002 mm)	Ca	Mg	K				
	In		Pct	Pct	Pct	Meq/100 g				Pct	pH	
Choccolocco:												
S74-A1-55-1-1---	0-7	Ap	12.7	62.6	24.7	5.42	1.26	0.09	4.15	62.00	5.4	10.94
S74-A1-55-1-2---	7-28	B21t	7.4	61.3	31.3	2.78	0.49	0.07	7.04	32.30	4.8	10.39
S74-A1-55-1-3---	28-39	B22t	28.0	47.0	25.0	1.04	0.13	0.07	6.64	15.83	4.7	7.88
S74-A1-55-1-4---	39-49	B31	30.5	47.7	21.8	0.51	0.09	0.07	6.64	9.17	4.8	7.31
S74-A1-55-1-5---	49-54	B32	33.0	46.4	20.6	0.36	0.04	0.08	6.80	6.89	4.5	7.30
S74-A1-55-1-6---	54-82	C	50.6	31.8	17.6	0.34	0.05	0.07	5.28	8.23	4.5	5.75
Holston Variant:												
S74-A1-55-6-1---	0-6	Ap	43.3	51.4	5.3	1.81	0.67	0.12	1.92	57.75	5.7	4.54
S74-A1-55-6-2---	6-13	B21t	26.2	55.7	18.1	0.88	0.21	0.07	4.48	20.66	4.8	5.64
S74-A1-55-6-3---	13-24	B22t	24.2	53.4	22.4	0.87	0.14	0.06	5.20	17.25	4.7	6.28
S74-A1-55-6-4---	24-37	B23t	31.5	47.1	21.4	---	---	---	---	---	---	---
S74-A1-55-6-5---	37-70	B24t	31.0	40.2	28.8	0.40	0.07	0.05	7.44	6.69	4.6	7.97
Leesburg:												
S74-A1-55-5-1---	0-6	Ap	44.2	49.2	6.6	1.25	0.18	0.13	2.72	36.60	5.4	4.29
S74-A1-55-5-2---	6-10	B1	38.1	47.0	14.9	0.52	0.11	0.13	3.92	16.47	4.8	4.69
S74-A1-55-5-3---	10-23	B21t	29.4	48.1	22.5	0.48	0.09	0.12	5.20	12.01	4.7	5.91
S74-A1-55-5-4---	23-30	B22t	29.3	45.8	24.9	1.04	0.21	0.14	5.76	19.69	4.8	7.17
S74-A1-55-5-5---	30-45	B23t	30.5	42.7	26.8	0.72	0.23	0.09	6.08	14.81	4.8	7.13
S74-A1-55-5-6---	45-60	B3	32.6	42.2	25.2	0.25	0.08	0.10	6.08	6.83	4.7	6.52
Nella:												
S74-A1-55-2-1---	0-5	A	47.2	44.6	8.2	7.08	2.01	0.51	6.88	58.31	5.4	16.50
S74-A1-55-2-2---	5-9	B1	44.3	38.1	17.6	0.19	0.04	0.17	4.80	8.01	4.8	5.21
S74-A1-55-2-3---	9-20	B21t	32.3	45.5	22.2	0.19	0.07	0.16	5.12	7.81	4.8	5.55
S75-A1-55-2-4---	20-65	B22t	36.0	38.3	25.7	0.16	0.15	0.12	5.68	7.19	4.7	6.12
Townley:												
S74-A1-55-7-1---	0-7	Ap	21.0	52.5	26.5	4.45	0.72	0.49	4.08	58.18	5.3	9.75
S74-A1-55-7-2---	7-12	B21t	9.0	39.9	51.1	3.30	0.88	0.23	7.36	37.49	4.9	11.77
S74-A1-55-7-3---	12-23	B22t	3.4	42.3	54.3	1.49	0.69	0.24	11.60	17.29	4.6	14.02
S74-A1-55-7-4---	23-30	B23t	9.6	37.4	53.0	2.31	0.75	0.20	8.80	27.08	4.8	12.06
S74-A1-55-7-5---	30-50	B3	7.5	53.7	38.8	0.62	0.18	0.25	10.00	9.61	4.6	11.06
Waynesboro:												
S74-A1-55-3-1---	0-9	Ap	34.4	53.0	12.6	3.17	1.56	0.42	1.76	74.58	6.1	6.92
S74-A1-55-3-2---	9-12	B1	18.9	52.7	28.4	2.34	0.62	0.22	4.96	39.18	5.0	8.15
S74-A1-55-3-3---	12-23	B21t	18.0	46.4	35.6	1.92	0.41	0.11	6.16	28.48	4.7	8.61
S74-A1-55-3-4---	23-65	B22t	22.5	29.9	47.6	1.40	0.47	0.18	5.92	28.26	4.6	8.25

TABLE 18.--ENGINEERING TEST DATA

[Tests performed by the Alabama State Highway Department in accordance with standard procedures of the American Association of State Highway and Transportation Officials (AASHTO) (4). NP means nonplastic]

Soil name and location	Laboratory number	Depth from surface	Moisture-density[1]		Mechanical analysis[2]							Liquid limit	Plasticity index	Classification	
			Maximum dry density	Optimum moisture	Percentage passing sieve--				Percentage smaller than--					AASHTO	Unified
					No. 4	No. 10	No. 40	No. 200	2.0 mm	0.05 mm	0.002 mm				
		In	Lbs/ft^3	Pct								Pct			
Holston Variant fine sandy loam:															
NE1/4SW1/4 sec. 35, T. 11 S., R. 7 E.:	FGR35-649	0-6	115.1	10.4	99	98	95	59	100	56.7	5.3	17	NP	A-4	ML
	FGR35-650	6-13	116.8	11.5	99	98	96	73	100	73.8	18.1	23	7	A-4	CL-ML
	FGR35-651	13-24	110.9	15.6	99	98	96	74	100	75.8	22.4	24	5	A-4	CL-ML
	FGR35-652	24-37	111.9	13.2	99	99	97	75	100	68.5	21.4	30	12	A-6	CL
	FGR35-653	37-70	108.4	15.1	99	99	98	75	100	69.0	28.8	38	15	A-6	CL
Leesburg gravelly loam:															
NE1/4NE1/4 sec. 24, T. 12 S., R. 6 E.:	FGR35-643	0-6	121.1	9.8	71	65	59	35	100	55.8	6.6	16	NP	A-2-4	SM
	FGR35-644	6-10	121.7	9.6	78	74	68	47	100	61.9	14.9	20	5	A-4	SM-SC
	FGR35-645	10-23	116.0	12.1	79	74	70	53	100	70.6	22.5	27	8	A-4	CL
	FGR35-646	23-30	113.2	14.8	78	72	68	51	100	70.7	24.9	32	11	A-6	CL
	FGR35-647	30-45	111.5	14.2	76	71	65	49	100	69.5	26.8	38	14	A-6	SC
	FGR35-648	45-60	111.6	15.2	62	59	55	41	100	67.4	25.2	37	11	A-6	SM
Townley clay loam:															
SW1/4NW1/4 sec. 16, T. 12 S., R. 3 E.:	FGR35-654	0-7	106.6	16.0	93	87	82	72	100	79.0	26.5	30	7	A-4	ML
	FGR35-655	7-12	91.5	25.3	90	88	86	82	100	91.0	51.1	56	26	A-7-5	MH
	FGR35-656	12-23	91.7	24.7	98	96	95	93	100	96.6	54.3	61	28	A-7-5	MH
	FGR35-657	23-30	94.1	23.4	91	89	85	81	100	90.4	53.0	50	21	A-7-6	ML
	FGR35-658	30-50	100.4	19.4	89	80	78	76	100	92.5	38.8	43	14	A-7-6	ML

[1]Based on AASHTO Designation: T 99-57, Method A (4).

[2]Mechanical analysis according to AASHTO Designation T 88-57 (4). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO procedure, the fine material is analyzed by the hydrometer method and the various grain-sized fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and material coarser than 2 millimeters is excluded from calculations of grain-sized fractions. The mechanical analysis data used in this table are not suitable for naming textural classes for soils.

TABLE 19.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Allen	Fine-loamy, siliceous, thermic Typic Paleudults
Bodine	Loamy-skeletal, siliceous, thermic Typic Paleudults
Cedarbluff	Fine-loamy, siliceous, thermic Fragiaquic Paleudults
Chewacla	Fine-loamy, mixed, thermic Fluvaquentic Dystrochrepts
Choccolocco	Fine-silty, mixed, thermic Typic Hapludults
Cloudland	Coarse-loamy, siliceous, thermic Glossic Fragiudults
Conasauga	Fine, mixed, thermic Typic Hapludalfs
Dewey	Clayey, kaolinitic, thermic Typic Paleudults
Ellisville	Fine-silty, mixed, thermic Dystric Fluventic Eutrochrepts
Ennis	Fine-loamy, siliceous, thermic Fluventic Dystrochrepts
Firestone	Very-fine, mixed, thermic Typic Hapludalfs
Gaylesville	Fine, mixed, thermic Aeric Ochraqualfs
Hartsells	Fine-loamy, siliceous, thermic Typic Hapludults
Holston	Fine-loamy, siliceous, thermic Typic Paleudults
Holston Variant	Fine-loamy, siliceous, thermic Typic Paleudults
Leadvale	Fine-silty, siliceous, thermic Typic Fragiudults
Leesburg	Fine-loamy, siliceous, thermic Typic Paleudults
Linker	Fine-loamy, siliceous, thermic Typic Hapludults
Lobelville	Fine-loamy, siliceous, thermic Fluvaquentic Dystrochrepts
McQueen	Clayey, mixed, thermic Typic Hapludults
Minvale	Fine-loamy, siliceous, thermic Typic Paleudults
Nella	Fine-loamy, siliceous, thermic Typic Paleudults
Palmerdale	Loamy-skeletal, mixed, acid, thermic Typic Udorthents
Stemley	Coarse-loamy, siliceous, thermic Glossic Fragiudults
Toccoa	Coarse-loamy, mixed, nonacid, thermic Typic Udifluvents
Townley	Clayey, mixed, thermic Typic Hapludults
Waynesboro	Clayey, kaolinitic, thermic Typic Paleudults
Wickham	Fine-loamy, mixed, thermic Typic Hapludults
Wynnville	Fine-loamy, siliceous, thermic Glossic Fragiudults

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