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United States Department  
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Environment and Natural  
Resources; North Carolina  
Agricultural Research  
Service; North Carolina  
Cooperative Extension  
Service; Mitchell Soil and  
Water Conservation  
District; and Mitchell  
County Board of  
Commissioners

# Soil Survey of Mitchell County, North Carolina





# How To Use This Soil Survey

## General Soil Map

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

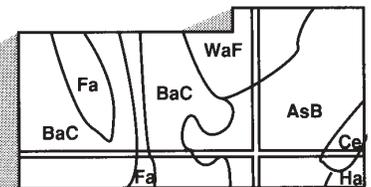
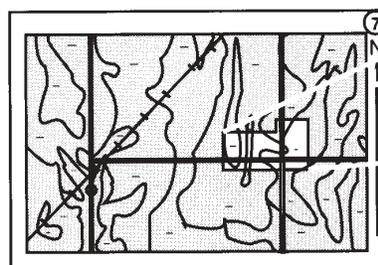
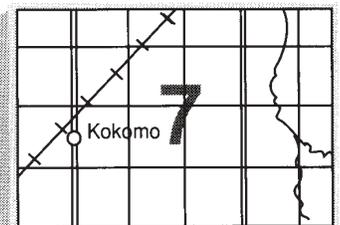
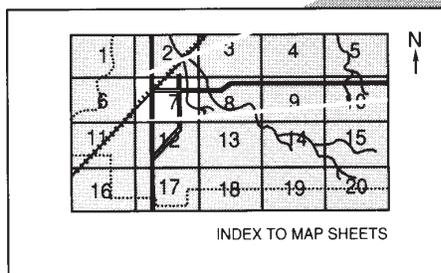
## Detailed Soil Maps

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

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

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

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



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

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This soil survey is a publication of the National Cooperative Soil Survey a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the North Carolina Agricultural Research Service, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1992. Soil names and descriptions were approved in 1996. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1996. This soil survey was made cooperatively by the Natural Resources Conservation Service and the United States Department of Agriculture, Forest Service; the North Carolina Department of Environment and Natural Resources; the North Carolina Agricultural Research Service; the North Carolina Cooperative Extension Service; the Mitchell Soil and Water Conservation District; and the Mitchell County Board of Commissioners. The survey is part of the technical assistance furnished to the Mitchell Soil and Water Conservation District. The Mitchell County Board of Commissioners provided financial assistance for the survey.

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

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**Cover: View of Roan Valley from Roan Mountain. Areas in the foreground and on the high mountains are in the Wayah-Balsam-Tanasee general soil map unit. Areas in the valley are in the Saunook-Thunder general soil map unit. Areas on the intermediate mountains are in the Buladean-Plott-Chestnut general soil map unit.**

*Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is <http://www.nrcs.usda.gov>.*

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# Foreword

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This soil survey contains information that affects land use planning in Mitchell County. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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

Various regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various decisions for land use or land treatment. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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

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

Mary K. Combs  
State Conservationist  
Natural Resources Conservation Service



# Soil Survey of Mitchell County, North Carolina

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By Bruce P. Smith, Jr., Natural Resources Conservation Service, and John B. Allison, North Carolina Department of Environment and Natural Resources

Soils surveyed by John B. Allison, North Carolina Department of Environment and Natural Resources, and Bruce P. Smith, Jr., and Robert H. Ranson, Jr., Natural Resources Conservation Service

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

MITCHELL COUNTY is located in the northern mountains of western North Carolina, about 240 miles west of Raleigh, the State Capital (fig. 1). It covers 142,080 acres, or approximately 222 square miles. It consists of very steep mountains, rolling intermountain hills, and narrow valleys. Elevation ranges from 1,720 feet above sea level on the Nolichucky River at the Tennessee State line to 6,267 feet at Roan High Knob.

The county is in the southern Blue Ridge Mountain Physiographic Province. It is bordered to the east by Avery County, to the south by McDowell County, and to the west by Yancey County. It is bordered to the north by Carter and Unicoi Counties, Tennessee. According to the U.S. Census Bureau, the county had a population of 14,433 in 1990 and an estimated 1999 population of 14,763. In 1990, Bakersville, the county seat, had a population of 332 and Spruce Pine had a population of 2,010.

The Blue Ridge Parkway traverses the southern border of Mitchell County for approximately 12 miles and occupies approximately 600 acres of the county. It is managed by the National Park Service. Pisgah National Forest occupies 17,498 acres in the northern part of the county. It is managed by the U.S. Forest Service.

This soil survey updates the survey of Mitchell

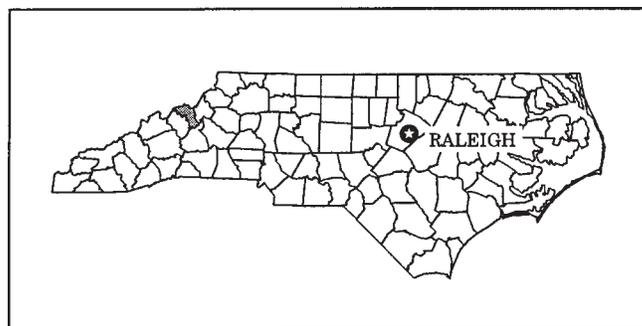


Figure 1.—Location of Mitchell County in North Carolina.

County published in 1952 (15). It provides additional information and has larger maps, which show the soils in greater detail.

## General Nature of the Survey Area

This section gives general information about Mitchell County. It describes the history and development; economic development; physiography, relief, and drainage; mineral resources; water supply; and climate.

## History and Development

The Mitchell County Chamber of Commerce and J.T. McRae, Mitchell County Historical Society, helped prepare this section.

The survey area, which is part of the Toe River Valley, was home to the Cherokee and Catawba Indians, who used it primarily as a hunting ground. Early explorers included Daniel Boone, French botanist André Michaux, English botanist John Fraser, and Dr. Asa Gray, the "Father of American Botany."

The first European settlers arrived in the mid-1700's. Most of these settlers were Scotch-Irish and English. Due to the rugged mountains and lack of roads, the early settlers of the Toe River Valley lived in virtual isolation. By 1840, a road from the Yancey County seat of Burnsville to the Blue Ridge was built. The area, however, remained inaccessible to the rest of the state until the Civil War.

Mitchell County was created from part of Yancey County in 1861. In 1868, Bakersville became the county seat. The county is named after Dr. Elisha Mitchell, a mathematics professor at the University of North Carolina who lost his life in a fall down a waterfall while exploring Mount Mitchell and the Black Mountain Range.

At the turn of the 20th century, the Carolina, Clinchfield, and Ohio Railroad (CC&O), known locally as "the Clinchfield," was built along the North Toe River on the Mitchell County side. It came within 3 miles of Bakersville and passed through Spruce Pine. Until the railroad penetrated the valley, Mitchell County was mostly inaccessible to the rest of the world. The railroad opened up new opportunities for mountain people, and their lifestyles began to change. The coming of the railroad caused the town of Spruce Pine to grow and become the industrial center of the county.

Tourism has played a significant role in the history and development of Mitchell County. The Cloudland Hotel was built in 1885 near Roan High Knob on Roan Mountain. The hotel had 166 rooms. Its guests included European royalty and celebrated Americans, many of which were amateur botanists. They were attracted by the elegant accommodations and a view that boasted 110 mountain peaks. The hotel was destroyed by fire in 1927.

The Blue Ridge Parkway was built during the 1930's and 1940's along the eastern boundary of the county and has brought thousands of visitors to the area.

Gemstones, kaolin, feldspar, quartz, and mica have been mined in the county since the late 1880's. Tiffany's of New York operated the Crabtree Emerald

mine here in 1898. Feldspar (used for paint and glass) and quartz (used for semiconductors) are still mined near Spruce Pine today.

Following a population decline after World War II, Mitchell County has grown slowly since the mid-1960's. Several factors have contributed to this growth. Economic opportunity in the form of light industry and providing goods and services in support of the tourist industry has reduced outmigration. Construction is also providing an increasing number of jobs. Mitchell County offers a high quality of life, and entrepreneurs are moving to the area to start small businesses. Many retirees, having previously built summer homes in the county, are permanently settling here.

## Economic Development

Initially, Mitchell County had a subsistence-based agricultural economy. In the late 1880's, the railroad opened up the area to large-scale timber and mining operations. The chestnut blight of the 1930's closed out the era of the timber baron. Gemstone mining proved unsustainable, and the move away from mica-based electrical conductors to quartz-based semiconductors closed down countless small mines. Mitchell County is still home of the Spruce Pine Mining District.

Today, the county has a mixed economy of industry, manufacturing, retail, construction, and agriculture. There are three mining companies in operation, extracting approximately 35 percent of the Nation's production of feldspar and about 95 percent of the Nation's supply and about 65 percent of the world's supply of ultra-pure quartz. Mica, to a much smaller extent, is also mined. With 105,101 acres, or 74 percent of the county, in woodland, forest products are also an important industry. In 1995, income from forest products was \$6,575,000. Conditions in the county are conducive to the production of quality hardwoods. The industrial base also includes several furniture and textile plants. In 1995, approximately 34 percent of the work force was in manufacturing, 48 percent in services, and 18 percent in agriculture.

In 1992, according to the North Carolina Department of Agriculture, the county had 322 farms covering 23,007 acres. In 1995, cash receipts totaled \$7,963,000. The major agricultural products are burley tobacco, hay, and beef cattle. Apples, truck crops, and trout are also raised. Burley tobacco is grown on most farms and supplements the income of many factory workers. The production of Christmas trees and native ornamentals has increased rapidly in recent years

and, in some cases, has taken the place of growing burley tobacco. Generally, farms are small and specialized and grow a high-value crop.

Tourism and its related businesses are becoming vital parts of the economy. The scenic 600 acres along the Blue Ridge Parkway and the 17,498 acres of Pisgah National Forest are hubs for much of this activity. Also, the mountain arts and craft tradition has become the third largest income sector, with gross receipts of \$3.5 million annually.

### **Physiography, Relief, and Drainage**

Mitchell County is in the southern Blue Ridge Mountain Physiographic Province. The physiography of the county consists of high, intermediate, and low mountains; intermountain hills; coves; terraces; and flood plains. Elevation ranges from 1,720 feet above sea level on the Nolichucky River at the Tennessee State line to 6,267 feet at Roan High Knob.

The high mountain landscape is above about 4,600 feet in elevation. It has steep or very steep soils on side slopes, gently sloping to steep soils on ridgetops, and moderately steep or steep soils in coves. The well drained soils are shallow to very deep to hard bedrock. The clay content of the subsoil is low. The surface layers are thick and have a very high content of organic matter. Surface stones and boulders are common. In places rock outcrops occur. This landscape is subject to very cold temperatures and windswept conditions. High mountains are confined to the northern portion of the county. Unaka Mountain and Roan Mountain are examples.

The intermediate mountain landscape ranges from 3,500 to 4,800 feet in elevation. It is the most extensive landscape in the county. It has moderately steep to very steep soils on side slopes and gently sloping to steep soils on ridgetops. These soils are shallow to very deep to hard or soft weathered bedrock and are well drained to somewhat excessively drained. Very deep, moderately steep or steep, well drained soils are in coves and in drainageways where surface stones and boulders are common. In general, the clay content of the subsoil is low at the higher elevations and low or medium at the lower elevations. The soils on cool aspects, in coves, and in drainageways have thick surface layers with a high content of organic matter. In places rock outcrops occur. Intermediate mountains occur throughout the county. Pumpkin Patch Mountain and Woody's Knob are examples.

The low mountain landscape ranges from 2,000 to 3,500 feet in elevation. It has moderately steep to very steep soils on side slopes and gently sloping or

strongly sloping soils on ridgetops. The soils are shallow to very deep to weathered bedrock and are well drained to somewhat excessively drained. Very deep, strongly sloping to steep, well drained soils are in coves and in drainageways. In general, the clay content of the subsoil is medium or high. The soils on cool, north- to east-facing aspects, in coves, and in drainageways have thick surface layers with a high content of organic matter. Low mountains occur throughout the county.

The intermountain hill landscape ranges from 1,800 to 2,800 feet in elevation. It has strongly sloping to steep soils on side slopes and gently sloping or strongly sloping soils on ridgetops. Soils are moderately deep to very deep to weathered bedrock. Surface layers are thin or eroded and have a low content of organic matter. The clay content of the subsoil is medium or high. The soils on ridgetops commonly contain more clay than those on side slopes. In coves soils are very deep, gently sloping to moderately steep, and well drained. Surface layers, where uneroded, commonly contain rock fragments and have a medium or high content of organic matter. The clay content of the subsoil is medium or high. The intermountain hills occur mostly between Red Hill and Tipton Hill and around Bakersville, Spruce Pine, and Little Switzerland.

Terraces have nearly level to strongly sloping soils, are narrow, and run parallel to the streams. Soils are very deep, and the clay content of the subsoil is high. Surface layers, where uneroded, commonly contain rock fragments and have a medium or high content of organic matter. Many terraces occur along Rock Creek and Cane Creek in and around Bakersville. Generally, terraces are above the larger flood plains of intermountain hills and low mountain areas.

Flood plains have nearly level soils and run parallel to the stream. In general, soils next to major streams and rivers and at the upper end of watersheds are moderately well drained and shallow or moderately deep to gravelly strata. At the lower end of watersheds, soils are well drained to somewhat poorly drained and moderately deep to very deep to gravelly strata. Along the smaller streams and branches, soils are moderately well drained or somewhat poorly drained and moderately deep to gravelly strata. In general the clay content of the subsoil is low, but it ranges to medium along the smaller streams and at the lower end of watersheds. The surface layers, where they have not been scoured by flooding, have a medium or high content of organic matter.

The majority of Mitchell County is drained by the North Toe River, which flows into the Nolichucky River. Drainage is generally to the northwest. The

headwaters of the North Toe River are in Avery County and in Yancey County (as the South Toe River). They join near Kona in Mitchell County. The North Toe River continues northwest through the county, joining the Cane River at Hunt Dale (in Yancey County) to become the Nolichucky River. The Nolichucky River continues north through the Nolichucky Gorge into Unicoi County, Tennessee, and eventually into the French Broad River.

A small portion of the county drains directly into the Nolichucky River. Major drainage areas are Shinbone, Bowling Green, and Hollow Poplar Creeks.

In the northern half of Mitchell County, the major drainage areas of the North Toe watershed are Pigeonroost, Bearallow, Brummett, Raccoon, Big Rock, Greasy, Spring, Beans, Bad, Little Rock, Cane, Mine, White Oak, and Greene Creeks and their associated forks and branches. In the southern half of the county, the major drainage areas of the North Toe watershed are Snow, Sink Hole, Rebels, Big Crabtree, Brushy, Bear, Beaver, Gouges, Rose, Cathis, Grassy, Graveyard, and Rockhouse Creeks and their associated forks and branches.

## Mineral Resources

Carl Merschat, Area Geologist, and the Mitchell County Chamber of Commerce helped prepare this section.

Mitchell County is known in the mining industry as the Spruce Pine mining district. The first miners of this district were native Americans, who dug clay for pottery and searched for rocks with specific qualities to be used for tools and hunting. Soapstone was collected and carved into bowls and vessels. Mica was mined, trimmed into ornaments, and traded. The early Spanish explorers prospected for gold about 400 years ago in western North Carolina, possibly in the area of present-day Mitchell County.

Kaolin has been mined in the Spruce Pine area for local use since 1744. Kaolin from the Spruce Pine Mining District was first commercially mined along upper Bear Creek in 1904. Spruce Pine kaolin revolutionized the china and white-ware industries because of its high plasticity. Pieces which previously required 90 minutes to mold took only 4 minutes by using Spruce Pine district kaolin. Spruce Pine kaolin was initially obtained from small, hand dug, weathered pegmatite and alaskite bodies scattered throughout the district. Today's kaolin production comes from a large, weathered alaskite body along Brushy Creek in Avery County.

All early production of mica, feldspar, and quartz

was from the small, very coarse-grained pegmatites which could readily be hand-cobbed and sorted. Sheet mica was first mined commercially in the district in 1868. The Indians mined it long before that for jewelry making and trade. The industrial uses for sheet mica grew from woodstove windows to a broad range of uses in electrical technology, insulation, and lubricants. The demand for mica increased, but by the 1950's the labor intensive industry was having a hard time competing against foreign suppliers. Sheet mica was mined until June 1962, when a Federal program of buying mica for the Nation's strategic stockpile came to an end. Sheet mica is still split, trimmed, and fabricated at one plant in Spruce Pine, but the raw material is now imported.

Cuttings and trimmings from the early sheet mica operations and waste from kaolin mining provided the original source of scrap mica. Scrap mica is any mica of suitable quality and size that cannot be used as sheet mica. Later, simple washing and screening was used to recover mica flakes from deeply weathered alaskite bodies. Currently, almost all mica in the district is recovered by froth flotation, either as a principal product from weathered alaskite or as an important by-product from feldspar mines in the hard-rock alaskite bodies. Scrap mica is used in plasterboard, joint cement, paints, plastics, roofing, molded rubber products, oil well drilling mud, and cosmetics.

Feldspar mining and processing has developed into a very important industry for Mitchell County. Feldspar is used in a large variety of products, such as glass, cleansers, ceramics, dentures, and porcelains. Feldspar was first shipped from North Carolina in 1911. Early production was also from small pegmatite bodies that required labor intensive hand work. But in 1946, the first commercial feldspar and mica flotation plant opened. This plant, based on a process developed by the U.S. Bureau of Mines, greatly increased feldspar production by making use of the huge alaskite deposits in the area. Mining of these large, uniform bodies instead of the small pegmatites is much less labor intensive. These alaskites are still mined today, enabling the Spruce Pine mining district to be a leading feldspar producing area in the country.

Historically, quartz cores from some of the pegmatites were hand-cobbed on a sporadic basis to provide small quantities of by-product quartz. For example, the 200-inch mirror of the telescope in Mount Palomar, California, was made partly of quartz mined from the Chestnut Flats pegmatite mine in 1933. In recent years, the increased demand for high-quality quartz prompted the mining companies to add quartz

recovery and purification circuits to their processing plants. Much of the Spruce Pine material is used to make crucibles in which electronic-grade quartz crystals are grown.

In all of the mining and exploration of this area, many other minerals and gems were discovered. Since the early 1900's, hundreds of minerals and gems have been identified in Mitchell County. Most of these minerals occur in the pegmatites and alaskites of the Spruce Pine mining district.

Two of the most successful gem mines in the district were the Crabtree Emerald mine and the Wiseman Aquamarine mine. Material of both mines developed in pegmatites. The Crabtree Emerald mine in the Little Switzerland area was originally mined for building stone in 1893, but miners soon discovered gem-quality emerald. This mine was worked commercially for years by Tiffany's of New York and later by the American Gem Company. In the late 1960's and early 1970's, it was opened to the public for a fee. Today the Crabtree Emerald mine is closed to the public.

The Wiseman Mica mine opened in 1894. The mine contained excellent specimens of aquamarine and golden beryl crystals. The Wiseman mine is abandoned and closed to the public.

Over 200 abandoned pegmatite mines and prospects are known in Mitchell County and probably that many more exist and are unlisted. They were mined originally for mica or feldspar, or both. Today, the Spruce Pine mining district leads North Carolina and the Nation in the production of feldspar and mica and produces kaolin clays and industrial quartz. All of this production comes from five large mines in Mitchell County and one in neighboring Avery County.

## Climate

In Mitchell County, the climate of the mountains differs greatly from that of the intermountain hills and flood plains. Climate is influenced by elevation, aspect, and wind direction, which is predominantly from the west. Rainfall increases with elevation and temperature decreases. Temperatures are cooler on north- to east-facing aspects. Daily temperatures can fluctuate widely with cold or warm spells possible year-round. There is a chance of frost in the high mountains during the summer months.

Precipitation is heavy and generally evenly distributed throughout the year. Summer precipitation falls chiefly during thunderstorms. In summer, several inches of moisture are added to the soils at the higher elevations when fog condenses on trees and flows

down the trunk. In winter, precipitation in valleys is usually rain and occasionally snow. In the mountains, especially above 4,000 feet in elevation, it is mainly snow, although rains are frequent. Ice storms and rime ice occur on high mountains and on prominent ridgetops and upper side slopes of intermediate mountains (fig. 2). In Mitchell County, snow cover does not persist except at the high elevations and on northerly aspects.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Gillespie Gap near Little Switzerland, North Carolina, for the period 1953 to 1976. (The long-term climate station for Mitchell County has been closed and more up-to-date information is not available.) 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 35 degrees F and the average daily minimum temperature is 25 degrees. The lowest temperature on record, which occurred at Gillespie Gap on January 24, 1963, is -10 degrees. In summer, the average temperature is 68 degrees and the average daily maximum temperature is 80 degrees. The highest recorded temperature, which occurred on July 15, 1954, is 94 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees). 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. Slow air drainage allows frost pockets to form in late spring and early fall in nearly level or gently sloping areas on the lower landscapes. These areas have a growing season shorter than the county average.

Annual precipitation varies throughout the county. It averages about 55 inches around Little Switzerland and northward to Bakersville, approximately 56 to 60 inches along the Avery County line, and more than 60 inches on Roan Mountain. An estimated 50 to 56 inches of annual precipitation occurs along the North Carolina-Tennessee State line near the Pigeonroost and Buladean communities. About 46 to 52 inches of rainfall occurs in the Green Mountain-Tipton Hill area.

About 50 percent of the total annual precipitation usually falls in April through September, which is the growing season for most crops. In 2 years out of 10, short but significant droughts occur. Heavy rains from prolonged storms occasionally cover the entire area (or individual watersheds) and cause severe flooding



Figure 2.—Rime ice occurs on high mountains and on ridgetops and upper side slopes of prominent intermediate mountains.

in valleys. The heaviest 1-day rainfall during the period of record was 6.38 inches at Gillespie Gap on February 13, 1966. Thunderstorms occur on about 46 days each year.

The average seasonal snowfall at Gillespie Gap is about 19 inches. The Buladean and Poplar communities and the high mountains receive more. The greatest snow depth at any one time during the period of record at Gillespie Gap was 20 inches. About 1 to 2 feet of snow accumulates on the high mountains in most winters. On the average, 2 days of the year have at least 1 inch of snow on the ground in the valleys. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 90 percent. Where air drainage is slow, near seeps and springs, and along flowing water, the average daytime relative humidity is higher. The sun shines 60 percent of the time possible in summer and 55 percent in winter. The prevailing wind is highly dependent on location in this mountainous area. Valleys, however, channel the windflow in all directions throughout the year. Average windspeed in the valleys is highest, 13 miles per hour, in winter. High mountain ridgetops and side slopes and prominent intermediate mountain ridgetops are

windswept. Sustained winds of more than 25 miles per hour are common.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

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

A soil boundary or map unit delineation designates the landform and slope on which a soil occurs. Landform (position) is the three-dimensional part of the land surface and has a distinctive shape. Examples include flood plain, cove, side slope, and ridgetop. The slope (steepness) is given as a range; for example, 15 to 30 percent. All or part of that range may exist within a delineation.

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

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

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a relatively high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will be at a specific level in the soil on a specific date.

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

roads, and rivers, all of which help in accurately locating boundaries.

## Survey Procedures

The general procedures followed in making this survey are described in the "National Soil Survey Handbook" of the Natural Resources Conservation Service and in the "Soil Survey Manual" (17, 20).

Before fieldwork began, preliminary boundaries of slopes and landforms were plotted stereoscopically on aerial photographs taken in 1984 at a scale of 1:12,000. United States Geological Survey geologic and topographic maps at a scale of 1:24,000 were also used. Map units were then designed according to the pattern of soils interpreted from photographs, maps, and field observations.

Traverses in the valleys were made by truck or on foot. The soils were examined at intervals ranging from a few hundred feet to about  $\frac{1}{4}$  mile, depending on the landscape and soil pattern. Observations of special features, such as landforms, vegetation, and evidence of flooding, were made continuously without regard to spacing. Soil boundaries were determined on the basis of soil examinations, observations, and photo interpretations. In many areas, such as those where very steep slopes intersect with flood plains, these boundaries are precise because of an abrupt change in the landform. The soils were examined with the aid of a hand probe, a bucket auger, or a spade to a depth of about 3 to 5 feet. The typical pedons were observed in pits dug by hand or with a backhoe.

Traverses in the mountainous areas were made by truck or on foot along the existing network of roads and trails. These traverses commonly were made a

few miles apart where the geologic materials and landscapes were uniform. In areas where differences in geologic material or landscape were observed, traverses were made at intervals close enough for the soil scientists to observe any differences among the soils. Examinations were made at intervals ranging from a few hundred feet to about  $\frac{1}{4}$  mile.

Observations of landforms and vegetation were made continuously without regard to spacing. Where soil profiles were readily observable, such as along recently constructed access roads and along logging roads, observations of the content of rock fragments, depth to bedrock, depth of rooting, the landform, and the underlying material were made without regard to spacing. Soil boundaries were plotted stereoscopically on the basis of parent material, landform, and relief. Many of these boundaries cannot be exact because they fall within a zone of gradual change between landforms, such as an area where a mountain ridge becomes a mountainside. Much intermingling of the soils occurs in these zones.

Samples for chemical and physical analyses were taken from the site of the typical pedon of the major soils in the survey area. Most of the analyses were made by the Soil Survey Laboratory, Lincoln, Nebraska. Some soils were analyzed by the North Carolina State University Soils Laboratory, Raleigh, North Carolina. Commonly used laboratory procedures were followed (19).

After completion of the soil mapping on aerial photographs, map unit delineations and surface drainage were transferred by hand to orthophotographs at a scale of 1:12,000 (1 inch equals 1,000 feet). Cultural features were transferred from 7.5-minute topographic maps of the United States Geological Survey.

## Detailed Soil Map Units

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The map units delineated on the detailed maps represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses (fig. 3). They also can be used to plan the management needed for those uses. More information about each map unit is given under the heading "Use and Management of the Soils."

A map unit delineation on a map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some "included" areas that belong to other taxonomic classes. These areas are listed under "Minor Components" in the map unit descriptions.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, inclusions. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or

miscellaneous areas are mentioned in the map unit descriptions. A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

Soils of one series can differ in texture of the surface layer, slope, stoniness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Dillsboro clay loam, 15 to 30 percent slopes, stony, is a phase of the Dillsboro series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes. A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown



**Figure 3.—This soil survey is designed for many different land uses, including housing, agriculture, and forestry. Soil properties and site features that affect land use are identified, and management measures are offered for consideration.**

separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Buladean-Chestnut complex, 30 to 50 percent slopes, stony, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The Rock outcrop part of Sylco-Rock

outcrop complex, 50 to 95 percent slopes, is an example.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see “Contents”) give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas.

## **AcF—Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, very bouldery**

### **Setting**

*Landscape:* Low and intermediate mountains throughout the county

*Elevation range:* 2,000 to 4,800 feet

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Irregular

*Size of areas:* 2 to 116 acres

### **Composition**

Ashe soil and similar inclusions: 30 percent

Cleveland soil and similar inclusions: 25 percent

Rock outcrop: 25 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Ashe**

*Surface layer:*

0 to 3 inches—very dark brown very gravelly sandy loam

3 to 6 inches—dark yellowish brown very gravelly sandy loam

*Subsoil:*

6 to 21 inches—brown gravelly sandy loam

*Underlying material:*

21 to 32 inches—brown gravelly sandy loam saprolite

*Bedrock:*

32 to 43 inches—unweathered, slightly fractured biotite granitic gneiss

#### **Cleveland**

*Surface layer:*

0 to 3 inches—black gravelly sandy loam

3 to 7 inches—dark brown gravelly sandy loam

*Subsoil:*

7 to 14 inches—strong brown gravelly loam

*Bedrock:*

14 to 25 inches—unweathered, moderately fractured biotite granitic gneiss

#### **Rock outcrop**

*Composition:* Dominantly biotite granitic gneiss bedrock

### **Properties and Qualities of the Ashe and Cleveland Soils**

*Depth class:* Ashe—moderately deep; Cleveland—shallow

*Drainage class:* Somewhat excessively drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep or very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges and upper side slopes, rime ice in winter and high winds year-round

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Ashe—20 to 40 inches to hard bedrock; Cleveland—10 to 20 inches to hard bedrock

*Other distinctive properties:* Random areas of seeps and springs; water movement along bedrock contacts

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Buladean soils that have soft bedrock at a depth of 40 to 60 inches
- Random areas of soils that have hard bedrock at a depth of 1 to 10 inches
- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Ashe and Cleveland soils and have hard bedrock at a depth of more than 60 inches, in drainageways and on benches below rock outcrops
- Random areas of Chandler and Micaville soils that have more mica in the subsoil than the Ashe and Cleveland soils and have hard bedrock at a depth of more than 40 inches
- Areas of rubble land below rock outcrops and in drainageways

- Areas on prominent ridges and upper side slopes that are windswept

*Similar inclusions:*

- Ashe and Cleveland soils that have surface layers of coarse sandy loam, fine sandy loam, or loam
- Random areas of Chestnut soils that have soft bedrock at a depth of 20 to 40 inches

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, extent of rock outcrops, and the very bouldery surface. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the slope, erodibility, extent of rock outcrops, and the very bouldery surface. A site on better suited soils should be selected.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, extent of rock outcrops, and the very bouldery surface. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the slope, erodibility, low productivity, low volume, depth to bedrock, extent of rock outcrops, and the very bouldery surface. A site on better suited soils should be selected.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings

because of the slope, erodibility, depth to bedrock, extent of rock outcrops, and the very bouldery surface. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope, depth to bedrock, extent of rock outcrops, and very bouldery surface. A site on better suited soils should be selected.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope, erodibility, depth to bedrock, extent of rock outcrops, and very bouldery surface. A site on better suited soils should be selected.

#### **Lawns and landscaping**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope, erodibility, depth to bedrock, extent of rock outcrops, and the very bouldery surface. A site on better suited soils should be selected.

### **Interpretive Groups**

*Land capability classification:* Ashe and Cleveland—7e; Rock outcrop—8s

*Woodland ordination symbol:* Based on chestnut oak as the indicator species, 4R in areas of the Ashe soil and 2R in areas of the Cleveland soil; Rock outcrop—none assigned

### **BaD—Balsam sandy loam, 15 to 30 percent slopes, extremely bouldery**

#### **Setting**

*Landscape:* High mountains, from Little Rock Knob to Roan Mountain and south to Spears Top, and on Unaka Mountain

*Elevation range:* 4,200 to 6,000 feet

*Landform:* Coves and drainageways

*Landform position:* Side slopes, footslopes, and head slopes

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 6 to 117 acres

### **Composition**

Balsam soil and similar inclusions: 80 percent  
Dissimilar inclusions: 20 percent

### **Typical Profile**

#### *Surface layer:*

0 to 3 inches—black sandy loam  
3 to 13 inches—very dark grayish brown gravelly fine sandy loam

#### *Subsoil:*

13 to 27 inches—strong brown very gravelly loamy coarse sand  
27 to 42 inches—strong brown very gravelly sandy loam  
42 to 63 inches—strong brown extremely gravelly sandy loam  
63 to 74 inches—strong brown extremely gravelly coarse sandy loam

#### *Underlying material:*

74 to 90 inches—strong brown very gravelly loamy coarse sand

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy with many rock fragments

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 15 percent stones and boulders that average about 10 to 48 inches in diameter and 3 to 10 feet apart

*Organic matter content (surface layer):* Very high

*Potential frost action:* Moderate

*Special climatic conditions:* Extreme freezing and rime ice in winter, high winds, high rainfall, and short growing season

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock and metasandstone on Unaka Mountain

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments

### **Minor Components**

#### *Dissimilar inclusions:*

- Tanasee soils that have fewer rock fragments in the subsoil than the Balsam soil, on the outer edge of map unit delineations
- Areas of rubble land in drainageways and below rock outcrops
- Wayah soils that have a loamy subsoil, on residual landforms within the map unit
- Burton soils that have a loamy subsoil and have hard bedrock at a depth of 20 to 40 inches, along the outer edge of map unit delineations
- Unprotected areas that are windswept
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways

#### *Similar inclusions:*

- Balsam soils that have a surface layer of loamy sand, loamy coarse sand, coarse sandy loam, fine sandy loam, or loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation and pasture

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, extremely bouldery surface, and short growing season. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, pesticide retention, soil fertility, and short growing season

*Management measures and considerations:*

- The slope and surface stones and boulders limit the use of equipment and may be hazardous.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are

applied to the plant rather than the soil may increase their effectiveness.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the extremely bouldery surface and short growing season. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the extremely bouldery surface, short growing season, and low productivity. A site on better suited soils should be selected.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the extremely bouldery surface, extreme freezing, and seeps and springs. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the extremely bouldery surface, extreme freezing, seeps and springs, and poor filtering capacity. A site on better suited soils should be selected.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large

stones, seeps and springs, frost action, and differential settling

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Large stones and boulders are a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the extremely bouldery surface and the high content of rock fragments.

### **Interpretive Groups**

*Land capability classification:* 7s

*Woodland ordination symbol:* 10R, based on red spruce as the indicator species

### **BaE—Balsam sandy loam, 30 to 50 percent slopes, extremely bouldery**

#### **Setting**

*Landscape:* High mountains from Little Rock Knob to Roan Mountain and south to Spears Top

*Elevation range:* 4,200 to 6,000 feet

*Landform:* Coves and drainageways

*Landform position:* Side slopes, footslopes, and head slopes

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 9 to 239 acres

#### **Composition**

Balsam soil and similar inclusions: 85 percent

Dissimilar inclusions: 15 percent

### **Typical Profile**

#### *Surface layer:*

0 to 3 inches—black sandy loam

3 to 13 inches—very dark grayish brown gravelly fine sandy loam

#### *Subsoil:*

13 to 27 inches—strong brown very gravelly loamy coarse sand

27 to 42 inches—strong brown very gravelly sandy loam

42 to 63 inches—strong brown extremely gravelly sandy loam

63 to 74 inches—strong brown extremely gravelly coarse sandy loam

#### *Underlying material:*

74 to 90 inches—strong brown very gravelly loamy coarse sand

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy with many rock fragments

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 15 percent stones and boulders that average about 10 to 48 inches in diameter and 3 to 10 feet apart

*Organic matter content (surface layer):* Very high

*Potential frost action:* Moderate

*Special climatic conditions:* Extreme freezing and rime ice in winter, high winds, high rainfall, and short growing season

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments

### **Minor Components**

#### *Dissimilar inclusions:*

- Tanasee soils that have fewer rock fragments in the

subsoil than the Balsam soil, on the outer edge of map unit delineations

- Areas of rubble land, in drainageways and below rock outcrops
- Wayah soils that have a loamy subsoil, on residual landforms within the map unit
- Burton soils that have a loamy subsoil and have hard bedrock at a depth of 20 to 40 inches, along the outer edge of map unit delineations
- Unprotected areas that are windswept
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways

#### *Similar inclusions:*

- Balsam soils that have a surface layer of loamy sand, loamy coarse sand, coarse sandy loam, fine sandy loam, or loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation and pasture

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, extremely bouldery surface, and short growing season. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, pesticide retention, soil fertility, and short growing season

*Management measures and considerations:*

- The slope and surface stones and boulders limit the use of equipment and may be hazardous.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to

recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.

- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the extremely bouldery surface and short growing season. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the extremely bouldery surface, short growing season, and low productivity. A site on better suited soils should be selected.

## **Urban Development**

### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the extremely bouldery surface, extreme freezing, and seeps and springs. A site on better suited soils should be selected.

### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope, extremely bouldery surface, extreme freezing, seeps and springs, and poor filtering capacity. A site on better suited soils should be selected.

### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, seeps and springs, frost action, and differential settling

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.

- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Large stones and boulders are a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the extremely bouldery surface and the high content of rock fragments.

### **Interpretive Groups**

*Land capability classification:* 7s

*Woodland ordination symbol:* 10R, based on red spruce as the indicator species

## **BdA—Bandana sandy loam, 0 to 3 percent slopes, occasionally flooded**

### **Setting**

*Landscape:* Valleys of mountains and intermountain hills

*Elevation range:* 2,200 to 2,700 feet

*Landform:* Flood plains throughout the county

*Landform position:* Planar to slightly concave bottomland slopes

*Shape of areas:* Long and narrow

*Size of areas:* 1 to 130 acres

### **Composition**

Bandana soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 8 inches—brown sandy loam

*Subsoil:*

8 to 18 inches—yellowish brown sandy loam that has grayish brown mottles

*Underlying material:*

18 to 27 inches—grayish brown sandy loam that has mottles in shades of brown

27 to 37 inches—gray sandy loam

37 to 62 inches—mixed dark yellowish brown, grayish brown, and strong brown very gravelly sand

**Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*General texture class:* Loamy in the upper part and sandy-skeletal in the lower part

*Permeability:* Moderately rapid in the upper part and rapid or very rapid in the lower part

*Available water capacity:* Low

*Depth to seasonal high water table:* 1.0 to 2.0 feet from December through May

*Hazard of flooding:* Occasional, throughout the year with standing water for less than 2 days

*Shrink-swell potential:* Low

*Slope class:* Nearly level or gently sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* None or slight

*Organic matter content (surface layer):* Moderate or high

*Potential frost action:* Low

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Strongly acid to slightly acid throughout the profile

*Parent material:* Alluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Depth to contrasting material:* 20 to 40 inches to deposits of cobbles and gravel that are stratified with sandy or loamy material

*Other distinctive properties:* Soil subject to scouring and deposition during flooding

**Minor Components***Dissimilar inclusions:*

- The moderately well drained Dellwood and Reddies soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 8 to 40 inches, along drainageways
- Soils that are poorly drained, in depressions, old stream channels, and backwater areas
- Moderately well drained soils that have more clay in the subsoil than the Bandana soil and have strata with a high content of rock fragments at a depth of more than 60 inches, on low stream terraces and toeslopes

- The well drained Saunook soils that have more clay in the subsoil than the Bandana soil, on toeslopes
- The well drained Rosman soils that have strata with a high content of rock fragments at a depth of more than 40 inches, in the slightly higher positions
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways

*Similar inclusions:*

- Bandana soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam
- Random areas of soils that are similar to the Bandana soil but have a thick, darker colored, loamy surface layer

**Land Use**

**Dominant Uses:** Pasture and hayland

**Other Uses:** Cropland, ornamental crops, and woodland

**Agricultural Development****Cropland**

*Suitability:* Well suited

*Management concerns:* Flooding, wetness, soil fertility, nutrient leaching, pesticide retention, and climate

*Management measures and considerations:*

- Although most flooding occurs during the winter months, there is a risk of crop loss during the growing season.
- Maintaining existing artificial drainage systems helps to reduce the wetness limitation caused by a seasonal high water table and improve soil productivity.
- Using conservation tillage, winter cover crops, crop residue management, and crop rotations which include grasses and legumes helps to increase the available water capacity and improve soil fertility.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients below the plant roots and into the water table.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

### Pasture and hayland

*Suitability:* Well suited

*Management concerns:* Flooding, wetness, pesticide retention, soil fertility, nutrient leaching, and erodibility

*Management measures and considerations:*

- Although most flooding occurs during the winter months, there is a risk of crop loss during the growing season.
- Maintaining existing drainageways and ditches helps to remove excess water from a seasonal high water table.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients below the plant roots and into the water table.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.

### Orchards and ornamental crops

*Suitability for orchards:* Unsited

*Suitability for ornamental crops:* Poorly suited

*Management concerns:* Flooding, wetness, root disease, climate, soil fertility, nutrient leaching, pesticide retention, and ball and burlap harvesting

*Management measures and considerations:*

- This map unit may be difficult to manage for ornamental because of the potential for flooding.
- Maintaining existing artificial drainage systems helps to reduce the wetness limitation caused by a seasonal high water table and improve soil productivity.
- Because of the seasonal high water table, soil wetness, and flooding, the potential for phytophthora root disease is increased. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.

- In areas where water concentrates, such as depressions, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients below the plant roots and into the water table.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.

### Woodland Management and Productivity

*Potential for commercial species:* Moderately high for cove hardwoods

*Suitability:* Suited

*Management concerns:* Wetness, flooding, and pesticide retention

*Management measures and considerations:*

- Restricting logging operations to periods when the soil is not saturated helps to prevent rutting and soil compaction.
- The potential for flooding is a consideration in the placement of haul roads and log landings.

### Urban Development

#### Dwellings

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the flooding and wetness. A site on better suited soils should be selected.

#### Septic tank absorption fields

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the wetness, poor filtering capacity, and flooding. A site on better suited soils should be selected.

**Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the flooding and wetness. A site on better suited soils should be selected.

**Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Flooding, wetness, root disease, pesticide retention, soil fertility, nutrient leaching, and climate

*Management measures and considerations:*

- This map unit is difficult to manage for lawns and landscaping because of the flooding.
- Maintaining existing artificial drainage systems helps to reduce the wetness limitation caused by a seasonal high water table and improve soil productivity.
- Because of the seasonal high water table, soil wetness, and flooding, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as depressions, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients below the plant roots and into the water table.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

**Interpretive Groups**

*Land capability classification:* 3w

*Woodland ordination symbol:* 8W, based on yellow-poplar as the indicator species

**BmA—Biltmore sand, 0 to 3 percent slopes, frequently flooded****Setting**

*Landscape:* Mountain valleys

*Elevation range:* 2,000 to 2,700 feet

*Landform:* Flood plains, dominantly along the North Toe and Nolichucky Rivers

*Landform position:* Planar to slightly convex bottomland slopes

*Shape of areas:* Long and narrow

*Size of areas:* 1 to 55 acres

**Composition**

Biltmore soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

**Typical Profile**

*Surface layer:*

0 to 10 inches—yellowish brown sand

*Underlying material:*

10 to 45 inches—yellowish brown sand

45 to 62 inches—yellowish brown fine sand

**Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Sandy

*Permeability:* Rapid

*Available water capacity:* Very low

*Depth to seasonal high water table:* 3.5 to 6.0 feet from December through May

*Hazard of flooding:* Frequent, throughout the year with standing water for less than 2 days

*Shrink-swell potential:* Low

*Slope class:* Nearly level or gently sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* None or slight

*Organic matter content (surface layer):* Low

*Potential frost action:* Low

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Strongly acid to slightly alkaline throughout the profile

*Parent material:* Recent sandy alluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Soil subject to scouring and deposition during flooding

**Minor Components**

*Dissimilar inclusions:*

- Soils that are occasionally flooded, in the slightly higher positions
- Soils that are moderately well drained, in depressions and backwater areas

- Rosman soils that have loamy subsoils and are occasionally flooded, in the slightly higher positions
- The moderately well drained Dellwood and Reddies soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 8 to 40 inches, along drainageways
- The somewhat poorly drained Bandana soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 20 to 40 inches, in depressions, old stream channels, and backwater areas
- Soils that are poorly drained, in depressions, old stream channels, and backwater areas

*Similar inclusions:*

- Biltmore soils that have a loam or sandy loam surface layer

### **Land Use**

**Dominant Uses:** Woodland, wildlife habitat, and recreation

**Other Uses:** Pasture and hayland

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:* Flooding, droughtiness, soil fertility, nutrient leaching, climate, and equipment use

*Management measures and considerations:*

- This map unit is difficult to manage for cropland because of the potential for flooding during the growing season.

#### **Pasture and hayland**

*Suitability:* Poorly suited

*Management concerns:* Flooding, droughtiness, soil fertility, and nutrient leaching

*Management measures and considerations:*

- Although most flooding occurs during the winter months, there is a risk of crop loss during the growing season.
- Using drought-tolerant plants helps to increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using split applications of lime, fertilizer, and pesticides helps to increase their effectiveness.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing

livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the frequent flooding. A site on better suited soils should be selected.

#### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods

*Suitability:* Poorly suited

*Management concerns:* Flooding and seedling survival

*Management measures and considerations:*

- This map unit may be difficult to manage for timber production because of the flooding.
- The potential for flooding is a consideration in the placement of haul roads and log landings.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the flooding. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the flooding and poor filtering capacity. A site on better suited soils should be selected.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the flooding. A site on better suited soils should be selected.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Flooding, high sand content, soil fertility, nutrient leaching, and climate

*Management measures and considerations:*

- This map unit is difficult to manage for lawns and landscaping because of the flooding.
- The quick and permanent establishment of ground cover helps to stabilize the sandy soil and improves trafficability.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Using split applications of lime, fertilizer, and pesticides helps to increase their effectiveness.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients and pesticides below the plant roots.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- In areas where water concentrates, such as depressions, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 4w

*Woodland ordination symbol:* 8S, based on yellow-poplar as the indicator species

## **BtD—Buladean-Chestnut complex, 15 to 30 percent slopes, stony**

### **Setting**

*Landscape:* Low and intermediate mountains dominantly in the northern and central parts of the county

*Elevation range:* 2,400 to 4,600 feet

*Landform:* Ridges

*Landform position:* Summits and the upper side slopes

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 2 to 128 acres

### **Composition**

Buladean soil and similar inclusions: 50 percent

Chestnut soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Buladean**

*Surface layer:*

0 to 3 inches—very dark grayish brown loam

*Subsoil:*

3 to 20 inches—brown loam

20 to 26 inches—brown coarse sandy loam

*Underlying material:*

26 to 50 inches—multicolored coarse sandy loam saprolite

*Bedrock:*

50 to 86 inches—weathered, slightly fractured biotite granitic gneiss

#### **Chestnut**

*Surface layer:*

0 to 2 inches—dark yellowish brown loam

*Subsoil:*

2 to 20 inches—strong brown loam

20 to 27 inches—strong brown coarse sandy loam

*Bedrock:*

27 to 80 inches—weathered, moderately fractured biotite granitic gneiss

### **Soil Properties and Qualities**

*Depth class:* Buladean—deep; Chestnut—moderately deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Buladean—moderate; Chestnut—low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Buladean—40 to 60 inches to soft bedrock; Chestnut—20 to 40 inches to soft bedrock

### **Minor Components**

*Dissimilar inclusions:*

- Cowee and Pigeonroost soils that have more clay in the subsoil than the Buladean and Chestnut soils and

have soft bedrock at a depth of 20 to 40 inches, on shoulder slopes and nose slopes

- Evard and Edneytown soils that have more clay in the subsoil than the Buladean and Chestnut soils, on nose slopes and the lower side slopes
- Random areas of Micaville and Chandler soils that have more mica in the subsoil than the Buladean and Chestnut soils and have soft bedrock at a depth of 40 to more than 60 inches
- Saunook soils that have thicker surface layers with more organic matter than those of the Buladean and Chestnut soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in saddles and gaps
- Widely scattered areas of rock outcrop, on narrow ridges
- Ashe soils that have hard bedrock at a depth of 20 to 40 inches, in areas adjacent to rock outcrops
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Buladean and Chestnut soils that have surface layers of coarse sandy loam, sandy loam, or fine sandy loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, hayland, ornamental crops, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for cropland.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, soil fertility, and rooting depth and droughtiness in areas of the Chestnut soil

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing

livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Chestnut soil for the production of pasture and hay crops is difficult.

### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, soil fertility, ball and burlap harvesting, plant shape, and rooting depth and droughtiness in areas of the Chestnut soil

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, managing areas of the Chestnut soil for orchards and ornamental crops is difficult.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Buladean—equipment use and erodibility; Chestnut—equipment use, erodibility, and windthrow hazard

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.

- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Chestnut soil because of the limited rooting depth.

### ***Urban Development***

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Buladean—slope, erodibility, and corrosivity; Chestnut—slope, erodibility, corrosivity, and depth to bedrock

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials for foundations and basements helps to reduce the risk of damage to concrete.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Locating and using areas of the deeper Buladean soil may improve the performance of filter fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, slippage, erodibility, depth to bedrock, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill

slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.

- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, droughtiness, and soil fertility and depth to bedrock in areas of the Chestnut soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Chestnut soil for lawns and landscaping is difficult, especially if the soil has been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

#### ***Interpretive Groups***

*Land capability classification:* 6e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 13R in areas of the Buladean soil and 10R in areas of the Chestnut soil

#### **BtE—Buladean-Chestnut complex, 30 to 50 percent slopes, stony**

##### ***Setting***

*Landscape:* Low and intermediate mountains dominantly in the northern and central parts of the county

*Elevation range:* 2,000 to 4,600 feet  
*Landform:* Ridges and south- to west-facing mountain slopes  
*Landform position:* Summits and side slopes  
*Shape of areas:* Long and narrow on summits and irregular on side slopes  
*Size of areas:* 5 to 132 acres

### **Composition**

Buladean soil and similar inclusions: 50 percent  
 Chestnut soil and similar inclusions: 30 percent  
 Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Buladean**

*Surface layer:*  
 0 to 3 inches—very dark grayish brown loam

*Subsoil:*  
 3 to 20 inches—brown loam  
 20 to 26 inches—brown coarse sandy loam

*Underlying material:*  
 26 to 50 inches—multicolored coarse sandy loam saprolite

*Bedrock:*  
 50 to 86 inches—weathered, slightly fractured biotite granitic gneiss

#### **Chestnut**

*Surface layer:*  
 0 to 2 inches—dark yellowish brown loam

*Subsoil:*  
 2 to 20 inches—strong brown loam  
 20 to 27 inches—strong brown coarse sandy loam

*Bedrock:*  
 27 to 80 inches—weathered, moderately fractured biotite granitic gneiss

### **Soil Properties and Qualities**

*Depth class:* Buladean—deep; Chestnut—moderately deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Buladean—moderate;  
 Chestnut—low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe  
*Rock fragments on the surface:* Cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges and upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Buladean—40 to 60 inches to soft bedrock; Chestnut—20 to 40 inches to soft bedrock

### **Minor Components**

*Dissimilar inclusions:*

- Cowee and Pigeonroost soils that have more clay in the subsoil than the Buladean and Chestnut soils and have soft bedrock at a depth of 20 to 40 inches, on nose slopes and spur ridges
  - Evard and Edneytown soils that have more clay in the subsoil than the Buladean and Chestnut soils, on nose slopes and the lower side slopes
  - Random areas of Micaville and Chandler soils that have more mica in the subsoil than the Buladean and Chestnut soils and have soft bedrock at a depth of 40 to more than 60 inches
  - Saunook soils that have thicker surface layers with more organic matter than those of the Buladean and Chestnut soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and on footslopes
  - Plott soils that have thicker surface layers with more organic matter than those of the Buladean and Chestnut soils and have bedrock at a depth of more than 60 inches, at the higher elevations and in concave areas at the head of drains
  - Widely scattered areas of rock outcrop
  - Areas on prominent ridges and upper side slopes that are windswept
  - Cullasaja soils that have thicker surface layers with more organic matter than those of the Buladean and Chestnut soils, have more rock fragments in the subsoil, and have bedrock at a depth of more than 60 inches, in drainageways and below rock outcrops
- Similar inclusions:*
- Buladean and Chestnut soils that have surface layers of coarse sandy loam, sandy loam, or fine sandy loam

## ***Land Use***

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, hayland, ornamental crops, and building site development

### ***Agricultural Development***

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, soil fertility, and rooting depth and droughtiness in areas of the Chestnut soil

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Chestnut soil for the production of pasture and hay crops is difficult.

#### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, soil fertility, ball and burlap harvesting, plant shape, and rooting depth and droughtiness in areas of the Chestnut soil

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, managing areas of the Chestnut soil for orchards and ornamental crops is difficult.

### ***Woodland Management and Productivity***

*Potential for commercial species:* Moderately high for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Buladean—equipment use and erodibility; Chestnut—equipment use, erodibility, and windthrow hazard

*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Chestnut soil because of the limited rooting depth.

### ***Urban Development***

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Buladean—slope, erodibility,

and corrosivity; Chestnut—slope, erodibility, corrosivity, and depth to bedrock

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials for foundations and basements helps to reduce the risk of damage to concrete.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Locating and using areas of the deeper Buladean soil may improve the performance of filter fields.

### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, slippage, erodibility, depth to bedrock, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, droughtiness, and soil fertility and depth to bedrock in areas of the Chestnut soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Chestnut soil for lawns and landscaping is difficult, especially if the soil has been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 13R in areas of the Buladean soil and 10R in areas of the Chestnut soil

## **BtF—Buladean-Chestnut complex, 50 to 95 percent slopes, stony**

### **Setting**

*Landscape:* Low and intermediate mountains dominantly in the northern and central parts of the county

*Elevation range:* 2,000 to 4,600 feet

*Landform:* South- to west-facing mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Oblong or irregular

*Size of areas:* 5 to 420 acres

### **Composition**

Buladean soil and similar inclusions: 50 percent

Chestnut soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Buladean**

*Surface layer:*

0 to 3 inches—very dark grayish brown loam

*Subsoil:*

3 to 20 inches—brown loam

20 to 26 inches—brown coarse sandy loam

*Underlying material:*26 to 50 inches—multicolored coarse sandy loam  
saprolite*Bedrock:*50 to 86 inches—weathered, slightly fractured biotite  
granitic gneiss**Chestnut***Surface layer:*

0 to 2 inches—dark yellowish brown loam

*Subsoil:*

2 to 20 inches—strong brown loam

20 to 27 inches—strong brown coarse sandy loam

*Bedrock:*27 to 80 inches—weathered, moderately fractured  
biotite granitic gneiss**Soil Properties and Qualities***Depth class:* Buladean—deep; Chestnut—moderately  
deep*Drainage class:* Well drained*General texture class:* Loamy*Permeability:* Moderately rapid*Available water capacity:* Buladean—moderate;  
Chestnut—low*Depth to seasonal high water table:* More than 6.0 feet*Hazard of flooding:* None*Shrink-swell potential:* Low*Slope class:* Very steep*Extent of erosion:* Slight, less than 25 percent of the  
original surface layer has been removed*Hazard of water erosion:* Very severe*Rock fragments on the surface:* Cobbles and stones  
that average about 3 to 24 inches in diameter and  
25 to 75 feet apart*Organic matter content (surface layer):* Low to high*Potential frost action:* Moderate*Special climatic conditions:* On the prominent upper  
side slopes, rime ice in winter and high winds*Soil reaction:* Extremely acid to moderately acid  
throughout the profile*Parent material:* Residuum affected by soil creep in  
the upper part, weathered from felsic, high-grade  
metamorphic or igneous rock*Depth to bedrock:* Buladean—40 to 60 inches to soft  
bedrock; Chestnut—20 to 40 inches to soft  
bedrock**Minor Components***Dissimilar inclusions:*

- Cowee and Pigeonroost soils that have more clay in the subsoil than the Buladean and Chestnut soils and have soft bedrock at a depth of 20 to 40 inches, on nose slopes and spur ridges
- Evard and Edneytown soils that have more clay in the subsoil than the Buladean and Chestnut soils, on nose slopes and the lower side slopes
- Random areas of Micaville and Chandler soils that have more mica in the subsoil than the Buladean and Chestnut soils and have soft bedrock at a depth of 40 to more than 60 inches
- Saunook soils that have thicker surface layers with more organic matter than those of the Buladean and Chestnut soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and on footslopes
- Soils that have thicker surface layers with more organic matter than those of the Buladean and Chestnut soils, at the higher elevations and on north-to east-facing side slopes
- Widely scattered areas of rock outcrop
- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Buladean and Chestnut soils and have hard bedrock at a depth of more than 60 inches, in drainageways and on benches below rock outcrops
- Areas on the prominent upper side slopes that are windswept

*Similar inclusions:*

- Buladean and Chestnut soils that have surface layers of coarse sandy loam, sandy loam, or fine sandy loam

**Land Use****Dominant Uses:** Woodland and wildlife habitat**Agricultural Development****Cropland***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

**Pasture and hayland***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for the production of

pasture and hay crops because of the slope and erodibility. A site on better suited soils should be selected.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope and erodibility. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for upland hardwoods and high for eastern white pine

*Suitability:* Poorly suited

*Management concerns:* Buladean—equipment use and erodibility; Chestnut—equipment use, erodibility, and windthrow hazard

*Management measures and considerations:*

- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Chestnut soil because of the limited rooting depth.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the slope and erodibility. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope and the depth to bedrock of the Chestnut soil. The local Health Department should be contacted for additional guidance.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and

streets because of the slope, erodibility, and depth to bedrock. A site on better suited soils should be selected.

### **Lawns and landscaping**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope, erodibility, and the depth to bedrock of the Chestnut soil. A site on better suited soils should be selected.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 13R in areas of the Buladean soil and 10R in areas of the Chestnut soil

### **ByC—Burton-Craggey complex, windswept, 8 to 15 percent slopes, extremely bouldery**

#### **Setting**

*Landscape:* High mountains on Unaka Mountain and Jane Bald

*Elevation range:* 5,000 to 5,800 feet

*Landform:* Ridges

*Landform position:* Summits

*Shape of areas:* Long and narrow

*Size of areas:* 9 and 42 acres

#### **Composition**

Burton soil and similar inclusions: 40 percent

Craggey soil and similar inclusions: 35 percent

Dissimilar inclusions: 25 percent

#### **Typical Profile**

##### **Burton**

*Surface layer:*

0 to 10 inches—very dark gray gravelly sandy loam

10 to 18 inches—black gravelly loam

*Subsoil:*

18 to 26 inches—yellowish brown gravelly loam

26 to 30 inches—yellowish brown cobbly loam

*Bedrock:*

30 to 41 inches—unweathered, moderately fractured metasandstone (biotite hornblende gneiss on Jane Bald)

**Craggey***Surface layer:*

0 to 3 inches—black gravelly loam

3 to 11 inches—very dark grayish brown gravelly loam

*Subsoil:*

11 to 17 inches—dark yellowish brown gravelly loam

*Bedrock:*17 to 28 inches—unweathered, slightly fractured  
metasandstone (biotite hornblende gneiss on  
Jane Bald)**Soil Properties and Qualities***Depth class:* Burton—moderately deep; Craggey—  
shallow*Drainage class:* Burton—well drained; Craggey—  
somewhat excessively drained*General texture class:* Loamy*Permeability:* Moderately rapid*Available water capacity:* Very low*Depth to seasonal high water table:* More than 6.0 feet*Hazard of flooding:* None*Shrink-swell potential:* Low*Slope class:* Strongly sloping*Extent of erosion:* Slight, less than 25 percent of the  
original surface layer has been removed*Hazard of water erosion:* Severe*Rock fragments on the surface:* About 15 percent  
stones and boulders that average about 10 to 48  
inches in diameter and 3 to 10 feet apart*Organic matter content (surface layer):* Very high*Potential frost action:* Moderate*Special climatic conditions:* Extreme freezing and rime  
ice in winter, high winds, high rainfall, and short  
growing season*Soil reaction:* Extremely acid to moderately acid  
throughout the profile*Parent material:* Residuum affected by soil creep in  
the upper part, weathered from felsic or mafic,  
high-grade metamorphic or igneous rock on Jane  
Bald and metasandstone on Unaka Mountain*Depth to bedrock:* Burton—20 to 40 inches to hard  
bedrock; Craggey—10 to 20 inches to hard  
bedrock*Other distinctive properties:* Random areas of seeps  
and springs; water movement along bedrock  
contact**Minor Components***Dissimilar inclusions:*

- Random areas of soils that have bedrock at a depth of 40 to more than 60 inches
- Widely scattered areas of rock outcrop

- Random areas of soils that have hard bedrock at a depth of 1 to 10 inches

*Similar inclusions:*

- Burton soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam
- Craggey soils that have a surface layer of coarse sandy loam, sandy loam, or fine sandy loam

**Land Use****Dominant Uses:** Woodland and wildlife habitat**Other Uses:** Recreation**Agricultural Development****Cropland***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for crop production because of the depth to bedrock, extremely bouldery surface, and short growing season. A site on better suited soils should be selected.

**Pasture and hayland***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the depth to bedrock, extremely bouldery surface, and short growing season. A site on better suited soils should be selected.

**Orchards and ornamental crops***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the depth to bedrock, extremely bouldery surface, damaging high winds, and short growing season. A site on better suited soils should be selected.

**Woodland Management and Productivity***Potential for commercial species:* Not used*Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for timber production because of the damaging high winds, short growing season, low productivity, depth to bedrock, and extremely bouldery surface. A site on better suited soils should be selected.

**Urban Development****Dwellings***Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the depth to bedrock, extremely bouldery surface, extreme freezing, and damaging high winds. A site on better suited soils should be selected.

**Septic tank absorption fields***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the depth to bedrock, extremely bouldery surface, and extreme freezing.
- The local Health Department should be contacted for additional guidance.

**Local roads and streets***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for roads and streets because of the depth to bedrock, extremely bouldery surface, and extreme freezing. A site on better suited soils should be selected.

**Lawns and landscaping***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the depth to bedrock, extremely bouldery surface, damaging high winds, and short growing season. A site on better suited soils should be selected.

**Interpretive Groups***Land capability classification:* Burton—4e; Craggey—7s*Woodland ordination symbol:* Based on northern red oak as the indicator species, 2R in areas of the Burton soil and 2D in areas of the Craggey soil**CaD—Cashiers sandy loam, 15 to 30 percent slopes, stony****Setting***Landscape:* Intermountain hills and low and intermediate mountains dominantly in the southern part of the county*Elevation range:* 2,800 to 4,600 feet*Landform:* North- to east-facing ridges and mountain slopes and those shaded by the higher mountains*Landform position:* Summits and side slopes*Shape of areas:* Long and narrow on summits and oblong or irregular on side slopes*Size of areas:* 2 to 85 acres**Composition**

Cashiers soil and similar inclusions: 85 percent

Dissimilar inclusions: 15 percent

**Typical Profile***Surface layer:*

0 to 9 inches—very dark grayish brown sandy loam

*Subsoil:*

9 to 13 inches—strong brown sandy loam that has mottles in shades of brown

13 to 68 inches—strong brown sandy loam

*Underlying material:*

68 to 75 inches—multicolored loamy sand saprolite

**Soil Properties and Qualities***Depth class:* Very deep*Drainage class:* Well drained*General texture class:* Loamy*Permeability:* Moderately rapid*Available water capacity:* Moderate*Depth to seasonal high water table:* More than 6.0 feet*Hazard of flooding:* None*Shrink-swell potential:* Low*Slope class:* Moderately steep*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed*Hazard of water erosion:* Very severe*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart*Organic matter content (surface layer):* High or very high*Potential frost action:* Moderate*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on prominent ridges, rime ice in winter and high winds*Soil reaction:* Extremely acid to moderately acid throughout the profile*Parent material:* Residuum affected by soil creep in the upper part, weathered from high-grade metamorphic or igneous rock with a high mica content*Depth to bedrock:* More than 60 inches*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement

when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

#### *Dissimilar inclusions:*

- Micaville and Chandler soils that have thinner surface layers with less organic matter than that of the Cashiers soil and have soft bedrock at a depth of 40 to more than 60 inches, on south- to west-facing shoulder slopes, nose slopes, and side slopes
- Random areas of Hunt Dale soils that have more clay and less mica in the subsoil than the Cashiers soil
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Areas on prominent ridges that are windswept

#### *Similar inclusions:*

- Cashiers soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Ornamental crops and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for cropland.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, soil fertility, and pesticide retention

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in

the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

#### **Orchards and ornamental crops**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, pesticide retention, ball and burlap harvesting, plant shape, climate, and soil fertility

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

#### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Well suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water

directly onto fill slopes help to stabilize logging roads, skid trails, and landings.

- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the mica content.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, low strength, slippage, and differential settling

*Management measures and considerations:*

- This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, low strength, slippage, erodibility, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill

slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.

- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native, winter-hardy landscape plants is recommended.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

#### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* 7R, based on yellow-poplar as the indicator species

### **CaE—Cashiers sandy loam, 30 to 50 percent slopes, stony**

#### **Setting**

*Landscape:* Intermountain hills and low and

intermediate mountains dominantly in the southern part of the county

*Elevation range:* 2,800 to 4,600 feet

*Landform:* North- to east-facing mountain slopes and those shaded by the higher mountains

*Landform position:* Side slopes

*Shape of areas:* Oblong or irregular

*Size of areas:* 5 to 150 acres

### **Composition**

Cashiers soil and similar inclusions: 85 percent

Dissimilar inclusions: 15 percent

### **Typical Profile**

*Surface layer:*

0 to 9 inches—very dark grayish brown sandy loam

*Subsoil:*

9 to 13 inches—strong brown sandy loam that has mottles in shades of brown

13 to 68 inches—strong brown sandy loam

*Underlying material:*

68 to 75 inches—multicolored loamy sand saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on prominent ridges and upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from high-grade

metamorphic or igneous rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Micaville and Chandler soils that have thinner surface layers with less organic matter than that of the Cashiers soil and have soft bedrock at a depth of 40 to more than 60 inches, on south- to west-facing spur ridges, nose slopes, and side slopes
- Random areas of Hunt Dale soils that have more clay and less mica in the subsoil than the Cashiers soil
- Saunook soils that have more clay and less mica in the subsoil than the Cashiers soil, in concave areas at the head of drains and on footslopes
- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Cashiers soil, in drainageways
- Widely scattered areas of rock outcrop
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Areas on prominent ridges and upper side slopes that are windswept

*Similar inclusions:*

- Cashiers soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Orchards and ornamental crops, pasture, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, soil fertility, and pesticide retention

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

**Orchards and ornamental crops***Suitability:* Poorly suited*Management concerns:* Equipment use, erodibility, pesticide retention, ball and burlap harvesting, plant shape, climate, and soil fertility*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.

- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

***Woodland Management and Productivity****Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods*Suitability:* Suited*Management concerns:* Equipment use and erodibility*Management measures and considerations:*

- This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the mica content.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

***Urban Development*****Dwellings***Suitability:* Poorly suited*Management concerns:* Slope, erodibility, low strength, slippage, and differential settling*Management measures and considerations:*

- This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

### Septic tank absorption fields

*Suitability:* Poorly suited

*Management concerns:* Slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Slope, low strength, slippage, erodibility, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.

- The use of native, winter-hardy landscape plants is recommended.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### Interpretive Groups

*Land capability classification:* 7e

*Woodland ordination symbol:* 7R, based on yellow-poplar as the indicator species

### CaF—Cashiers sandy loam, 50 to 95 percent slopes, stony

#### Setting

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the southern part of the county

*Elevation range:* 2,800 to 5,000 feet

*Landform:* North- to east-facing mountain slopes and those shaded by the higher mountains

*Landform position:* Side slopes

*Shape of areas:* Oblong or irregular

*Size of areas:* 5 to 150 acres

#### Composition

Cashiers soil and similar inclusions: 85 percent

Dissimilar inclusions: 15 percent

#### Typical Profile

*Surface layer:*

0 to 9 inches—very dark grayish brown sandy loam

*Subsoil:*

9 to 13 inches—strong brown sandy loam that has mottles in shades of brown

13 to 68 inches—strong brown sandy loam

*Underlying material:*

68 to 75 inches—multicolored loamy sand saprolite

#### Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on the prominent upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from high-grade metamorphic or igneous rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Micaville and Chandler soils that have thinner surface layers with less organic matter than that of the Cashiers soil and have soft bedrock at a depth of 40 to more than 60 inches, on south- to west-facing spur ridges, nose slopes, and side slopes
- Random areas of Hunt Dale soils that have more clay and less mica in the subsoil than the Cashiers soil
- Saunook soils that have more clay and less mica in the subsoil than the Cashiers soil, in concave areas at the head of drains and on footslopes
- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Cashiers soil, below rock outcrops and in drainageways
- Widely scattered areas of rock outcrop
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Areas on the prominent upper side slopes that are windswept

*Similar inclusions:*

- Cashiers soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam

## **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the slope and erodibility. A site on better suited soils should be selected.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope and erodibility. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Poorly suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings

because of the slope, erodibility, and soil instability. A site on better suited soils should be selected.

### Septic tank absorption fields

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for additional guidance.

### Local roads and streets

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope, erodibility, and soil instability. A site on better suited soils should be selected.

### Lawns and landscaping

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope and erodibility. A site on better suited soils should be selected.

### Interpretive Groups

*Land capability classification:* 7e

*Woodland ordination symbol:* 7R, based on yellow-poplar as the indicator species

## CdB—Chandler loam, 2 to 8 percent slopes

### Setting

*Landscape:* Intermountain hills dominantly in the Little Switzerland community

*Elevation range:* 2,800 to 3,800 feet

*Landform:* Ridges

*Landform position:* Summits

*Shape of areas:* Long and narrow

*Size of areas:* 3 to 19 acres

### Composition

Chandler soil and similar inclusions: 85 percent

Dissimilar inclusions: 15 percent

### Typical Profile

*Surface layer:*

0 to 3 inches—dark yellowish brown loam

*Subsoil:*

3 to 26 inches—yellowish brown sandy loam

*Underlying material:*

26 to 70 inches—multicolored loamy sand saprolite

### Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Gently sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Moderate

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### Minor Components

*Dissimilar inclusions:*

- Random areas of Micaville soils that have soft bedrock at a depth of 40 to 60 inches
- Random areas of Watauga soils that have more clay in the subsoil than the Chandler soil
- Fannin soils that have more clay in the subsoil than the Chandler soil, on nose slopes
- Random areas of moderately eroded to severely eroded soils
- Random areas of soils that have soft bedrock at a depth of less than 40 inches
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Chandler soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam

### Land Use

**Dominant Uses:** Cropland and ornamental crops

**Other Uses:** Pasture, hayland, and building site development

## ***Agricultural Development***

### **Cropland**

*Suitability:* Well suited

*Management concerns:*

- This map unit is not managed for cropland.

### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Erodibility, droughtiness, and soil fertility

*Management measures and considerations:*

- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increase germination.
- Using drought-tolerant plants helps to increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Suited

*Management concerns:* Erodibility, droughtiness, soil fertility, and ball and burlap harvesting

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Using supplemental irrigation and crop varieties that are adapted to droughty conditions helps to increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### ***Woodland Management and Productivity***

*Potential for commercial species:* Moderate or low for upland hardwoods and high for eastern white pine

*Suitability:* Well suited

*Management concerns:*

- This map unit is not managed for timber production.

## ***Urban Development***

### **Dwellings**

*Suitability:* Suited

*Management concerns:* Erodibility, low strength, slippage, differential settling, and corrosivity

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials for foundations and basements helps to reduce the risk of damage to concrete.

### **Septic tank absorption fields**

*Suitability:* Well suited

*Management concerns:*

- This map unit has no significant limitations affecting septic tank absorption fields.

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields

### **Local roads and streets**

*Suitability:* Suited

*Management concerns:* Low strength, erodibility, slippage, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as

possible help to prevent slippage and excessive soil erosion.

- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Well suited

*Management concerns:* Erodibility, soil fertility, and droughtiness

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 3e

*Woodland ordination symbol:* 11A, based on eastern white pine as the indicator species

## **CdC—Chandler loam, 8 to 15 percent slopes**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the Little Switzerland community

*Elevation range:* 2,800 to 4,000 feet

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits

*Shape of areas:* Long and narrow

*Size of areas:* 3 to 31 acres

### **Composition**

Chandler soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 3 inches—dark yellowish brown loam

*Subsoil:*

3 to 26 inches—yellowish brown sandy loam

*Underlying material:*

26 to 70 inches—multicolored loamy sand saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Strongly sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Micaville soils that have soft bedrock at a depth of 40 to 60 inches
- Random areas of Watauga soils that have more clay in the subsoil than the Chandler soil
- Fannin soils that have more clay in the subsoil than the Chandler soil, on nose slopes
- Random areas that are moderately eroded to severely eroded
- Random areas of soils that have soft bedrock at a depth of less than 40 inches
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Saunook soils that have a surface layer with more organic matter than that of the Chandler soil and have more clay in the subsoil, in saddles, gaps, and concave areas
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Chandler soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam

**Land Use**

**Dominant Uses:** Pasture, hayland, and woodland

**Other Uses:** Ornamental crops and building site development

**Agricultural Development****Cropland**

*Suitability:* Suited

*Management concerns:*

- This map unit is not managed for cropland.

**Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Equipment use, erodibility, droughtiness, and soil fertility

*Management measures and considerations:*

- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increase germination.
- Using drought-tolerant plants helps to increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hay and pasture.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

**Orchards and ornamental crops**

*Suitability:* Suited

*Management concerns:* Erodibility, equipment use, droughtiness, soil fertility, and ball and burlap harvesting

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- The slope may limit equipment use in the steeper areas.
- Using supplemental irrigation and crop varieties that are adapted to droughty conditions helps to increase productivity.
- Applying lime and fertilizer according to

recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.

- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

**Woodland Management and Productivity**

*Potential for commercial species:* Moderate or low for upland hardwoods and high for eastern white pine

*Suitability:* Well suited

*Management concerns:*

- This map unit is not managed for woodland.

**Urban Development****Dwellings**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, low strength, slippage, differential settling, and corrosivity

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials for foundations and basements helps to reduce the risk of damage to concrete.

**Septic tank absorption fields**

*Suitability:* Suited

*Management concerns:* Slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

**Local roads and streets**

*Suitability:* Suited

*Management concerns:* Low strength, slope, erodibility, slippage, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

**Lawns and landscaping***Suitability:* Suited*Management concerns:* Slope, erodibility, soil fertility, and droughtiness*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

**Interpretive Groups***Land capability classification:* 4e*Woodland ordination symbol:* 11A, based on eastern white pine as the indicator species**CeD—Chandler-Micaville complex, 15 to 30 percent slopes, stony****Setting***Landscape:* Intermountain hills and low and

intermediate mountains dominantly in the southern part of the county

*Elevation range:* 2,800 to 4,000 feet*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes*Landform position:* Summits and side slopes*Shape of areas:* Long and narrow on summits and oblong or irregular on side slopes*Size of areas:* 5 to 71 acres**Composition**

Chandler soil and similar inclusions: 50 percent

Micaville soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

**Typical Profile****Chandler***Surface layer:*

0 to 3 inches—dark yellowish brown gravelly sandy loam

*Subsoil:*

3 to 12 inches—yellowish brown gravelly sandy loam

12 to 26 inches—yellowish brown sandy loam

*Underlying material:*

26 to 49 inches—brown coarse sand saprolite

49 to 70 inches—brown coarse sandy loam saprolite

**Micaville***Surface layer:*

0 to 3 inches—black channery coarse sandy loam

*Subsoil:*

3 to 7 inches—yellowish brown channery coarse sandy loam

7 to 37 inches—yellowish brown coarse sandy loam

37 to 51 inches—yellowish brown gravelly sandy loam

*Bedrock:*

51 to 61 inches—weathered, moderately fractured mica schist

**Soil Properties and Qualities***Depth class:* Chandler—very deep; Micaville—deep*Drainage class:* Somewhat excessively drained*General texture class:* Loamy*Permeability:* Moderately rapid*Available water capacity:* Low*Depth to seasonal high water table:* More than 6.0 feet*Hazard of flooding:* None*Shrink-swell potential:* Low*Slope class:* Moderately steep*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Depth to bedrock:* Chandler—more than 60 inches; Micaville—40 to 60 inches to soft bedrock

*Other distinctive properties:* Subsoil that has a high mica content; soils subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Watauga soils that have a higher clay content in the subsoil than the Chandler and Micaville soils
- Fannin soils that have more clay in the subsoil than the Chandler and Micaville soils, on nose slopes and shoulder slopes
- Saunook soils that have surface layers with more organic matter than those of the Chandler and Micaville soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in saddles and gaps and in concave areas at the head of drains
- Random areas of Chestnut and Buladean soils that have less mica in the subsoil than the Chandler and Micaville soils and have soft bedrock at a depth of less than 60 inches
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Widely scattered areas of rock outcrop
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Chandler and Micaville soils that have surface layers of coarse sandy loam, fine sandy loam, or loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, hayland, ornamental crops, and building site development

## **Agricultural Development**

### **Cropland**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for cropland.

### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, droughtiness, and soil fertility

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Using drought-tolerant plants helps to increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, droughtiness, soil fertility, ball and burlap harvesting, and plant shape

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Using supplemental irrigation and crop varieties that are adapted to droughty conditions helps to increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.

- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate or low for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- These soils are highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of mica.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, low strength, slippage, differential settling, and corrosivity and depth to bedrock in areas of the Micaville soil

*Management measures and considerations:*

- These soils are highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Chandler—slope; Micaville—slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Locating and using areas of the deeper Chandler soil may improve the performance of filter fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, low strength, slippage, erodibility, differential settling, and frost action and depth to bedrock in areas of the Micaville soil

*Management measures and considerations:*

- These soils are highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, and droughtiness

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as

possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 11R in areas of the Chandler soil and 10R in areas of the Micaville soil

## **CeE—Chandler-Micaville complex, 30 to 50 percent slopes, stony**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the southern part of the county

*Elevation range:* 2,800 to 4,000 feet

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow on summits and irregular on side slopes

*Size of areas:* 5 to 221 acres

### **Composition**

Chandler soil and similar inclusions: 50 percent

Micaville soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Chandler**

*Surface layer:*

0 to 3 inches—dark yellowish brown gravelly sandy loam

*Subsoil:*

3 to 12 inches—yellowish brown gravelly sandy loam

12 to 26 inches—yellowish brown sandy loam

*Underlying material:*

26 to 49 inches—brown coarse sand saprolite

49 to 70 inches—brown coarse sandy loam saprolite

#### **Micaville**

*Surface layer:*

0 to 3 inches—black channery coarse sandy loam

*Subsoil:*

3 to 7 inches—yellowish brown channery coarse sandy loam

7 to 37 inches—yellowish brown coarse sandy loam

37 to 51 inches—yellowish brown gravelly sandy loam

*Bedrock:*

51 to 61 inches—weathered, moderately fractured mica schist

### **Soil Properties and Qualities**

*Depth class:* Chandler—very deep; Micaville—deep

*Drainage class:* Somewhat excessively drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges and upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Depth to bedrock:* Chandler—more than 60 inches; Micaville—40 to 60 inches to soft bedrock

*Other distinctive properties:* Subsoil that has a high mica content; soils subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Watauga and Fannin soils that have a higher clay

content than the Chandler and Micaville soils and have bedrock at a depth of more than 60 inches, on nose slopes and spur ridges

- Saunook soils that have surface layers with more organic matter than those of the Chandler and Micaville soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and on footslopes
- Soils that have thicker surface layers with more organic matter than those of the Chandler and Micaville soils, on north- to east-facing side slopes
- Random areas of Chestnut and Buladean soils that have less mica in the subsoil than the Chandler and Micaville soils and have soft bedrock at a depth of less than 60 inches
- Thunder and Cullasaja soils that have surface layers with more organic matter than those of the Chandler and Micaville soils and have more rock fragments in the subsoil, in drainageways
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Widely scattered areas of rock outcrop
- Areas on prominent ridges and upper side slopes that are windswept

*Similar inclusions:*

- Chandler and Micaville soils that have surface layers of coarse sandy loam, fine sandy loam, or loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, ornamental crops, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, droughtiness, and soil fertility

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Growing adapted plants helps to ensure the

production of high-quality forage and minimize soil erosion.

- Using drought-tolerant plants helps to increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, droughtiness, soil fertility, ball and burlap harvesting, and plant shape

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Using supplemental irrigation and crop varieties that are adapted to droughty conditions helps to increase productivity.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

#### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate or low for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- These soils are highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high mica content.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, low strength, slippage, differential settling, and corrosivity and depth to bedrock in areas of the Micaville soil

*Management measures and considerations:*

- These soils are highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Chandler—slope; Micaville—slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.

- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Locating and using areas of the deeper Chandler soil may improve the performance of filter fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, low strength, slippage, erodibility, differential settling, and frost action and depth to bedrock in areas of the Micaville soil

*Management measures and considerations:*

- These soils are highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, and droughtiness

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 11R in areas of the Chandler soil and 10R in areas of the Micaville soil

## **CeF—Chandler-Micaville complex, 50 to 95 percent slopes, stony**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the southern part of the county

*Elevation range:* 2,200 to 4,000 feet

*Landform:* South- to west-facing hillslopes and mountain slopes

*Landform position:* Sides slopes

*Shape of areas:* Irregular

*Size of areas:* 10 to 154 acres

### **Composition**

Chandler soil and similar inclusions: 50 percent

Micaville soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Chandler**

*Surface layer:*

0 to 3 inches—dark yellowish brown gravelly sandy loam

*Subsoil:*

3 to 12 inches—yellowish brown gravelly sandy loam

12 to 26 inches—yellowish brown sandy loam

*Underlying material:*

26 to 49 inches—brown coarse sand saprolite

49 to 70 inches—brown coarse sandy loam saprolite

#### **Micaville**

*Surface layer:*

0 to 3 inches—black channery coarse sandy loam

*Subsoil:*

3 to 7 inches—yellowish brown channery coarse sandy loam

7 to 37 inches—yellowish brown coarse sandy loam

37 to 51 inches—yellowish brown gravelly sandy loam

*Bedrock:*

51 to 61 inches—weathered, moderately fractured mica schist

### **Soil Properties and Qualities**

*Depth class:* Chandler—very deep; Micaville—deep

*Drainage class:* Somewhat excessively drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On the prominent upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Depth to bedrock:* Chandler—more than 60 inches; Micaville—40 to 60 inches to soft bedrock

*Other distinctive properties:* Subsoil that has a high mica content; soils subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Watauga and Fannin soils that have a higher clay content than the Chandler and Micaville soils and have bedrock at a depth of more than 60 inches, on nose slopes and spur ridges
- Saunook soils that have surface layers with more organic matter than those of the Chandler and Micaville soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and on footslopes
- Soils that have thicker surface layers with more organic matter than those of the Chandler and Micaville soils, on north- to east-facing side slopes
- Random areas of Chestnut and Buladean soils that have less mica in the subsoil than the Chandler and

Micaville soils and have soft bedrock at a depth of less than 60 inches

- Thunder and Cullasaja soils that have surface layers with more organic matter than those of the Chandler and Micaville soils and have more rock fragments in the subsoil, in drainageways
- Widely scattered areas of rock outcrop
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Areas on the prominent upper side slopes that are windswept

*Similar inclusions:*

- Chandler and Micaville soils that have surface layers of coarse sandy loam, fine sandy loam, or loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the slope and erodibility. A site on better suited soils should be selected.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope and erodibility. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate or low for upland hardwoods and high for eastern white pine

*Suitability:* Poorly suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- These soils are highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Using cable logging methods helps to overcome

equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.

- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the slope, erodibility, and soil instability. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for additional guidance.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope, erodibility, and soil instability. A site on better suited soils should be selected.

#### **Lawns and landscaping**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope and erodibility. A site on better suited soils should be selected.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 11R in areas of the Chandler soil and 10R in areas of the Micaville soil

### **CfD—Cheoah channery loam, windswept, 10 to 35 percent slopes, stony**

#### **Setting**

*Landscape:* Intermediate mountains in the northwestern part of the county

*Elevation range:* 3,800 to 4,400 feet

*Landform:* North- to east-facing ridges and those shaded by the higher mountains

*Landform position:* Summits and the upper side slopes

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 10 to 95 acres

### **Composition**

Cheoah soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 12 inches—black channery loam

*Subsoil:*

12 to 46 inches—dark yellowish brown channery loam

*Bedrock:*

46 to 60 inches—weathered, moderately fractured, low-grade metasandstone

### **Soil Properties and Qualities**

*Depth class:* Deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Strongly sloping to steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe or very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; rime ice in winter; damaging high winds year-round

*Soil reaction:* Extremely acid to strongly acid in the A horizon, except in limed areas, and extremely acid to moderately acid in the B and C horizons

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Depth to bedrock:* 40 to 60 inches to soft bedrock

*Other distinctive properties:* Soil subject to downslope

movement when lateral support is removed and to differential settling when used as fill material; low natural fertility

### **Minor Components**

*Dissimilar inclusions:*

- Keener soils that have less organic matter in the surface layer than the Cheoah soil, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in saddles and gaps
- Random areas of soils that have soft bedrock at a depth of less than 40 inches
- Widely scattered areas of rock outcrop
- Sylco soils that have less organic matter in the surface layer than the Cheoah soil, have more rock fragments in the subsoil, and have hard bedrock at a depth of 20 to 40 inches, in areas adjacent to rock outcrops
- Soco soils that have less organic matter in the surface layer than the Cheoah soil and have soft bedrock at a depth of 20 to 40 inches, on shoulder slopes and in areas adjacent to rock outcrops
- Widely scattered areas of rock outcrop
- Nonwindswept areas on protected east-facing slopes

*Similar inclusions:*

- Cheoah soils that have a surface layer of fine sandy loam or silt loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, damaging high winds, and short growing season. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is limited for pasture and hayland because of the slope, erodibility, damaging high winds, and short growing season.
- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the

production of high-quality forage and minimize soil erosion.

- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the damaging high winds and a short growing season. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the damaging high winds, short growing season, and low productivity. A site on better suited soils should be selected.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, slippage, differential settling, corrosivity, and depth to bedrock

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Design modifications are needed to overcome the limitation of high winds.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as

possible or constructing silt fences helps to maintain soil stability and keep sediments on site.

- Because of the low natural fertility and droughty nature of this soil, cut and fill slopes can be difficult to revegetate.
- This soil is subject to uneven settling and may be unstable if not properly compacted.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated concrete.
- The soft bedrock underlying this soil is not difficult to excavate but is difficult to vegetate and pack into a fill slope.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, slippage, differential settling, depth to bedrock, low strength, and frost action

*Management measures and considerations:*

- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the low natural fertility and droughty nature of this soil, cut and fill slopes can be difficult to revegetate.
- The soft bedrock underlying this soil is not difficult to excavate but is difficult to vegetate and pack into a fill slope.
- This soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Permanently surfacing roads or using suitable

subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, climate, pesticide retention, soil fertility, and depth to bedrock

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- The use of native, winter-hardy landscape plants is recommended.
- This map unit is subject to damaging high winds and late spring frost and may be unsuitable for some types of landscaping.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* 2R, based on yellow-poplar as the indicator species

## **ChE—Cheoah channery loam, 35 to 50 percent slopes, stony**

### **Setting**

*Landscape:* Intermediate mountains in the far northwestern part of the county

*Elevation range:* 3,400 to 4,600 feet

*Landform:* North- to east-facing mountain slopes and those shaded by the higher mountains

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 5 to 81 acres

### **Composition**

Cheoah soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 12 inches—black channery loam

*Subsoil:*

12 to 46 inches—dark yellowish brown channery loam

*Bedrock:*

46 to 60 inches—weathered, moderately fractured, low-grade metasandstone

### **Soil Properties and Qualities**

*Depth class:* Deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on the prominent upper side slopes above 3,800 feet in elevation, rime ice in winter and high winds

*Soil reaction:* Extremely acid to strongly acid in the A horizon, except in limed areas, and extremely acid to moderately acid in the B and C horizons

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Depth to bedrock:* 40 to 60 inches to soft bedrock

*Other distinctive properties:* Soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material; low natural fertility

### **Minor Components**

#### *Dissimilar inclusions:*

- Keener soils that have less organic matter in the surface layer than the Cheoah soil, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains, on benches, and on footslopes
- Lostcove soils that have more clay and more rock fragments in the subsoil than the Cheoah soil and have bedrock at a depth of more than 60 inches, in drainageways
- Random areas of soils that have soft bedrock at a depth of less than 40 inches
- Soco soils that have less organic matter in the surface layer than the Cheoah soil and have soft bedrock at a depth of 20 to 40 inches, on shoulder slopes and spur ridges
- Sylco soils that have less organic matter in the surface layer than the Cheoah soil, have more rock fragments in the subsoil, and have hard bedrock at a depth of 20 to 40 inches, on spur ridges and in areas adjacent to rock outcrops
- Widely scattered areas of rock outcrops
- Areas on the prominent upper side slopes that are windswept

#### *Similar inclusions:*

- Cheoah soils that have a surface layer of fine sandy loam or silt loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:*

- This map unit is not managed for pasture and hayland.

#### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for orchards and ornamental crops.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit for access roads.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Because of the low natural fertility and droughty nature of this soil, cut and fill slopes can be difficult to revegetate.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for dwellings.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, slippage, differential settling, depth to bedrock, low strength, and frost action

*Management measures and considerations:*

- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the low natural fertility and droughty nature of this soil, cut and fill slopes can be difficult to revegetate.
- The soft bedrock underlying this soil is not difficult to excavate but is difficult to vegetate and pack into a fill slope.
- This soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for lawns and landscaping.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

## **ChF—Cheoah channery loam, 50 to 95 percent slopes, stony**

### **Setting**

*Landscape:* Intermediate mountains in the far northwestern part of the county

*Elevation range:* 2,000 to 4,800 feet

*Landform:* North- to east-facing mountain slopes and those shaded by the higher mountains

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 3 to 215 acres

### **Composition**

Cheoah soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 12 inches—black channery loam

*Subsoil:*

12 to 46 inches—dark yellowish brown channery loam

*Bedrock:*

46 to 60 inches—weathered, moderately fractured, low-grade metasandstone

### **Soil Properties and Qualities**

*Depth class:* Deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on the prominent upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to strongly acid in the A horizon, except in limed areas, and extremely acid to moderately acid in the B and C horizons

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Depth to bedrock:* 40 to 60 inches to soft bedrock

*Other distinctive properties:* Soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material; low natural fertility

### **Minor Components**

#### *Dissimilar inclusions:*

- Keener soils that have less organic matter in the surface layer than the Cheoah soil, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains, on benches, and on footslopes
- Lostcove soils that have a higher clay content and more rock fragments in the subsoil than the Cheoah soil and have bedrock at a depth of more than 60 inches, in drainageways
- Random areas of soils that have soft bedrock at a depth of less than 40 inches
- Widely scattered areas of outcrops
- Sylco soils that have less organic matter in the surface layer than the Cheoah soil, have more rock fragments in the subsoil, and have hard bedrock at a depth of 20 to 40 inches, on spur ridges and in areas adjacent to rock outcrops
- Soco soils that have less organic matter in the surface layer than the Cheoah soil and have soft bedrock at a depth of 40 to 60 inches, on shoulder slopes and spur ridges
- Areas on the prominent upper side slopes that are windswept

#### *Similar inclusions:*

- Cheoah soils that have a surface layer of fine sandy loam or silt loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

#### ***Agricultural Development***

##### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

##### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the slope and erodibility. A site on better suited soils should be selected.

##### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and

ornamental crops because of the slope and erodibility. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for cove hardwoods and northern hardwoods

*Suitability:* Poorly suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit for access roads.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the slope, instability of the underlying bedrock, and erodibility. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for additional guidance.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope, erodibility, and the instability of the underlying bedrock. A site on better suited soils should be selected.

#### **Lawns and landscaping**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope and erodibility. A site on better suited soils should be selected.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

## **CnC2—Clifton clay loam, 8 to 15 percent slopes, eroded**

### **Setting**

*Landscape:* Intermountain hills and low mountains dominantly in the central part of the county

*Elevation range:* 2,400 to 3,400 feet

*Landform:* Ridges

*Landform position:* Summits

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 2 to 209 acres

### **Composition**

Clifton soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 10 inches—yellowish red clay loam

*Subsoil:*

10 to 34 inches—red clay loam

*Underlying material:*

34 to 79 inches—yellowish red fine sandy loam saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Clayey

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* High

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Moderate

*Slope class:* Strongly sloping

*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Organic matter content (surface layer):* Low or moderate

*Potential frost action:* Moderate

*Soil reaction:* Very strongly acid to slightly acid throughout the profile

*Parent material:* Residuum affected by soil creep in

the upper part, weathered from mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* High clay content with high base saturation in the lower part of the subsoil

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Cowee and Evard soils that have less clay in the subsoil than the Clifton soil and have soft bedrock at a depth of 20 to more than 60 inches
- Random areas of Fannin soils that have less clay and more mica in the subsoil than the Clifton soil
- Random areas of soils that are similar to the Clifton soil but have soft bedrock at a depth of less than 60 inches
- Random areas of severely eroded soils where underlying material is exposed at the surface
- Areas of Clifton soils on Pumpkin Patch Mountain that have closely spaced stones and boulders on the surface

*Similar inclusions:*

- Clifton soils that have a surface layer of loam or sandy clay loam
- Random areas of soils that have reaction in the lower part of the subsoil that ranges to neutral

### **Land Use**

**Dominant Uses:** Cropland, pasture, and hayland

**Other Uses:** Building site development, woodland, and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Suited

*Management concerns:* Erodibility, equipment use, tillage, root penetration, soil fertility, and pesticide retention

*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- The slope may limit equipment use in the steeper areas.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Chisel plowing and subsoiling help to break through

clay pans and thus allow increased root penetration and the infiltration of rainfall.

- Using perennial grasses and legumes in rotation helps to penetrate and break up the clayey root zone.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Equipment use, erodibility, root penetration, soil fertility, and pesticide retention

*Management measures and considerations:*

- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Preparing seedbeds on the contour when renovating pastures and establishing seedbeds helps to prevent further soil erosion and increase germination.
- Using perennial grasses and legumes helps to penetrate and break up the clayey root zone.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

### **Orchards and ornamental crops**

*Suitability for orchards:* Suited

*Suitability for ornamental crops:* Poorly suited

*Management concerns:* Erodibility, equipment use, root disease, soil fertility, pesticide retention, and ball and burlap harvesting

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- The slope may limit equipment use in the steeper areas.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of plant roots.

### **Woodland Management and Productivity**

*Potential for commercial species:* Very high for eastern white pine and moderate for upland hardwoods

*Suitability:* Well suited

*Management concerns:* Erodibility and equipment use

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due the clay content of the subsoil.
- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Livestock should not be allowed to graze in areas managed for woodland.

- Soil-applied herbicides are retained due to herbicide-clay bonding, and they may damage tree seedlings when cropland is converted to woodland.

### ***Urban Development***

#### **Dwellings**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, and high clay content

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.

#### **Septic tank absorption fields**

*Suitability:* Suited

*Management concerns:* Restricted permeability, high clay content, and slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing septic system distribution lines during periods when the soil is not wet helps to reduce the smearing and sealing of trench walls.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Suited

*Management concerns:* Low strength, high clay content, slope, erodibility, and frost action

*Management measures and considerations:*

- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Using a nondegradeable, permeable fabric filter cloth between the roadbed and the soil surface helps to restrict the loss of stone into the soil.

- The soil is slippery and sticky when wet and slow to dry.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- Permanently surfacing roads or using suitable subgrade or base material increases soil strength, allows year-round use, and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, high clay content, soil compaction, root disease, pesticide retention, and soil fertility

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.

### **Interpretive Groups**

*Land capability classification:* 4e

*Woodland ordination symbol:* 12A, based on eastern white pine as the indicator species

### **CnD2—Clifton clay loam, 15 to 30 percent slopes, eroded**

#### **Setting**

*Landscape:* Intermountain hills and low mountains dominantly in the central part of the county

*Elevation range:* 2,400 to 3,400 feet

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow on summits and oblong or irregular on side slopes

*Size of areas:* 2 to 69 acres

#### **Composition**

Clifton soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

#### **Typical Profile**

*Surface layer:*

0 to 10 inches—yellowish red clay loam

*Subsoil:*

10 to 34 inches—red clay loam

*Underlying material:*

34 to 79 inches—yellowish red fine sandy loam saprolite

#### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Clayey

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* High

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Moderate

*Slope class:* Moderately steep

*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Organic matter content (surface layer):* Low or moderate

*Potential frost action:* Moderate

*Soil reaction:* Very strongly acid to slightly acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* High clay content with high base saturation in the lower part of the subsoil

#### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Cowee and Evard soils that have less clay in the subsoil than the Clifton soil and have soft bedrock at a depth of 20 to more than 60 inches
- Random areas of Fannin soils that have less clay and more mica in the subsoil than the Clifton soil
- Random areas of soils that are similar to the Clifton soil but have soft bedrock at a depth of less than 60 inches
- Random areas of severely eroded soils where underlying material is exposed at the surface
- Uneroded Dillsboro and Saunook soils in concave areas and in drainageways
- Areas of Clifton soils on Pumpkin Patch Mountain that have closely spaced stones and boulders on the surface

*Similar inclusions:*

- Clifton soils that have a surface layer of loam or sandy clay loam
- Random areas of soils that have reaction in the lower part of the subsoil that ranges to neutral

#### **Land Use**

**Dominant Uses:** Pasture and hayland

**Other Uses:** Woodland, wildlife habitat, building site development, and cropland

#### **Agricultural Development**

##### **Cropland**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, tith, root penetration, soil fertility, and pesticide retention

*Management measures and considerations:*

- This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.

- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Chisel plowing and subsoiling help to break through clay pans and thus allow increased root penetration and the infiltration of rainfall.
- Using perennial grasses and legumes in rotation helps to penetrate and break up the clayey root zone.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, root penetration, soil fertility, and pesticide retention

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Using perennial grasses and legumes helps to penetrate and break up the clayey root zone.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

### **Orchards and ornamental crops**

*Suitability for orchards:* Suited

*Suitability for ornamental crops:* Poorly suited

*Management concerns:* Equipment use, erodibility, root disease, soil fertility, pesticide retention, and ball and burlap harvesting

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of plant roots.

### **Woodland Management and Productivity**

*Potential for commercial species:* Very high for eastern white pine and moderate for upland hardwoods

*Suitability:* Suited

*Management concerns:* Erodibility and equipment use

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due the clay content of the subsoil.
- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.

- Livestock should not be allowed to graze in areas managed for woodland.
- Soil-applied herbicides are retained due to herbicide-clay bonding, and they may damage tree seedlings when cropland is converted to woodland.

### ***Urban Development***

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and high clay content

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope, restricted permeability, and high clay content

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Installing septic system distribution lines during periods when the soil is not wet helps to reduce the smearing and sealing of trench walls.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Low strength, high clay content, slope, erodibility, and frost action

*Management measures and considerations:*

- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Using a nondegradeable, permeable fabric filter cloth between the roadbed and the soil surface helps to restrict the loss of stone into the soil.

- The soil is slippery and sticky when wet and slow to dry.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- Permanently surfacing roads or using suitable subgrade or base material increases soil strength, allows year-round use, and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, high clay content, soil compaction, root disease, pesticide retention, and soil fertility

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* 12R, based on eastern white pine as the indicator species

### **CnE2—Clifton clay loam, 30 to 50 percent slopes, eroded**

#### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central part of the county

*Elevation range:* 2,400 to 3,400 feet

*Landform:* South- to west-facing hillslopes and mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Oblong or irregular

*Size of areas:* 3 to 147 acres

#### **Composition**

Clifton soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

#### **Typical Profile**

*Surface layer:*

0 to 10 inches—yellowish red clay loam

*Subsoil:*

10 to 34 inches—red clay loam

*Underlying material:*

34 to 79 inches—yellowish red fine sandy loam saprolite

#### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Clayey

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* High

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Moderate

*Slope class:* Steep

*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Organic matter content (surface layer):* Low or moderate

*Potential frost action:* Moderate

*Soil reaction:* Very strongly acid to slightly acid throughout the soil

*Parent material:* Residuum affected by soil creep in the upper part, weathered from mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* High clay content with high base saturation in the lower part of the subsoil

#### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Cowee and Evard soils that have less clay in the subsoil than the Clifton soil and have soft bedrock at a depth of 20 to more than 60 inches
- Random areas of Fannin soils that have less clay and more mica in the subsoil than the Clifton soil
- Random areas of soils that are similar to the Clifton soil but have soft bedrock at a depth of less than 60 inches
- Random areas of severely eroded soils where underlying material is exposed at the surface
- Uneroded Dillsboro and Saunook soils in concave areas and in drainageways
- Areas of Clifton soils on Pumpkin Patch Mountain that have closely spaced stones and boulders on the surface
- Widely scattered areas of rock outcrop

*Similar inclusions:*

- Clifton soils that have a surface layer of loam or sandy clay loam
- Random areas of soils that have reaction in the lower part of the subsoil that ranges to neutral

#### **Land Use**

**Dominant Uses:** Pasture, woodland, and wildlife habitat

**Other Uses:** Building site development

#### **Agricultural Development**

##### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

##### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility,

root penetration, soil fertility, and pesticide retention

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

**Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, root disease, soil fertility, pesticide retention, and ball and burlap harvesting

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The

concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of plant roots.

***Woodland Management and Productivity***

*Potential for commercial species:* Very high for eastern white pine and moderate for upland hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due the clay content of the subsoil.
- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Soil-applied herbicides are retained due to herbicide-clay bonding, and they may damage tree seedlings when cropland or pastureland is converted to woodland.

***Urban Development***

**Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and high clay content

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.

- The soil is slippery and sticky when wet and slow to dry.

### Septic tank absorption fields

*Suitability:* Poorly suited

*Management concerns:* Slope, restricted permeability, and high clay content

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Installing septic system distribution lines during periods when the soil is not wet helps to reduce the smearing and sealing of trench walls.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Low strength, high clay content, slope, erodibility, and frost action

*Management measures and considerations:*

- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Using a nondegradable, permeable fabric filter cloth between the roadbed and the soil surface helps to restrict the loss of stone into the soil.
- The soil is slippery and sticky when wet and slow to dry.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- Permanently surfacing roads or using suitable subgrade or base material increases soil strength, allows year-round use, and helps to minimize damage from frost heaving.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, high clay content, soil compaction, root disease, pesticide retention, and soil fertility

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- This soil may retain soil-applied herbicides and other pesticides due to the high clay content. The concentration of pesticides may be damaging to landscape plants.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.

### Interpretive Groups

*Land capability classification:* 7e

*Woodland ordination symbol:* 12R, based on eastern white pine as the indicator species

## CsD—Cullasaja cobbly fine sandy loam, 8 to 30 percent slopes, very bouldery

### Setting

*Landscape:* Intermediate mountains dominantly in the central and northern parts of the county

*Elevation range:* 2,800 to 5,000 feet

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Shape of areas:* Long and narrow or oblong

*Size of areas:* 2 to 157 acres

### Composition

Cullasaja soil and similar inclusions: 90 percent

Dissimilar inclusions: 10 percent

### Typical Profile

#### Surface layer:

0 to 18 inches—very dark brown cobbly fine sandy loam

#### Subsoil:

18 to 60 inches—dark yellowish brown very cobbly fine sandy loam

### Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy with many rock fragments

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Strongly sloping or moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe or very severe

*Rock fragments on the surface:* About 3 percent stones and boulders that average about 24 to 48 inches in diameter and 10 to 65 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Very strongly acid to slightly acid in the A horizon, except in limed areas, and very strongly acid to moderately acid in the B and C horizons

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments

### Minor Components

#### Dissimilar inclusions:

- Areas of rubble land, below rock outcrops and in drainageways
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and drainageways
- Saunook soils that have fewer rock fragments and more clay in the subsoil than the Cullasaja soil, on toeslopes
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations

- Areas where the surface fragments have been removed
- Areas of soils that are occasionally to rarely flooded, in drainageways

#### Similar inclusions:

- Cullasaja soils that have a surface layer of sandy loam, loam, or sandy clay loam
- Random areas of soils that are similar to the Cullasaja soil but have less organic matter in the surface layer

### Land Use

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture and recreation

### Agricultural Development

#### Cropland

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, very bouldery surface, and skeletal soils. A site on better suited soils should be selected.

#### Pasture and hayland

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope and surface stones and boulders limit the use of equipment and may be hazardous.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hay and pasture.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover

before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the very bouldery surface and skeletal soils. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for cove hardwoods and northern hardwoods

*Suitability:* Poorly suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

## **Urban Development**

### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, large stones, erodibility, seeps and springs, cutbanks cave, and corrosivity

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Large stones and boulders are a problem during excavation.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Installing permanent retaining walls helps to improve soil stability.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.

### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the very bouldery surface and skeletal soils. A site on better suited soils should be selected.

### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, seeps and springs, differential settling, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Large stones and boulders are a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- This soil is subject to uneven settling and may be unstable if not properly compacted.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, pesticide retention, climate, and soil fertility

*Management measures and considerations:*

- This map unit is limited for lawns and landscaping because of the very bouldery surface and the high content of rock fragments.
- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 7s

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

## **DeA—Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded**

### **Setting**

*Landscape:* Valleys of mountains and intermountain hills

*Elevation range:* 2,400 to 3,000 feet

*Landform:* Flood plains dominantly at the upper end of mountain valleys

*Landform position:* Planar to slightly convex bottomland slopes

*Shape of areas:* Long and narrow

*Size of areas:* 1 to 188 acres

### **Composition**

Dellwood soil and similar inclusions: 45 percent

Reddies soil and similar inclusions: 25 percent

Dissimilar inclusions: 30 percent

### **Typical Profile**

#### **Dellwood**

*Surface layer:*

0 to 12 inches—very dark grayish brown sandy loam

*Underlying material:*

12 to 26 inches—dark yellowish brown very gravelly coarse sand

26 to 71 inches—multicolored extremely gravelly coarse sand

#### **Reddies**

*Surface layer:*

0 to 12 inches—dark brown fine sandy loam

*Subsoil:*

12 to 31 inches—dark yellowish brown fine sandy loam

*Underlying material:*

31 to 35 inches—multicolored extremely gravelly loamy sand

35 to 79 inches—multicolored extremely gravelly coarse sand

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*General texture class:* Dellwood—sandy in the upper part and sandy-skeletal in the lower part; Reddies—sandy in the upper part and sandy or sandy-skeletal in the lower part

*Permeability:* Dellwood—moderately rapid in the surface layer and rapid or very rapid in the underlying material; Reddies—moderately rapid in the surface layer and subsoil and rapid in the underlying material

*Available water capacity:* Very low

*Depth to seasonal high water table:* Dellwood—2.0 to 4.0 feet from December through May; Reddies—2.0 to 3.5 feet from December through May

*Hazard of flooding:* Occasional, throughout the year with standing water for less than 2 days

*Shrink-swell potential:* Low

*Slope class:* Nearly level or gently sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* None or slight

*Organic matter content (surface layer):* Moderate or high

*Potential frost action:* Low

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Very strongly acid to neutral throughout the profile

*Parent material:* Alluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Depth to contrasting material:* Dellwood—8 to 20 inches to deposits of cobbles and gravel that are stratified with sandy or loamy material; Reddies—20 to 40 inches to deposits of cobbles and gravel that are stratified with sandy or loamy material

*Other distinctive properties:* Soils subject to scouring and deposition during flooding

### **Minor Components**

*Dissimilar inclusions:*

- Soils that are rarely flooded, on the wider flood plains
- Soils that are well drained or excessively well drained, in the wider map units and those adjacent to the deeper stream channels

- The somewhat poorly drained Bandana soils that have a subsoil that is loamy in the upper part and have strata with a high content of rock fragments at a depth of 20 to 40 inches, in depressions, old stream channels, and backwater areas
- The well drained Rosman soils that have strata with a high content of rock fragments at a depth of more than 40 inches, in the slightly higher positions
- Soils that are poorly drained, in depressions and old stream channels
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways

*Similar inclusions:*

- Dellwood soils that have a surface layer of sandy loam or fine sandy loam
- Reddies soils that have a surface layer of loam or fine sandy loam

### **Land Use**

**Dominant Uses:** Cropland and ornamental crops

**Other Uses:** Pasture, hayland, woodland, and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Suited

*Management concerns:* Flooding, droughtiness, pesticide retention, soil fertility, nutrient leaching, and climate

*Management measures and considerations:*

- Although most flooding occurs during the winter months, there is a risk of crop loss during the growing season.
- These soils have a low available water capacity and become droughty during periods of low rainfall.
- Using conservation tillage, winter cover crops, crop residue management, and crop rotations which include grasses and legumes helps to increase the available water capacity and improve soil fertility.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching

of plant nutrients below the plant roots and into the water table.

- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the plant roots (fig. 4).
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Flooding, droughtiness, pesticide retention, soil fertility, nutrient leaching, and erodibility

*Management measures and considerations:*

- Although most flooding occurs during the winter months, there is a risk of crop loss during the growing season.
- These soils have a low available water capacity and become droughty during periods of low rainfall.
- Using supplemental irrigation and crop varieties that are adapted to droughty conditions helps to increase crop production.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients below the plant roots and into the water table.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.

#### **Orchards and ornamental crops**

*Suitability for orchards:* Unsited

*Suitability for ornamental crops:* Poorly suited

*Management concerns:* Flooding, droughtiness, root disease, climate, soil fertility, nutrient leaching, pesticide retention, and ball and burlap harvesting

*Management measures and considerations:*

- This map unit may be difficult to manage for



**Figure 4.—Soils in the Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded, are droughty. Crop yields are improved by proper irrigation.**

orchards and ornamental crops because of the potential for flooding.

- These soils have a low available water capacity and become droughty during periods of low rainfall.
- Because of the seasonal high water table and flooding, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.

- In areas where water concentrates, such as toeslopes and drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to

increase the availability of plant nutrients and maximize productivity.

- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients below the plant roots and into the water table.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the plant roots.
- Because plant-applied herbicides are tied up by organic matter, using herbicides that are applied to the plant rather than the soil increases their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents of the Reddies soil.
- Areas of the Dellwood soil are severely limited to ball and burlap harvesting due to the high content of rock fragments.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods

*Suitability:* Well suited

*Management concerns:* Flooding and pesticide retention

*Management measures and considerations:*

- The potential for flooding is a consideration in the placement of haul roads and log landings.
- Soil-applied herbicides are retained due to herbicide-organic matter bonding, and they may damage tree seedlings when cropland is converted to woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the flooding and wetness. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the wetness and poor filtering capacity. The local Health Department should be contacted for additional guidance.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the flooding. A site on better suited soils should be selected.

### **Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Flooding, droughtiness, pesticide retention, root disease, soil fertility, nutrient leaching, and climate

*Management measures and considerations:*

- This map unit is difficult to manage for lawns and landscaping because of the flooding, and use is severely limited during periods of inundation.
- These soils have a low available water capacity and become droughty during periods of low rainfall.
- Using supplemental irrigation and selecting varieties that are adapted to droughty conditions help to increase the survival of grasses and landscaping plants.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of the seasonal high water table and flooding, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients below the plant roots and into the water table.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the plant roots.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

### **Interpretive Groups**

*Land capability classification:* Dellwood—3s;  
Reddies—2w

*Woodland ordination symbol:* Based on yellow-poplar as the indicator species, 8F in areas of the Dellwood soil and 8A in areas of the Reddies soil

## DoB—Dillsboro clay loam, 2 to 8 percent slopes

### Setting

*Landscape:* Dominantly the low mountains of the Buladean community and the intermountain hills in and around the town of Bakersville

*Elevation range:* 2,400 to 3,400 feet

*Landform:* Coves, colluvial fans, high stream terraces, and benches

*Landform position:* Foothills and toeslopes

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 3 to 55 acres

### Composition

Dillsboro soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

### Typical Profile

*Surface layer:*

0 to 13 inches—dark yellowish brown clay loam

*Subsoil:*

13 to 26 inches—brown clay loam

26 to 64 inches—yellowish red clay

64 to 72 inches—yellowish red clay loam

*Underlying material:*

72 to 87 inches—multicolored cobbly sandy clay loam

### Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Clayey

*Permeability:* Moderate

*Available water capacity:* High

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low in the surface layer and moderate in the subsoil

*Slope class:* Gently sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Moderate

*Organic matter content (surface layer):* Moderate or high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*Parent material:* Old alluvium and colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high clay content; random areas of seeps and springs

### Minor Components

*Dissimilar inclusions:*

- Soils that are moderately eroded, in cropped fields
- Random areas of Saunook soils that have less clay in the subsoil than the Dillsboro soil
- Thunder soils that have less clay and more rock fragments in the subsoil than the Dillsboro soil, in drainageways
- Moderately well drained to poorly drained soils, in depressions and on toeslopes
- The somewhat poorly drained Bandana soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 20 to 40 inches, in areas along stream channels
- Udorthents, loamy, in and around the towns of Bakersville and Spruce Pine
- Urban land in and around the towns of Bakersville and Spruce Pine

*Similar inclusions:*

- Dillsboro soils that have a surface layer of fine sandy loam, loam, or sandy clay loam
- Dillsboro soils that have less organic matter in the surface layer

### Land Use

**Dominant Uses:** Cropland, pasture, and hayland

**Other Uses:** Building site development

### Agricultural Development

#### Cropland

*Suitability:* Well suited

*Management concerns:* Erodibility, tillage, root penetration, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Chisel plowing and subsoiling help to break through clay pans and thus allow increased root penetration and the infiltration of rainfall.

- Using perennial grasses and legumes in rotation helps to penetrate and break up the clayey root zone.
- This soil may retain soil-applied herbicides due to the high content of organic matter in the surface layer and the high clay content. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Erodibility, root penetration, pesticide retention, and soil fertility

*Management measures and considerations:*

- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increase germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using perennial grasses and legumes helps to penetrate and break up the clayey root zone.
- This soil may retain soil-applied herbicides due to the high content of organic matter in the surface layer and the high clay content. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability for orchards:* Well suited

*Suitability for ornamental crops:* Suited

*Management concerns:* Erodibility, root disease,

climate, ball and burlap harvesting, pesticide retention, and soil fertility

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of plant roots.
- This soil may retain soil-applied herbicides due to the high content of organic matter in the surface layer and the high clay content. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and eastern white pine

*Suitability:* Well suited

*Management concerns:*

- This map unit is not managed for timber production.

### **Urban Development**

#### **Dwellings**

*Suitability:* Suited

*Management concerns:* Erodibility, high clay content, shrink-swell potential, corrosivity, seeps and springs, and large stones

*Management measures and considerations:*

- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Reinforcing foundations and footings or backfilling with coarse textured material helps to strengthen buildings and prevents damage caused by shrinking and swelling.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Large stones may be a problem during excavation.

### Septic tank absorption fields

*Suitability:* Suited

*Management concerns:* Restricted permeability, high clay content, seeps and springs, and large stones

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing septic system distribution lines during periods when the soil is not wet helps to reduce the smearing and sealing of trench walls.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Large stones may be a problem during excavation.

### Local roads and streets

*Suitability:* Suited

*Management concerns:* Low strength, high clay content, erodibility, frost action, and seeps and springs

*Management measures and considerations:*

- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Using a nondegradable, permeable fabric filter cloth between the roadbed and the soil surface helps to restrict the loss of stone into the soil.
- The soil is slippery and sticky when wet and slow to dry.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.

- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- Permanently surfacing roads or using suitable subgrade or base material increases soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.

### Lawns and landscaping

*Suitability:* Suited

*Management concerns:* Erodibility, high clay content, soil compaction, root disease, pesticide retention, climate, and soil fertility

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- This soil may retain soil-applied herbicides due to the high content of organic matter in the surface layer and the high clay content. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.

### **Interpretive Groups**

*Land capability classification:* 3e

*Woodland ordination symbol:* 8C, based on yellow-poplar as the indicator species

### **DrC—Dillsboro clay loam, 8 to 15 percent slopes, stony**

#### **Setting**

*Landscape:* Dominantly the low mountains of the Buladean community and the intermountain hills in and around the town of Bakersville

*Elevation range:* 2,500 to 3,600 feet

*Landform:* Coves, colluvial fans, high stream terraces, and benches

*Landform position:* Footslopes and toeslopes

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 3 to 145 acres

#### **Composition**

Dillsboro soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

#### **Typical Profile**

*Surface layer:*

0 to 13 inches—dark yellowish brown clay loam

*Subsoil:*

13 to 26 inches—brown clay loam

26 to 64 inches—yellowish red clay

64 to 72 inches—yellowish red clay loam

*Underlying material:*

72 to 87 inches—multicolored cobbly sandy clay loam

#### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Clayey

*Permeability:* Moderate

*Available water capacity:* High

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low in the surface layer and moderate in the subsoil

*Slope class:* Strongly sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Moderate or high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*Parent material:* Old alluvium and colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high clay content; random areas of seeps and springs

#### **Minor Components**

*Dissimilar inclusions:*

- Soils that are moderately eroded, in cropped fields
- Random areas of Saunook soils that have less clay in the subsoil than the Dillsboro soil
- Thunder soils that have less clay and more rock fragments in the subsoil than the Dillsboro soil, in drainageways
- Moderately well drained to poorly drained soils, in depressions and on toeslopes
- Udothents, loamy, in and around the towns of Bakersville and Spruce Pine
- Urban land in and around the towns of Bakersville and Spruce Pine

*Similar inclusions:*

- Dillsboro soils that have a surface layer of fine sandy loam, loam, or sandy clay loam
- Dillsboro soils that have less organic matter in the surface layer

#### **Land Use**

**Dominant Uses:** Cropland, pasture, and hayland

**Other Uses:** Building site development

#### **Agricultural Development**

##### **Cropland**

*Suitability:* Suited

*Management concerns:* Erodibility, equipment use, tillage, root penetration, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- The slope may limit equipment use in the steeper areas.

- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Chisel plowing and subsoiling help to break through clay pans and thus allow increased root penetration and the infiltration of rainfall.
- Using perennial grasses and legumes in rotation helps to penetrate and break up the clayey root zone.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Equipment use, erodibility, root penetration, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increase germination.
- Using perennial grasses and legumes helps to penetrate and break up the clayey root zone.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Using a rotational grazing system, implementing a

well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability for orchards:* Well suited

*Suitability for ornamental crops:* Suited

*Management concerns:* Erodibility, equipment use, root disease, climate, ball and burlap harvesting, pesticide retention, and soil fertility

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- The slope may limit equipment use in the steeper areas.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of plant roots.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and eastern white pine

*Suitability:* Well suited

*Management concerns:*

- This map unit is not managed for timber production.

### **Urban Development**

#### **Dwellings**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, high clay content, shrink-swell potential, corrosivity, seeps and springs, and large stones

*Management measures and considerations:*

- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Reinforcing foundations and footings or backfilling with coarse textured material helps to strengthen buildings and prevents damage caused by shrinking and swelling.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Large stones and boulders may be a problem during excavation.

### **Septic tank absorption fields**

*Suitability:* Suited

*Management concerns:* Restricted permeability, high clay content, slope, seeps and springs, and large stones

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing septic system distribution lines during periods when the soil is not wet helps to reduce the smearing and sealing of trench walls.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Large stones and boulders may be a problem during excavation.

### **Local roads and streets**

*Suitability:* Suited

*Management concerns:* Low strength, high clay content, slope, erodibility, frost action, and seeps and springs

*Management measures and considerations:*

- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Using a nondegradable, permeable fabric filter cloth between the roadbed and the soil surface helps to restrict the loss of stone into the soil.
- The soil is slippery and sticky when wet and slow to dry.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- Permanently surfacing roads or using suitable subgrade or base material increases soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.

### **Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, high clay content, soil compaction, root disease, pesticide retention, climate, and soil fertility

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are

susceptible to phytophthora root disease. These areas should not be used.

- This soil may retain soil-applied herbicides due to the high content of organic matter in the surface layer and the high clay content. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.

### **Interpretive Groups**

*Land capability classification:* 4e

*Woodland ordination symbol:* 8C, based on yellow-poplar as the indicator species

### **DrD—Dillsboro clay loam, 15 to 30 percent slopes, stony**

#### **Setting**

*Landscape:* Dominantly the low mountains of the Buladean community and the intermountain hills in and around the town of Bakersville

*Elevation range:* 2,400 to 3,600 feet

*Landform:* Coves, fans, high stream terraces, and benches

*Landform position:* Foothills and toeslopes

*Shape of areas:* Irregular

*Size of areas:* 5 to 62 acres

#### **Composition**

Dillsboro soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

#### **Typical Profile**

*Surface layer:*

0 to 13 inches—dark yellowish brown clay loam

*Subsoil:*

13 to 26 inches—brown clay loam

26 to 64 inches—yellowish red clay

64 to 72 inches—yellowish red clay loam

*Underlying material:*

72 to 87 inches—multicolored cobbly sandy clay loam

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Clayey

*Permeability:* Moderate

*Available water capacity:* High

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Moderate

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Moderate or high

*Potential frost action:* Moderate

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high clay content; random areas of seeps and springs

#### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Saunook soils that have a lower clay content in the subsoil than the Dillsboro soil
- Thunder and Cullasaja soils that have a lower clay content and more rock fragments in the subsoil than the Dillsboro soil, in drainageways
- Random areas of moderately eroded to severely eroded soils

*Similar inclusions:*

- Dillsboro soils that have a surface layer of fine sandy loam, loam, or sandy clay loam
- Dillsboro soils that have less organic matter in the surface layer

#### **Land Use**

**Dominant Uses:** Pasture and hayland

**Other Uses:** Building site development

#### **Agricultural Development**

##### **Cropland**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, tillage, root penetration, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Chisel plowing and subsoiling help to break through clay pans and thus allow increased root penetration and the infiltration of rainfall.
- Using perennial grasses and legumes in rotation helps to penetrate and break up the clayey root zone.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

**Pasture and hayland***Suitability:* Suited*Management concerns:* Equipment use, erodibility, root penetration, pesticide retention, and soil fertility*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using perennial grasses and legumes helps to penetrate and break up the clayey root zone.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and

maximizes productivity when establishing, maintaining, or renovating pasture and hayland.

- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

**Orchards and ornamental crops***Suitability:* Suited*Management concerns:* Equipment use, erodibility, root disease, climate, ball and burlap harvesting, pesticide retention, and soil fertility*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of plant roots.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.

**Woodland Management and Productivity***Potential for commercial species:* Moderately high for cove hardwoods and eastern white pine*Suitability:* Suited

*Management concerns:*

- This map unit is not managed for timber production.

**Urban Development****Dwellings***Suitability:* Poorly suited*Management concerns:* Slope, erodibility, high clay content, shrink-swell potential, corrosivity, seeps and springs, and large stones*Management measures and considerations:*

- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Reinforcing foundations and footings or backfilling with coarse textured material helps to strengthen buildings and prevents damage caused by shrinking and swelling.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Large stones and boulders may be a problem during excavation.

**Septic tank absorption fields***Suitability:* Poorly suited*Management concerns:* Slope, restricted permeability, high clay content, seeps and springs, and large stones*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Installing septic system distribution lines during periods when the soil is not wet helps to reduce the smearing and sealing of trench walls.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

- Excavations may cut into seeps and springs. These areas should not be used.
- Large stones and boulders may be a problem during excavation.

**Local roads and streets***Suitability:* Poorly suited*Management concerns:* Low strength, high clay content, slope, erodibility, frost action, and seeps and springs*Management measures and considerations:*

- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Using a nondegradeable, permeable fabric filter cloth between the roadbed and the soil surface helps to restrict the loss of stone into the soil.
- The soil is slippery and sticky when wet and slow to dry.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the high clay content, cut and fill slopes can be difficult to revegetate.
- Permanently surfacing roads or using suitable subgrade or base material increases soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.

**Lawns and landscaping***Suitability:* Poorly suited*Management concerns:* Slope, erodibility, high clay content, soil compaction, root disease, pesticide retention, climate, and soil fertility*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes may be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.

- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- This soil may retain soil-applied herbicides due to the high content of organic matter in the surface layer and the high clay content. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

## **DsC—Dillsboro clay loam, 8 to 15 percent slopes, rarely flooded**

### **Setting**

*Landscape:* Low mountain valleys dominantly along the North Toe River and intermountain hills along Cane Creek

*Elevation range:* 2,200 to 2,600 feet

*Landform:* Low stream terraces

*Landform position:* Toeslopes

*Shape of areas:* Long and narrow

*Size of areas:* 2 to 22 acres

### **Composition**

Dillsboro soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

### **Typical Profile**

*Surface layer:*

0 to 13 inches—dark yellowish brown clay loam

*Subsoil:*

13 to 26 inches—brown clay loam

26 to 64 inches—yellowish red clay

64 to 72 inches—yellowish red clay loam

*Underlying material:*

72 to 87 inches—multicolored cobbly sandy clay loam

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Clayey

*Permeability:* Moderate

*Available water capacity:* High

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* Rare, throughout the year with standing water for less than 2 days

*Shrink-swell potential:* Moderate

*Slope class:* Strongly sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Organic matter content (surface layer):* Moderate or high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*Parent material:* Old alluvium and colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high clay content; random areas of seeps and springs

### **Minor Components**

*Dissimilar inclusions:*

- Soils that are moderately eroded, in cropped fields
- Random areas of Saunook soils that have less clay in the subsoil than the Dillsboro soil
- Moderately well drained to poorly drained soils that have loamy to clayey subsoils, in depressions
- The well drained Biltmore soils that have a sandy subsoil and the well drained Rosman soils that have a loamy subsoil, along the banks of rivers and creeks
- The somewhat poorly drained Bandana soils that have a subsoil that is loamy in the upper part and have sandy strata with a high content of rock fragments at a depth of 20 to 40 inches, in the smaller drainageways

*Similar inclusions:*

- Dillsboro soils that have a surface layer of fine sandy loam, loam, or sandy clay loam
- Dillsboro soils that have less organic matter in the surface layer

## **Land Use**

**Dominant Uses:** Cropland

**Other Uses:** Ornamental crops and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Suited

*Management concerns:* Erodibility, equipment use, flooding, tillage, root penetration, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- The slope may limit equipment use in the steeper areas.
- Although most flooding occurs during the winter months, there is a risk of crop loss during the growing season.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Chisel plowing and subsoiling help to break through clay pans and thus allow increased root penetration and the infiltration of rainfall.
- Using perennial grasses and legumes in rotation helps to penetrate and break up the clayey root zone.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

#### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Equipment use, erodibility, flooding, root penetration, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increase germination.
- Although most flooding occurs during the winter months, livestock and hay crops are subject to loss by flooding any time of the year.
- Using perennial grasses and legumes helps to penetrate and break up the clayey root zone.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating hay and pasture.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability for orchards:* Poorly suited

*Suitability for ornamental crops:* Suited

*Management concerns:* Erodibility, equipment use, flooding, root disease, climate, ball and burlap harvesting, pesticide retention, and soil fertility

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- The slope may limit equipment use in the steeper areas.
- Although most flooding occurs during the winter months, plants are subject to loss by flooding any time of the year. Planting fast-growing or flood-tolerant species helps to reduce the risk of plant loss caused by flooding.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result,

this map unit is severely limited for the production of Fraser fir and other ornamentals.

- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of plant roots.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer and the high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and eastern white pine

*Suitability:* Well suited

*Management concerns:*

- This map unit is not managed for timber production.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Flooding, slope, erodibility, shrink-swell potential, high clay content, corrosivity, seeps and springs, and large stones

*Management measures and considerations:*

- Building structures on the highest part of the landscape helps to reduce the risk of damage from flooding.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes may be difficult to revegetate.
- Reinforcing foundations and footings or backfilling with coarse textured material helps to strengthen buildings and prevents damage caused by shrinking and swelling.

- The soil is slippery and sticky when wet and slow to dry.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Large stones and boulders may be a problem during excavation.

#### **Septic tank absorption fields**

*Suitability:* Suited

*Management concerns:* Restricted permeability, high clay content, slope, seeps and springs, and large stones

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing septic system distribution lines during periods when the soil is not wet helps to reduce the smearing and sealing of trench walls.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Large stones and boulders may be a problem during excavation.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Low strength, high clay content, flooding, slope, erodibility, frost action, and seeps and springs

*Management measures and considerations:*

- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Using a nondegradable, permeable fabric filter cloth between the roadbed and the soil surface helps to restrict the loss of stone into the soil.
- The soil is slippery and sticky when wet and slow to dry.
- Using well compacted fill material as a road base may help to elevate roads above the flood stage.
- Designing roads on the contour and installing water-

control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.

- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the high clay content, cut and fill slopes may be difficult to revegetate.
- Permanently surfacing roads or using suitable subgrade or base material increases soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.

### Lawns and landscaping

*Suitability:* Suited

*Management concerns:* Slope, erodibility, high clay content, soil compaction, root disease, pesticide retention, climate, soil fertility, and flooding

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the high clay content, cut and fill slopes may be difficult to revegetate.
- The soil is slippery and sticky when wet and slow to dry.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the high clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is severely limited for the production of Fraser fir and other susceptible ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- This soil may retain soil-applied herbicides due to the high content of organic matter in the surface layer and the high clay content. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Applying large granules or banding of phosphorus helps to overcome phosphorus fixation.

- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- This map unit is difficult to manage for lawns and landscaping because of the flooding, and use is severely limited during periods of inundation.

### Interpretive Groups

*Land capability classification:* 4e

*Woodland ordination symbol:* 8C, based on yellow-poplar as the indicator species

## **EcC—Evard-Cowee complex, 8 to 15 percent slopes**

### Setting

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central, west-central, and Gillespie Gap areas of the county

*Elevation range:* 2,400 to 3,600 feet

*Landform:* Ridges

*Landform position:* Summits

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 3 to 106 acres

### Composition

Evard soil and similar inclusions: 55 percent

Cowee soil and similar inclusions: 30 percent

Dissimilar inclusions: 15 percent

### Typical Profile

#### Evard

*Surface layer:*

0 to 3 inches—reddish brown loam

*Subsoil:*

3 to 28 inches—red clay loam

28 to 55 inches—strong brown loam

*Underlying material:*

55 to 62 inches—multicolored loam saprolite

#### Cowee

*Surface layer:*

0 to 2 inches—reddish brown loam

*Subsoil:*

2 to 14 inches—red loam

14 to 26 inches—yellowish red clay loam

26 to 36 inches—yellowish red gravelly clay loam

*Bedrock:*

36 to 62 inches—weathered, moderately fractured amphibolite

### **Soil Properties and Qualities**

*Depth class:* Evard—very deep; Cowee—moderately deep  
*Drainage class:* Well drained  
*General texture class:* Loamy  
*Permeability:* Moderate  
*Available water capacity:* Evard—moderate; Cowee—low  
*Depth to seasonal high water table:* More than 6.0 feet  
*Hazard of flooding:* None  
*Shrink-swell potential:* Low  
*Slope class:* Strongly sloping  
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed  
*Hazard of water erosion:* Severe  
*Organic matter content (surface layer):* Low to high  
*Potential frost action:* Moderate  
*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock  
*Depth to bedrock:* Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock

### **Minor Components**

#### *Dissimilar inclusions:*

- Random areas of Clifton soils that have a clayey subsoil and have bedrock at a depth of more than 60 inches
- Random areas of Fannin and Watauga soils that have more mica in the subsoil than the Evard and Cowee soils and have bedrock at a depth of more than 60 inches
- Saunook soils that have a thicker surface layer with more organic matter than those of the Evard and Cowee soils and have bedrock at a depth of more than 60 inches, in saddles and gaps
- Random areas of moderately eroded to severely eroded soils where underlying material is exposed at the surface
- Soils that have high base saturation in the lower part of the subsoil
- Areas on prominent ridges that are windswept
- Widely scattered areas that have very stony surfaces

#### *Similar inclusions:*

- Evard and Cowee soils that have surface layers of sandy loam or fine sandy loam
- Random areas of Edneytown and Pigeonroost soils that have brown subsoils

### **Land Use**

**Dominant Uses:** Cropland, pasture, and hayland

**Other Uses:** Ornamental crops, building site development, woodland, and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Evard—suited; Cowee—poorly suited  
*Management concerns:* Erodibility, equipment use, tillage, soil fertility, pesticide retention, and rooting depth and droughtiness in areas of the Cowee soil  
*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- The slope may limit equipment use in the steeper areas.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- These soils may retain soil-applied herbicides and other pesticides due to a high clay content. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Cowee soil for cultivated crops is difficult.

#### **Pasture and hayland**

*Suitability:* Well suited  
*Management concerns:* Equipment use, erodibility, soil fertility, pesticide retention, and rooting depth and droughtiness in areas of the Cowee soil  
*Management measures and considerations:*

- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Preparing seedbeds on the contour when renovating pastures and establishing seedbeds helps to prevent further soil erosion and increase germination.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover

before winter dormancy help to maintain pastures and increase productivity.

- These soils may retain soil-applied herbicides and other pesticides due to a high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Cowee soil for the production of pasture and hay crops is difficult.

### **Orchards and ornamental crops**

*Suitability:* Evard—suited; Cowee—poorly suited

*Management concerns:* Erodibility, equipment use, ball and burlap harvesting, pesticide retention, soil fertility, and rooting depth and droughtiness in areas of the Cowee soil

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- The slope may limit equipment use in the steeper areas.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- These soils may retain soil-applied herbicides and other pesticides due to a high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, managing areas of the Cowee soil for orchards and ornamental crops is difficult.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and high for eastern white pine

*Suitability:* Well suited

*Management concerns:* Erodibility, equipment use,

and pesticide retention and windthrow hazard in areas of the Cowee soil

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Cowee soil because of the limited rooting depth.
- Soil-applied herbicides may be retained due to herbicide-clay bonding, and they may damage tree seedlings when cropland is converted to woodland.

## **Urban Development**

### **Dwellings**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, and corrosivity and depth to bedrock in areas of the Cowee soil

*Management measures and considerations:*

- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Evard—slope and restricted permeability; Cowee—slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to

improve the performance of septic tank absorption fields.

- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Locating and using areas of the deeper Evard soil may improve the performance of filter fields.

### **Local roads and streets**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, and frost action and depth to bedrock in areas of the Cowee soil

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

### **Lawns and landscaping**

*Suitability:* Evard—suited; Cowee—poorly suited

*Management concerns:* Slope, erodibility, soil compaction, soil fertility, root disease, and pesticide retention and depth to bedrock and droughtiness in areas of the Cowee soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- These soils may retain soil-applied herbicides and

other pesticides due to a high clay content. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

- Because of the moderately deep rooting depth, managing areas of the Cowee soil for lawns and landscaping is difficult, especially if the soil has been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### **Interpretive Groups**

*Land capability classification:* 4e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 12A in areas of the Evard soil and 10D in areas of the Cowee soil

## **EcD—Evard-Cowee complex, 15 to 30 percent slopes**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central, west-central, and Gillespie Gap areas of the county

*Elevation range:* 2,400 to 3,800 feet

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow on summits and irregular on side slopes

*Size of areas:* 5 to 95 acres

### **Composition**

Evard soil and similar inclusions: 55 percent

Cowee soil and similar inclusions: 30 percent

Dissimilar inclusions: 15 percent

### **Typical Profile**

#### **Evard**

*Surface layer:*

0 to 3 inches—reddish brown loam

*Subsoil:*

3 to 28 inches—red clay loam

28 to 55 inches—strong brown loam

*Underlying material:*

55 to 62 inches—multicolored loam saprolite

#### **Cowee**

*Surface layer:*

0 to 2 inches—reddish brown loam

*Subsoil:*

2 to 14 inches—red loam

14 to 26 inches—yellowish red clay loam

26 to 36 inches—yellowish red gravelly clay loam

*Bedrock:*

36 to 62 inches—weathered, moderately fractured amphibolite

**Soil Properties and Qualities**

*Depth class:* Evard—very deep; Cowee—moderately deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Evard—moderate; Cowee—low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock

**Minor Components***Dissimilar inclusions:*

- Random areas of Clifton soils that have a clayey subsoil and have bedrock at a depth of more than 60 inches
- Random areas of Fannin and Watauga soils that have more mica in the subsoil than the Evard and Cowee soils and have bedrock at a depth of more than 60 inches
- Saunook soils that have thicker surface layers with more organic matter than those of the Evard and Cowee soils and have bedrock at a depth of more than 60 inches, in saddles and gaps and in concave areas at the head of drains
- Soils which have high base saturation in the lower part of the subsoil, dominantly in the Red Hill, Tipton Hill, and Roan Mountain areas
- Areas on prominent ridges that are windswept
- Widely scattered areas of rock outcrop, on narrow ridges

*Similar inclusions:*

- Evard and Cowee soils that have surface layers of sandy loam or fine sandy loam
- Random areas of Edneytown and Pigeonroost soils that have brown subsoils
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches

**Land Use**

**Dominant Uses:** Woodland, wildlife habitat, pasture, and hayland

**Other Uses:** Cropland, ornamental crops, and building site development

**Agricultural Development****Cropland**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, tillage, soil fertility, and rooting depth and droughtiness in areas of the Cowee soil

*Management measures and considerations:*

- This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Cowee soil for cultivated crops is difficult.

**Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, soil fertility, and rooting depth and droughtiness in areas of the Cowee soil

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.

- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Cowee soil for the production of pasture and hay crops is difficult.

### **Orchards and ornamental crops**

*Suitability:* Evard—suited; Cowee—poorly suited

*Management concerns:* Equipment use, erodibility, soil fertility, plant shape, and rooting depth and droughtiness in areas of the Cowee soil

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, managing areas of the Cowee soil for orchards and ornamental crops is difficult.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Evard—erodibility and equipment use; Cowee—erodibility, equipment use, and windthrow hazard

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water

directly onto fill slopes help to stabilize logging roads, skid trails, and landings.

- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Cowee soil because of the limited rooting depth.

## **Urban Development**

### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and corrosivity and depth to bedrock in areas of the Cowee soil

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Evard—slope and restricted permeability; Cowee—slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Locating and using areas of the deeper Evard soil may improve the performance of filter fields.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and frost action and depth to bedrock in areas of the Cowee soil

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate and pack if used in fill slopes.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Evard—slope, erodibility, soil compaction, and soil fertility; Cowee—slope, erodibility, soil compaction, soil fertility, depth to bedrock, and droughtiness

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Cowee soil for lawns and landscaping is difficult, especially if the soil has been disturbed.

- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### Interpretive Groups

*Land capability classification:* 6e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 12R in areas of the Evard soil and 10R in areas of the Cowee soil

### EdE—Evard-Cowee complex, 30 to 50 percent slopes, stony

#### Setting

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central, west-central, and Gillespie Gap areas of the county

*Elevation range:* 2,000 to 3,800 feet

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow on summits and irregular on side slopes

*Size of areas:* 5 to 242 acres

#### Composition

Evard soil and similar inclusions: 55 percent

Cowee soil and similar inclusions: 30 percent

Dissimilar inclusions: 15 percent

#### Typical Profile

##### Evard

*Surface layer:*

0 to 3 inches—reddish brown loam

*Subsoil:*

3 to 28 inches—red clay loam

28 to 55 inches—strong brown loam

*Underlying material:*

55 to 62 inches—multicolored loam saprolite

##### Cowee

*Surface layer:*

0 to 2 inches—reddish brown loam

*Subsoil:*

2 to 14 inches—red loam

14 to 26 inches—yellowish red clay loam

26 to 36 inches—yellowish red gravelly clay loam

*Bedrock:*

36 to 62 inches—weathered, moderately fractured amphibolite

### **Soil Properties and Qualities**

*Depth class:* Evard—very deep; Cowee—moderately deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Evard—moderate; Cowee—low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Clifton soils that have a clayey subsoil and have bedrock at a depth of more than 60 inches
- Random areas of Fannin soils that have more mica in the subsoil than the Evard and Cowee soils and have bedrock at a depth of more than 60 inches
- Saunook soils that have a thicker surface layer with more organic matter than those of the Evard and Cowee soils and have bedrock at a depth of more than 60 inches, in concave areas of head slopes, in drainageways, on benches, and on footslopes
- Soils that have a thicker surface layer with more organic matter than those of the Evard and Cowee soils, on north- to east-facing side slopes
- Soils that have high base saturation in the lower part of the subsoil, dominantly in the Red Hill, Tipton Hill, and Roan Mountain areas
- Widely scattered areas of rock outcrop
- Thunder soils that have thicker surface layers with more organic matter than those of the Evard and Cowee soils, have more rock fragments in the subsoil, and have bedrock at a depth of more than 60 inches, in drainageways

*Similar inclusions:*

- Evard and Cowee soils that have surface layers of sandy loam or fine sandy loam
- Random areas of Edneytown and Pigeonroost soils that have brown subsoils
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches

### **Land Use**

**Dominant Uses:** Woodland, wildlife habitat, and pasture

**Other Uses:** Building site development and ornamental crops

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, soil fertility, and rooting depth and droughtiness in areas of the Cowee soil

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Cowee soil for the production of pasture and hay crops is difficult.

#### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, soil fertility, plant shape, and rooting depth and droughtiness in areas of the Cowee soil

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, managing areas of the Cowee soil for orchards and ornamental crops is difficult.

**Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Evard—equipment use and erodibility; Cowee—equipment use, erodibility, and windthrow hazard

*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent

to streams helps to minimize siltation and provides shade for the aquatic habitat.

- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Cowee soil because of the limited rooting depth.

**Urban Development****Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Evard—slope, erodibility, and corrosivity; Cowee—slope, erodibility, corrosivity, and depth to bedrock

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- The soft bedrock underlying the Cowee soil is not difficult to excavate but is difficult to vegetate and pack into a fill slope.

**Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Evard—slope and restricted permeability; Cowee—slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Locating and using areas of the deeper Evard soil may improve the performance of filter fields.

**Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Evard—slope, erodibility, and frost action; Cowee—slope, erodibility, frost action, and depth to bedrock

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.

- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The soft bedrock underlying the Cowee soil is not difficult to excavate but is difficult to vegetate and pack into a fill slope.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil compaction, and soil fertility and depth to bedrock and droughtiness in areas of the Cowee soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Cowee soil for lawns and landscaping is difficult, especially if the soil has been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 12R in areas of the Evard soil and 10R in areas of the Cowee soil

### **EdF—Evard-Cowee complex, 50 to 95 percent slopes, stony**

#### **Setting**

*Landscape:* Low and intermediate mountains

dominantly in the central and northern parts of the county

*Elevation range:* 2,400 to 4,000 feet

*Landform:* South- to west-facing mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 10 to 90 acres

### **Composition**

Evard soil and similar inclusions: 55 percent

Cowee soil and similar inclusions: 30 percent

Dissimilar inclusions: 15 percent

### **Typical Profile**

#### **Evard**

*Surface layer:*

0 to 3 inches—reddish brown loam

*Subsoil:*

3 to 28 inches—red clay loam

28 to 55 inches—strong brown loam

*Underlying material:*

55 to 62 inches—multicolored loam saprolite

#### **Cowee**

*Surface layer:*

0 to 2 inches—reddish brown loam

*Subsoil:*

2 to 14 inches—red loam

14 to 26 inches—yellowish red clay loam

26 to 36 inches—yellowish red gravelly clay loam

*Bedrock:*

36 to 62 inches—weathered, moderately fractured amphibolite

### **Soil Properties and Qualities**

*Depth class:* Evard—very deep; Cowee—moderately deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Evard—moderate; Cowee—low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On the prominent upper side slopes, rime ice in winter and high winds

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Evard—more than 60 inches; Cowee—20 to 40 inches to soft bedrock

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Chestnut and Buladean soils that have less clay in the subsoil than the Evard and Cowee soils and have soft bedrock at a depth of less than 60 inches
- Random areas of soils that have more mica in the subsoil than the Evard and Cowee soils
- Saunook soils that have thicker surface layers with more organic matter than those of the Evard and Cowee soils and have bedrock at a depth of more than 60 inches, in concave areas of head slopes, in drainageways, on benches, and on footslopes
- Widely scattered areas of rock outcrop
- Thunder and Cullasaja soils that have thicker surface layers with more organic matter than those of the Evard and Cowee soils, have more rock fragments in the subsoil, and have bedrock at a depth of more than 60 inches, in drainageways
- Soils that have high base saturation in the lower part of the subsoil, dominantly in the Red Hill, Tipton Hill, and Roan Mountain areas
- Areas on the prominent upper side slopes that are windswept

*Similar inclusions:*

- Evard and Cowee soils that have surface layers of sandy loam or fine sandy loam
- Random areas of Edneytown and Pigeonroost soils that have brown subsoils
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production

because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the slope and erodibility. A site on better suited soils should be selected.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope and erodibility. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and high for eastern white pine

*Suitability:* Poorly suited

*Management concerns:* Evard—equipment use and erodibility; Cowee—equipment use, erodibility, and windthrow hazard

*Management measures and considerations:*

- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Cowee soil because of the limited rooting depth.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the slope and erodibility. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope and the depth to bedrock of the Cowee soil. The local Health

Department should be contacted for additional guidance.

### Local roads and streets

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope, erodibility, and the depth to bedrock of the Cowee soil. A site on better suited soils should be selected.

### Lawns and landscaping

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope and the depth to bedrock of the Cowee soil. A site on better suited soils should be selected.

### Interpretive Groups

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 12R in areas of the Evard soil and 10R in areas of the Cowee soil

## FeC2—Fannin sandy clay loam, 8 to 15 percent slopes, eroded

### Setting

*Landscape:* Intermountain hills and low mountains in the central and southern parts of the county

*Elevation range:* 2,500 to 3,500 feet

*Landform:* Ridges

*Landform position:* Summits

*Shape of areas:* Long and narrow

*Size of areas:* 3 to 145 acres

### Composition

Fannin soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

### Typical Profile

*Surface layer:*

0 to 2 inches—brown sandy clay loam

*Subsoil:*

2 to 9 inches—yellowish red sandy clay loam

9 to 22 inches—red clay loam

22 to 31 inches—yellowish red sandy clay loam

*Underlying material:*

31 to 79 inches—multicolored fine sandy loam saprolite

## Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Strongly sloping

*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Organic matter content (surface layer):* Low or moderate

*Potential frost action:* Moderate

*Soil reaction:* Extremely acid to slightly acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### Minor Components

*Dissimilar inclusions:*

- Random areas of Clifton soils that have more clay and less mica in the subsoil than the Fannin soil
- Random areas of Edneytown and Evard soils that have less mica than the Fannin soil and a thicker subsoil
- Cowee and Pigeonroost soils that have less mica in the subsoil than the Fannin soil and have soft bedrock at a depth of 20 to 40 inches, on shoulder slopes
- Random areas of severely eroded soils where the underlying material is exposed at the surface
- Saunook soils that have a thicker surface layer with more organic matter than that of the Fannin soil and a thicker subsoil, in saddles and gaps
- Udorthents, loamy, and areas associated with small, hand dug mica mines
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Fannin soils that have a clay loam surface layer
- Random areas of Watauga soils that have a brown loamy subsoil

## **Land Use**

**Dominant Uses:** Pasture, hayland, woodland, and wildlife habitat

**Other Uses:** Ornamental crops, building site development, and orchards

### **Agricultural Development**

#### **Cropland**

*Suitability:* Suited

*Management concerns:* Erodibility, equipment use, tilling, and soil fertility

*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- The slope may limit equipment use in the steeper areas.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.

#### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Equipment use, erodibility, and soil fertility

*Management measures and considerations:*

- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further soil erosion.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability for orchards:* Well suited

*Suitability for ornamental crops:* Suited

*Management concerns:* Erodibility, equipment use, soil fertility, and ball and burlap harvesting

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- The slope may limit equipment use in the steeper areas.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and very high for eastern white pine

*Suitability:* Well suited

*Management concerns:* Erodibility and equipment use

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of mica, and the clay content of the subsoil.
- Livestock should not be allowed to graze in areas managed for woodland.

## **Urban Development**

### **Dwellings**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, low strength, slippage, and differential settling

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

### **Septic tank absorption fields**

*Suitability:* Suited

*Management concerns:* Restricted permeability and slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

### **Local roads and streets**

*Suitability:* Suited

*Management concerns:* Low strength, slope, slippage, erodibility, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable

subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, soil fertility, droughtiness, and soil compaction

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* 12A, based on eastern white pine as the indicator species

## **FeD2—Fannin sandy clay loam, 15 to 30 percent slopes, eroded**

### **Setting**

*Landscape:* Intermountain hills and low mountains in the central and southeastern parts of the county

*Elevation range:* 2,500 to 3,200 feet

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow on summits and irregular on side slopes

*Size of areas:* 5 to 83 acres

### **Composition**

Fannin soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

### **Typical Profile**

*Surface layer:*

0 to 2 inches—brown sandy clay loam

*Subsoil:*

2 to 9 inches—yellowish red sandy clay loam

9 to 22 inches—red clay loam

22 to 31 inches—yellowish red sandy clay loam

*Underlying material:*

31 to 79 inches—multicolored fine sandy loam  
saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Moderate, about 25 to 75 percent of  
the original surface layer has been removed

*Hazard of water erosion:* Severe

*Organic matter content (surface layer):* Low or  
moderate

*Potential frost action:* Moderate

*Soil reaction:* Extremely acid to slightly acid  
throughout the profile

*Parent material:* Residuum affected by soil creep in  
the upper part, weathered from felsic or mafic,  
high-grade metamorphic or igneous rock with a  
high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high  
mica content; soil subject to downslope movement  
when lateral support is removed and to differential  
settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Clifton soils that have more clay and less mica in the subsoil than the Fannin soil
- Random areas of Edneytown and Evard soils that have less mica than the Fannin soil and a thicker subsoil
- Cowee and Pigeonroost soils that have less mica in the subsoil than the Fannin soil and have soft bedrock at a depth of 20 to 40 inches, on nose slopes and shoulder slopes
- Random areas of severely eroded soils where the underlying material is exposed at the surface

- Saunook soils that have a thicker surface layer with more organic matter than that of the Fannin soil and have a thicker subsoil, in concave areas at the head of drains, on footslopes, in drainageways, and in saddles and gaps

- Udothents, loamy, and areas associated with small, hand dug mica mines

*Similar inclusions:*

- Fannin soils that have a clay loam surface layer
- Random areas of Watauga soils that have a brown subsoil

### **Land Use**

**Dominant Uses:** Pasture, hayland, woodland, and wildlife habitat

**Other Uses:** Ornamental crops, building site development, and orchards

### **Agricultural Development**

#### **Cropland**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, tillage, and soil fertility

*Management measures and considerations:*

- This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, and soil fertility

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Special care is needed when renovating pastures and establishing seedbeds to prevent further soil erosion.
- Growing adapted plants helps to ensure the

production of high-quality forage and minimize soil erosion.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, soil fertility, ball and burlap harvesting, and plant shape

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and very high for eastern white pine

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of mica, and the clay content of the subsoil.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Livestock should not be allowed to graze in areas managed for woodland.

## **Urban Development**

### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, low strength, slippage, and differential settling

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Low strength, slope, slippage, erodibility, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, droughtiness, and soil compaction

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* 12R, based on eastern white pine as the indicator species

## **FeE2—Fannin sandy clay loam, 30 to 50 percent slopes, eroded**

### **Setting**

*Landscape:* Intermountain hills and low mountains in the central and southeastern parts of the county

*Elevation range:* 2,500 to 3,200 feet

*Landform:* South- to west-facing hillslopes and mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 5 to 564 acres

### **Composition**

Fannin soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

### **Typical Profile**

*Surface layer:*

0 to 2 inches—brown sandy clay loam

*Subsoil:*

2 to 9 inches—yellowish red sandy clay loam

9 to 22 inches—red clay loam

22 to 31 inches—yellowish red sandy clay loam

*Underlying material:*

31 to 79 inches—multicolored fine sandy loam saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Moderate, about 25 to 75 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Organic matter content (surface layer):* Low or moderate

*Potential frost action:* Moderate

*Soil reaction:* Extremely acid to slightly acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high

mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

#### *Dissimilar inclusions:*

- Random areas of Clifton soils that have more clay and less mica in the subsoil than the Fannin soil
- Random areas of Edneytown and Evard soils that have less mica than the Fannin soil and a thicker subsoil
- Cowee and Pigeonroost soils that have less mica in the subsoil than the Fannin soil and have soft bedrock at a depth of 20 to 40 inches, on nose slopes and shoulder slopes
- Random areas of severely eroded soils where the underlying material is exposed at the surface
- Saunook soils that have a thicker surface layer with more organic matter than that of the Fannin soil and a thicker subsoil, in concave areas at the head of drains, on footslopes, in drainageways, and in saddles and gaps
- Udorthents, loamy, and areas associated with small, hand dug mica mines

#### *Similar inclusions:*

- Fannin soils that have a clay loam surface layer
- Random areas of Watauga soils that have a brown subsoil

### **Land Use**

**Dominant Uses:** Pasture, woodland, and wildlife habitat

**Other Uses:** Ornamental crops, building site development, and orchards

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, and soil fertility

*Management measures and considerations:*

- This map unit is difficult to manage for pasture or hayland because of the slope.
- Special care is needed when renovating pastures

and establishing seedbeds to prevent further soil erosion.

- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, soil fertility, ball and burlap harvesting, and plant shape

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and very high for eastern white pine

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill,

due to the high mica content of the subsoil and underlying material.

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of mica, and the clay content of the subsoil.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, low strength, slippage, and differential settling

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to

improve the performance of septic tank absorption fields.

- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Low strength, slope, slippage, erodibility, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, droughtiness, and soil compaction

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 7e  
*Woodland ordination symbol:* 12R, based on eastern white pine as the indicator species

### **HaD—Harmiller-Shinbone complex, 15 to 30 percent slopes, stony**

#### **Setting**

*Landscape:* Low and intermediate mountains in the far northwestern part of the county  
*Elevation range:* 2,000 to 3,600 feet  
*Landform:* Ridges  
*Landform position:* Summits and the upper side slopes  
*Shape of areas:* Long and narrow or irregular on summits and irregular on side slopes  
*Size of areas:* 5 to 57 acres

#### **Composition**

Harmiller soil and similar inclusions: 55 percent  
 Shinbone soil and similar inclusions: 25 percent  
 Dissimilar inclusions: 20 percent

#### **Typical Profile**

##### **Harmiller**

*Surface layer:*  
 0 to 4 inches—brown sandy loam

*Subsoil:*  
 4 to 22 inches—dark yellowish brown loam

*Underlying material:*  
 22 to 31 inches—multicolored gravelly loamy sand saprolite

*Bedrock:*  
 31 to 61 inches—weathered, moderately fractured, low-grade metasandstone

##### **Shinbone**

*Surface layer:*  
 0 to 4 inches—brown sandy loam

*Subsoil:*  
 4 to 17 inches—yellowish brown loam  
 17 to 30 inches—brownish yellow sandy loam

*Underlying material:*  
 30 to 45 inches—brownish yellow gravelly coarse sandy loam saprolite

*Bedrock:*  
 45 to 62 inches—weathered, moderately fractured, low-grade metasandstone

### **Soil Properties and Qualities**

*Depth class:* Harmiller—moderately deep; Shinbone—deep  
*Drainage class:* Well drained  
*General texture class:* Loamy  
*Permeability:* Moderate  
*Available water capacity:* Moderate  
*Depth to seasonal high water table:* More than 6.0 feet  
*Hazard of flooding:* None  
*Shrink-swell potential:* Low  
*Slope class:* Moderately steep  
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed  
*Hazard of water erosion:* Very severe  
*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart  
*Organic matter content (surface layer):* Low to high  
*Potential frost action:* Moderate  
*Soil reaction:* Extremely acid to moderately acid throughout the profile  
*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock  
*Depth to bedrock:* Harmiller—20 to 40 inches to soft bedrock; Shinbone—40 to 60 inches to soft bedrock  
*Other distinctive properties:* Low natural fertility

#### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Soco and Stecoah soils that have less clay in the subsoil than the Harmiller and Shinbone soils and have soft bedrock at a depth of 20 to 60 inches
- Keener soils that have a thicker subsoil than the Harmiller and Shinbone soils, in saddles and gaps and in concave areas at the head of drains
- Widely scattered areas of rock outcrop
- Sylco soils that are loamy, have a high content of rock fragments, and have hard bedrock at a depth of 20 to 40 inches, adjacent to widely scattered areas of rock outcrop
- Lostcove soils that have thicker subsoils with more rock fragments than those of the Harmiller and Shinbone soils, in drainageways

*Similar inclusions:*

- Harmiller and Shinbone soils that have surface layers of coarse sandy loam, fine sandy loam, or loam

#### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat  
**Other Uses:** Recreation

## ***Agricultural Development***

### **Cropland**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for cropland.

### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, soil fertility, and rooting depth and droughtiness in areas of the Harmiller soil

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Harmiller soil for the production of pasture and hay crops is difficult.

### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for orchards and ornamental crops.

### ***Woodland Management and Productivity***

*Potential for commercial species:* Low or moderate for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, and rooting depth and windthrow hazard in areas of the Harmiller soil

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Because of the low natural fertility and droughty

nature of these soils, cut and fill slopes may be difficult to revegetate.

- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the content of silt and clay in the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Productivity is limited in areas of the Harmiller soil because of the limited rooting depth.

## ***Urban Development***

### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and corrosivity and depth to bedrock in areas of Harmiller soil

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.
- Using corrosion-resistant materials for foundations and basements helps to reduce the risk of damage to concrete.
- The soft bedrock underlying these soils is not difficult to excavate but is difficult to vegetate and pack into a fill slope.

### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Locating and using areas of the deeper Shinbone soil may improve the performance of filter fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, low strength, erodibility, depth to bedrock, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- The soft bedrock underlying these soils is not difficult to excavate but is difficult to vegetate and pack into a fill slope.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, and droughtiness and depth to bedrock in areas of the Harmiller soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Harmiller soil for lawns and landscaping is difficult, especially if the soil has been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 10R in areas of the Harmiller soil and 11R in areas of the Shinbone soil

### **HaE—Harmiller-Shinbone complex, 30 to 50 percent slopes, stony**

#### **Setting**

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Elevation range:* 2,400 to 3,600 feet

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Irregular or long and narrow on summits and irregular on side slopes

*Size of areas:* 6 to 569 acres

#### **Composition**

Harmiller soil and similar inclusions: 55 percent

Shinbone soil and similar inclusions: 25 percent

Dissimilar inclusions: 20 percent

#### **Typical Profile**

##### **Harmiller**

*Surface layer:*

0 to 4 inches—brown sandy loam

*Subsoil:*

4 to 22 inches—dark yellowish brown loam

*Underlying material:*

22 to 31 inches—multicolored gravelly loamy sand saprolite

*Bedrock:*

31 to 61 inches—weathered, moderately fractured, low-grade metasandstone

##### **Shinbone**

*Surface layer:*

0 to 4 inches—brown sandy loam

*Subsoil:*

4 to 17 inches—yellowish brown loam

17 to 30 inches—brownish yellow sandy loam

*Underlying material:*

30 to 45 inches—brownish yellow gravelly coarse sandy loam saprolite

*Bedrock:*

45 to 62 inches—weathered, moderately fractured, low-grade metasandstone

**Soil Properties and Qualities**

*Depth class:* Harmiller—moderately deep; Shinbone—deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Depth to bedrock:* Harmiller—20 to 40 inches to soft bedrock; Shinbone—40 to 60 inches to soft bedrock

*Other distinctive properties:* Low natural fertility

**Minor Components***Dissimilar inclusions:*

- Random areas of Stecoah soils that have a lower clay content than the Harmiller and Shinbone soils and have soft bedrock at a depth of 40 to 60 inches
- Random areas of Soco soils that have a lower clay content than the Harmiller and Shinebone soils and have soft bedrock at a depth of 20 to 40 inches
- Keener soils that have a thicker subsoil than the Harmiller and Shinbone soils, in concave areas at the head of drains and on footslopes
- Lostcove soils that have a thicker subsoil with more rock fragments than those of the Harmiller and Shinbone soils, in drainageways
- Ditney soils that have less clay in the subsoil than the Harmiller and Shinbone soils and have hard bedrock at a depth of 20 to 40 inches, on spur ridges
- Widely scattered areas of rock outcrop
- Sylco soils that are loamy, have a high content of rock fragments, and have hard bedrock at a depth of

20 to 40 inches, adjacent to widely scattered areas of rock outcrop

*Similar inclusions:*

- Harmiller and Shinbone soils that have surface layers of coarse sandy loam, fine sandy loam, or loam

**Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation

**Agricultural Development****Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

**Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:*

- This map unit is not managed for pasture and hayland.

**Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for orchards and ornamental crops.

**Woodland Management and Productivity**

*Potential for commercial species:* Low or moderate for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Harmiller—equipment use, erodibility, and windthrow hazard; Shinbone—equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.

- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due the content of silt and clay in the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Productivity is limited in areas of the Harmiller soil because of the limited rooting depth.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for dwellings.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, low strength, erodibility, depth to bedrock, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- The soft bedrock underlying these soils is not difficult to excavate but is difficult to vegetate and pack into a fill slope.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for lawns and landscaping.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 10R in areas of the Harmiller soil and 11R in areas of the Shinbone soil

## **HnD—Huntdale silty clay loam, 15 to 30 percent slopes, stony**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the north-central, northern, and northwestern parts of the county

*Elevation range:* 2,500 to 4,600 feet

*Landform:* North- to east-facing ridges, hillslopes, and mountain slopes and those shaded by the higher mountains

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow on summits and irregular on side slopes

*Size of areas:* 3 to 138 acres

### **Composition**

Huntdale soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 9 inches—very dark grayish brown silty clay loam

*Subsoil:*

9 to 20 inches—brown clay loam

20 to 36 inches—strong brown silt loam

36 to 58 inches—brownish yellow silt loam

*Underlying material:*

58 to 80 inches—multicolored fine sandy loam saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on prominent ridges, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

### **Minor Components**

*Dissimilar inclusions:*

- Edneytown and Evard soils that have a thinner surface layer with less organic matter than that of the Hunt Dale soil, on south- to west-facing slopes
- Fannin and Watauga soils that have a thinner surface layer with less organic matter than that of the Hunt Dale soil and have more mica in the subsoil, on south- to west-facing slopes
- Cowee and Pigeonroost soils that have a thinner surface layer with less organic matter than that of the Hunt Dale soil and have soft bedrock at a depth of 20 to 40 inches, on south- to west-facing nose slopes and shoulder slopes
- Random areas of soils that have more mica in the subsoil than the Hunt Dale soil
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Hunt Dale soils that have a surface layer of silt loam, loam, or clay loam
- Similar soils that have a red subsoil

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, hayland, ornamental crops, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for cropland.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, pesticide retention, ball and burlap harvesting, plant shape, climate, and soil fertility

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit,

late spring frost may damage new growth in some years.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.
- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and corrosivity

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, climate, pesticide retention, and soil compaction

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native, winter-hardy landscape plants is recommended.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.

- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

## **HuE—Hunt Dale silty clay loam, 30 to 50 percent slopes, very stony**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the north-central, northern, and northwestern parts of the county

*Elevation range:* 2,000 to 4,600 feet

*Landform:* North- to east-facing hillslopes and mountain slopes and those shaded by the higher mountains

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 5 to 272 acres

### **Composition**

Hunt Dale soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 9 inches—very dark grayish brown silty clay loam

*Subsoil:*

9 to 20 inches—brown clay loam

20 to 36 inches—strong brown silt loam

36 to 58 inches—brownish yellow silt loam

*Underlying material:*

58 to 80 inches—multicolored fine sandy loam saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate or high

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on prominent ridges and upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

### **Minor Components**

*Dissimilar inclusions:*

- Edneytown and Evard soils that have a thinner surface layer with less organic matter than that of the Hunt Dale soil, on south- to west-facing side slopes and spur ridges
- Fannin and Watauga soils that have a thinner surface layer with less organic matter than that of the Hunt Dale soil and have more mica in the subsoil, on south- to west-facing side slopes and spur ridges
- Cowee and Pigeonroost soils that have a thinner surface layer with less organic matter than that of the Hunt Dale soil and have soft bedrock at a depth of 20 to 40 inches, on south- to west-facing nose slopes
- Random areas of soils that have more mica in the subsoil than the Hunt Dale soil
- Thunder and Cullasaja soils that have more rock

fragments in the subsoil than the Hunt Dale soil, in drainageways

- Widely scattered areas of rock outcrop
- Areas on prominent ridges and upper side slopes that are windswept

*Similar inclusions:*

- Hunt Dale soils that have a surface layer of silt loam, loam, or clay loam
- Similar soils that have a red subsoil

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, ornamental crops, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, pesticide retention, ball and burlap harvesting, plant shape, climate, and soil fertility

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope and the very stony surface limit equipment use.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced

roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.

- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and corrosivity

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.

- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, soil fertility, climate, pesticide retention, and soil compaction

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Removing the larger stones and limiting equipment use to the larger open areas help to improve soil workability.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native, winter-hardy landscape plants is recommended.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

#### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

## **HuF—Huntdale silty clay loam, 50 to 95 percent slopes, very stony**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the north-central, northern, and northwestern parts of the county

*Elevation range:* 2,000 to 4,600 feet

*Landform:* North- to east-facing hillslopes and mountain slopes and those shaded by the higher mountains

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 10 to 221 acres

### **Composition**

Huntdale soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 9 inches—very dark grayish brown silty clay loam

*Subsoil:*

9 to 20 inches—brown clay loam

20 to 36 inches—strong brown silt loam

36 to 58 inches—brownish yellow silt loam

*Underlying material:*

58 to 80 inches—multicolored fine sandy loam saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate or high

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on the prominent upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

### **Minor Components**

*Dissimilar inclusions:*

- Plott soils that have a thicker surface layer than the Huntdale soil and have less clay in the subsoil, in concave areas at the head of drains
- Random areas of soils that have bedrock at a depth of less than 60 inches
- Edneytown and Evard soils that have a thinner surface layer with less organic matter than that of the Huntdale soil, on south- to west-facing side slopes and spur ridges
- Cowee and Pigeonroost soils that have a thinner surface layer with less organic matter than that of the Huntdale soil and have soft bedrock at a depth of 20 to 40 inches, on south- to west-facing nose slopes
- Random areas of soils that have more mica in the subsoil than the Huntdale soil
- Fannin and Watauga soils that have a thinner surface layer with less organic matter than that of the Huntdale soil and have more mica in the subsoil, on south- to west-facing side slopes and spur ridges
- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Huntdale soil, in drainageways
- Widely scattered areas of rock outcrop
- Areas on the prominent upper side slopes that are windswept

*Similar inclusions:*

- Huntdale soils that have a surface layer of silt loam, loam, or clay loam
- Similar soils that have a red subsoil

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

### **Agricultural Development**

**Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

**Pasture and hayland***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the slope and erodibility. A site on better suited soils should be selected.

**Orchards and ornamental crops***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope and erodibility. A site on better suited soils should be selected.

**Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Poorly suited*Management concerns:* Equipment use and erodibility*Management measures and considerations:*

- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

**Urban Development****Dwellings***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for dwellings because of the slope and erodibility. A site on better suited soils should be selected.

**Septic tank absorption fields***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for additional guidance.

**Local roads and streets***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope and erodibility. A site on better suited soils should be selected.

**Lawns and landscaping***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope and erodibility. A site on better suited soils should be selected.

**Interpretive Groups***Land capability classification:* 7e*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species**KcD—Keener-Lostcove complex, 15 to 30 percent slopes, very stony****Setting***Landscape:* Low and intermediate mountains in the far northwestern part of the county*Elevation range:* 2,000 to 4,800 feet*Landform:* Coves, colluvial fans, drainageways, and benches*Landform position:* Head slopes, side slopes, footslopes, and toeslopes*Shape of areas:* Irregular*Size of areas:* 4 to 337 acres**Composition**

Keener soil and similar inclusions: 60 percent

Lostcove soil and similar inclusions: 25 percent

Dissimilar inclusions: 15 percent

**Typical Profile****Keener***Surface layer:*

0 to 5 inches—brown loam

*Subsoil:*

5 to 25 inches—dark yellowish brown loam

25 to 55 inches—strong brown clay loam

55 to 62 inches—multicolored sandy clay loam

**Lostcove***Surface layer:*

0 to 3 inches—dark grayish brown cobbly loam

*Subsoil:*

3 to 6 inches—yellowish brown cobbly loam  
 6 to 43 inches—yellowish brown very cobbly sandy clay loam

*Underlying material:*

43 to 62 inches—multicolored very cobbly sandy loam

**Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Keener—loamy; Lostcove—loamy with many rock fragments

*Permeability:* Keener—moderate; Lostcove—moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Keener—moderate; Lostcove—low or moderate

*Depth to seasonal high water table:* Keener—more than 6.0 feet; Lostcove—5.0 to more than 6.0 feet from December through May

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart

*Organic matter content (surface layer):* Keener—high; Lostcove—high or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Colluvium derived from low-grade metasedimentary rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; low natural fertility; subsoil that has a high content of rock fragments in areas of the Lostcove soil

**Minor Components***Dissimilar inclusions:*

- Random areas of soils that are similar to the Keener and Lostcove soils but have less clay in the subsoil
- Random areas of rubble land
- Areas that have less than 15 percent or more than 30 percent slopes

*Similar inclusions:*

- Keener soils that have a surface layer of fine sandy loam
- Lostcove soils that have a surface layer of fine sandy loam or sandy loam

**Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation

**Agricultural Development****Cropland**

*Suitability:* Keener—poorly suited; Lostcove—unsuited

*Management concerns:* Equipment use, erodibility, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- This map unit is severely limited for crop production because of the slope, erodibility, the very stony surface, and the high content of rock fragments of the Lostcove soil.

**Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsuited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope and surface stones limit the use of equipment and may be hazardous.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- These soils may retain soil-applied herbicides where the surface layer has a high content of organic matter. The concentration of herbicides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### Orchards and ornamental crops

*Suitability:* Keener—suited; Lostcove—unsuited

*Management concerns:* Equipment use, ball and burlap harvesting, erodibility, soil fertility, climate, and pesticide retention and large stones in areas of the Lostcove soil

*Management measures and considerations:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, the very stony surface, and the high content of rock fragments of the Lostcove soil.
- Areas of the Lostcove soil are severely limited for ball and burlap harvesting because of the high content of rock fragments in the root zone.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### Woodland Management and Productivity

*Potential for commercial species:* Moderate for cove hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.

- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due the high content of organic matter in the surface layer and the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### Urban Development

#### Dwellings

*Suitability:* Keener—poorly suited; Lostcove—unsuited

*Management concerns:* Slope, large stones, erodibility, seeps and springs, and cutbanks cave and corrosivity in areas of the Lostcove soil

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Large stones and boulders may be a problem during excavation.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Installing permanent retaining walls helps to improve soil stability.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

#### Septic tank absorption fields

*Suitability:* Keener—poorly suited; Lostcove—unsuited

*Management concerns:* Keener—slope, large stones, seeps and springs, and restricted permeability; Lostcove—slope, large stones, seeps and springs, and poor filtering capacity

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.

- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Large stones and boulders may be a problem during excavation.
- Excavations may cut into seeps and springs. These areas should not be used.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Measures that improve the filtering capacity should be considered; the Lostcove soil readily absorbs but does not adequately filter effluent.

### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, seeps and springs, differential settling, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Large stones and boulders may be a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- These soils are subject to uneven settling and may be unstable if not properly compacted.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, soil fertility, climate, and pesticide retention

*Management measures and considerations:*

- This map unit is limited for lawns and landscaping because of the very stony surface and the high content of rock fragments in the Lostcove soil.
- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.

- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* Keener—6e; Lostcove—7s

*Woodland ordination symbol:* Based on yellow-poplar as the indicator species, 8R in areas of the Keener soil and 7R in areas of the Lostcove soil

## **PeD—Pigeonroost-Edneytown complex, 15 to 30 percent slopes, stony**

### **Setting**

*Landscape:* Low and intermediate mountains dominantly in the north-central, northern, and northwestern parts of the county

*Elevation range:* 2,400 to 3,800 feet

*Landform:* Ridges

*Landform position:* Summits and the upper side slopes

*Shape of areas:* Long and narrow

*Size of areas:* 5 to 112 acres

### **Composition**

Pigeonroost soil and similar inclusions: 45 percent

Edneytown soil and similar inclusions: 40 percent

Dissimilar inclusions: 15 percent

### **Typical Profile**

#### **Pigeonroost**

*Surface layer:*

0 to 3 inches—dark yellowish brown loam

*Subsoil:*

3 to 26 inches—brownish yellow loam

26 to 37 inches—yellowish brown sandy loam

*Bedrock:*

37 to 79 inches—weathered, moderately fractured granite gneiss

**Edneytown***Surface layer:*

0 to 4 inches—very dark grayish brown sandy loam

*Subsoil:*

4 to 37 inches—yellowish brown loam

*Underlying material:*

37 to 62 inches—multicolored sandy loam saprolite

**Soil Properties and Qualities**

*Depth class:* Pigeonroost—moderately deep;

Edneytown—very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Soil reaction:* Pigeonroost—extremely acid to moderately acid throughout the profile; Edneytown—extremely acid to moderately acid in the A horizon, except in limed areas, and very strongly acid or strongly acid in the B and C horizons

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Pigeonroost—20 to 40 inches to soft bedrock; Edneytown—more than 60 inches

**Minor Components***Dissimilar inclusions:*

- Random areas of soils that have more mica in the subsoil than the Pigeonroost and Edneytown soils
- Saunook soils that have a thicker surface layer with more organic matter than those of the Pigeonroost and Edneytown soils and have bedrock at a depth of

more than 60 inches, in saddles and gaps and in concave areas at the head of drains

- Random areas of Clifton soils that have a clayey subsoil and have bedrock at a depth of more than 60 inches
- Random areas of Chestnut and Buladean soils that have less clay in the subsoil than the Pigeonroost and Edneytown soils and have soft bedrock at a depth of less than 60 inches
- Widely scattered areas of rock outcrop, on narrow ridges

*Similar inclusions:*

- Pigeonroost soils that have a surface layer of sandy loam or fine sandy loam
- Edneytown soils that have a surface layer of fine sandy loam or loam
- Random areas of Evard and Cowee soils that have red subsoils
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches

**Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, hayland, ornamental crops, and building site development

**Agricultural Development****Cropland**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, tillage, soil fertility, and rooting depth and droughtiness in areas of the Pigeonroost soil

*Management measures and considerations:*

- This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Pigeonroost soil for cultivated crops is difficult.

### Pasture and hayland

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, soil fertility, and rooting depth and droughtiness in areas of the Pigeonroost soil

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Pigeonroost soil for the production of pasture and hay crops is difficult.

### Orchards and ornamental crops

*Suitability:* Pigeonroost—poorly suited; Edneytown—suited

*Management concerns:* Equipment use, erodibility, soil fertility, plant shape, and rooting depth and droughtiness in areas of the Pigeonroost soil

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, managing the Pigeonroost soil for orchards and ornamental crops is difficult.

### Woodland Management and Productivity

*Potential for commercial species:* Moderately high for upland hardwoods and very high for eastern white pine

*Suitability:* Suited

*Management concerns:* Pigeonroost—erodibility and windthrow hazard; Edneytown—erodibility

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Pigeonroost soil because of the limited rooting depth.

### Urban Development

#### Dwellings

*Suitability:* Poorly suited

*Management concerns:* Pigeonroost—slope, erodibility, depth to bedrock, and corrosivity; Edneytown—slope, erodibility, and depth to bedrock

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- The soft bedrock underlying the Pigeonroost soil is not difficult to excavate but is difficult to vegetate and pack into a fill slope.
- Using corrosion-resistant materials for foundations and basements helps to reduce the risk of damage to concrete.

### Septic tank absorption fields

*Suitability:* Poorly suited

*Management concerns:* Pigeonroost—slope and depth to bedrock; Edneytown—slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Locating and using areas of the deeper Edneytown soil may improve the performance of filter fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Pigeonroost—slope, erodibility, frost action, and depth to bedrock; Edneytown—slope, erodibility, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The soft bedrock underlying the Pigeonroost soil is not difficult to excavate but is difficult to vegetate and pack into a fill slope.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil compaction, soil fertility, and depth to bedrock and droughtiness in areas of the Pigeonroost soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.

- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Pigeonroost soil for lawns and landscaping is difficult, especially if the soil has been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### *Interpretive Groups*

*Land capability classification:* 6e

*Woodland ordination symbol:* 12R, based on eastern white pine as the indicator species

### **PeE—Pigeonroost-Edneytown complex, 30 to 50 percent slopes, stony**

#### ***Setting***

*Landscape:* Low and intermediate mountains dominantly in the north-central, northern, and northwestern parts of the county

*Elevation range:* 2,400 to 3,800 feet

*Landform:* South- to west-facing mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 5 to 193 acres

#### ***Composition***

Pigeonroost soil and similar inclusions: 45 percent

Edneytown soil and similar inclusions: 40 percent

Dissimilar inclusions: 15 percent

#### ***Typical Profile***

##### **Pigeonroost**

*Surface layer:*

0 to 3 inches—dark yellowish brown loam

*Subsoil:*

3 to 26 inches—brownish yellow loam

26 to 37 inches—yellowish brown sandy loam

*Bedrock:*

37 to 79 inches—weathered, moderately fractured granite gneiss

**Edneytown***Surface layer:*

0 to 4 inches—very dark grayish brown sandy loam

*Subsoil:*

4 to 37 inches—yellowish brown loam

*Underlying material:*

37 to 62 inches—multicolored sandy loam saprolite

**Soil Properties and Qualities**

*Depth class:* Pigeonroost—moderately deep;

Edneytown—very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Soil reaction:* Pigeonroost—extremely acid to moderately acid throughout the profile; Edneytown—extremely acid to moderately acid in the A horizon, except in limed areas, and very strongly acid or strongly acid in the B and C horizons

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Pigeonroost—20 to 40 inches to soft bedrock; Edneytown—more than 60 inches

**Minor Components***Dissimilar inclusions:*

- Random areas of Chestnut and Buladean soils that have less clay in the subsoil than the Pigeonroost and Edneytown soils and have soft bedrock at a depth of less than 60 inches
- Soils that have thicker surface layers with more organic matter than those of the Pigeonroost and Edneytown soils, on north- to east-facing side slopes
- Random areas of soils that have more mica in the subsoil than the Pigeonroost and Edneytown soils
- Saunook soils that have thicker surface layers with more organic matter than those of the Pigeonroost and Edneytown soils and have bedrock at a depth of

more than 60 inches, in concave areas at the head of drains and on footslopes

- Clifton soils that have a clayey subsoil, on spur ridges and nose slopes
- Thunder and Cullasaja soils that have thicker surface layers with more organic matter than those of the Pigeonroost and Edneytown soils, have more rock fragments in the subsoil, and have bedrock at a depth of more than 60 inches, in drainageways
- Widely scattered areas of rock outcrop

*Similar inclusions:*

- Pigeonroost soils that have a surface layer of sandy loam or fine sandy loam
- Edneytown soils that have a surface layer of fine sandy loam or loam
- Random areas of Evard and Cowee soils that have a red subsoil
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches

**Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, ornamental crops, and building site development

**Agricultural Development****Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

**Pasture and hayland**

*Suitability for pasture:* Suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, soil fertility, and rooting depth and droughtiness in areas of the Pigeonroost soil

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover

before winter dormancy help to maintain pastures and increase productivity.

- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Pigeonroost soil for the production of pasture and hay crops is difficult.

### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, soil fertility, plant shape, and rooting depth and droughtiness in areas of the Pigeonroost soil

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, managing areas of the Pigeonroost soil for orchards and ornamental crops is difficult.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for upland hardwoods and very high for eastern white pine

*Suitability:* Suited

*Management concerns:* Pigeonroost—equipment use, erodibility, and windthrow hazard; Edneytown—equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water

directly onto fill slopes help to stabilize logging roads, skid trails, and landings.

- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Pigeonroost soil because of the limited rooting depth.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and depth to bedrock and corrosivity in areas of the Pigeonroost soil

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- The soft bedrock underlying the Pigeonroost soil is not difficult to excavate but is difficult to vegetate and pack into a fill slope.
- Using corrosion-resistant materials for foundations and basements helps to reduce the risk of damage to concrete.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Pigeonroost—slope and depth to bedrock; Edneytown—slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Locating and using areas of the deeper Edneytown soil may improve the performance of filter fields.
- Raking trench walls helps to prevent the sealing of

soil pores, which may occur during the excavation of septic tank absorption fields.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Pigeonroost—slope, erodibility, frost action, and depth to bedrock; Edneytown—slope, erodibility, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The soft bedrock underlying these soils is not difficult to excavate but is difficult to vegetate and pack into a fill slope.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil compaction, soil fertility, and depth to bedrock and droughtiness in areas of the Pigeonroost soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Pigeonroost soil for lawns and landscaping is difficult, especially if the soil has been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.

### Interpretive Groups

*Land capability classification:* 7e

*Woodland ordination symbol:* 12R, based on eastern white pine as the indicator species

### PtD—Plott loam, 15 to 30 percent slopes, stony

#### Setting

*Landscape:* Low and intermediate mountains dominantly in the east-central, northern, and northwestern parts of the county

*Elevation range:* 3,000 to 4,600 feet

*Landform:* North- to east-facing ridges and those shaded by the higher mountains

*Landform position:* Summits and the upper side slopes

*Shape of areas:* Long and narrow

*Size of areas:* 5 to 115 acres

#### Composition

Plott soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

#### Typical Profile

*Surface layer:*

0 to 16 inches—very dark grayish brown loam

*Subsoil:*

16 to 37 inches—strong brown loam

37 to 43 inches—brown sandy loam

*Underlying material:*

43 to 62 inches—multicolored loamy sand saprolite

#### Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on prominent ridges, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of soils that have bedrock at a depth of less than 60 inches
- Chestnut and Buladean soils that have a thinner surface layer with less organic matter than that of the Plott soil and have soft bedrock at a depth of less than 60 inches, on south- to west-facing shoulder slopes, nose slopes, and side slopes
- Saunook soils that have more clay in the subsoil than the Plott soil, in saddles and gaps and in concave areas at the head of drains
- Areas on prominent ridges that are windswept
- Widely scattered areas of rock outcrop, on narrow ridges

*Similar inclusions:*

- Plott soils that have a surface layer of fine sandy loam or sandy loam
- Plott soils that have a surface layer with less organic matter

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, hayland, ornamental crops, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for cropland.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, pesticide retention, ball and burlap harvesting, plant shape, climate, and soil fertility

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.

- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* High for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and corrosivity

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, climate, and pesticide retention

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native, winter-hardy landscape plants is recommended.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* 9R, based on yellow-poplar as the indicator species

## **PtE—Plott loam, 30 to 50 percent slopes, stony**

### **Setting**

*Landscape:* Low and intermediate mountains dominantly in the east-central, northern, and northwestern parts of the county

*Elevation range:* 3,000 to 4,600 feet

*Landform:* North- to east-facing hillslopes and mountain slopes and those shaded by the higher mountains

*Landform position:* Side slopes

*Shape of areas:* Irregular and oblong

*Size of areas:* 5 to 102 acres

### **Composition**

Plott soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

*Surface layer:*

0 to 16 inches—very dark grayish brown loam

*Subsoil:*

16 to 37 inches—strong brown loam

37 to 43 inches—brown sandy loam

*Underlying material:*

43 to 62 inches—multicolored loamy sand saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher

mountains; on prominent ridges and upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of soils that have bedrock at a depth of less than 60 inches
- Hunt Dale soils that have more clay in the subsoil than the Plott soil, on spur ridges
- Saunook soils that have more clay in the subsoil than the Plott soil, in concave areas at the head of drains, on benches, and on footslopes
- Chestnut and Buladean soils that have a thinner surface layer with less organic matter than that of the Plott soil and have soft bedrock at a depth of less than 60 inches, on south- to west-facing spur ridges, nose slopes, and side slopes
- Widely scattered areas of rock outcrop
- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Plott soil, on benches below rock outcrops and in drainageways
- Areas on prominent ridges and upper side slopes that are windswept

*Similar inclusions:*

- Plott soils that have a surface layer of fine sandy loam or sandy loam
- Plott soils that have a surface layer with less organic matter

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

**Orchards and ornamental crops***Suitability:* Poorly suited*Management concerns:* Equipment use, erodibility, pesticide retention, ball and burlap harvesting, plant shape, climate, and soil fertility*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

**Woodland Management and Productivity***Potential for commercial species:* High for cove hardwoods and northern hardwoods*Suitability:* Suited*Management concerns:* Equipment use and erodibility*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

**Urban Development****Dwellings***Suitability:* Poorly suited*Management concerns:* Slope, erodibility, and corrosivity*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

**Septic tank absorption fields***Suitability:* Poorly suited*Management concerns:* Slope*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.

- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, and frost action

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, climate, and pesticide retention

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- The use of native, winter-hardy landscape plants is recommended.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### Interpretive Groups

*Land capability classification:* 7e

*Woodland ordination symbol:* 9R, based on yellow-poplar as the indicator species

### PtF—Plott loam, 50 to 95 percent slopes, stony

#### Setting

*Landscape:* Low and intermediate mountains dominantly in the east-central, northern, and northwestern parts of the county

*Elevation range:* 3,000 to 4,600 feet

*Landform:* North- to east-facing hillslopes and mountain slopes and those shaded by the higher mountains

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 10 to 286 acres

#### Composition

Plott soil and similar inclusions: 80 percent

Dissimilar inclusions: 20 percent

#### Typical Profile

*Surface layer:*

0 to 16 inches—very dark grayish brown loam

*Subsoil:*

16 to 37 inches—strong brown loam

37 to 43 inches—brown sandy loam

*Underlying material:*

43 to 62 inches—multicolored loamy sand saprolite

#### Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* High or very high

*Potential frost action:* Moderate

*Special climatic conditions:* Cooler annual air temperatures which allow late spring and early fall

frosts; higher soil moisture content due to north- to east-facing aspects or shading by the higher mountains; on the prominent upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of soils that have bedrock at a depth of less than 60 inches
- Hunt Dale soils that have more clay in the subsoil than the Plott soil, on spur ridges
- Saunook soils that have more clay in the subsoil than the Plott soil, in concave areas at the head of drains, on benches, and on footslopes
- Chestnut and Buladean soils that have a thinner surface layer with less organic matter than that of the Plott soil and have soft bedrock at a depth of less than 60 inches, on south- to west-facing spur ridges, nose slopes, and side slopes
- Widely scattered areas of rock outcrop
- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Plott soil, on benches below rock outcrops and in drainageways
- Areas on the prominent upper side slopes that are windswept

*Similar inclusions:*

- Plott soils that have a surface layer of fine sandy loam or sandy loam
- Plott soils that have a surface layer with less organic matter

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of

pasture and hay crops because of the slope and erodibility. A site on better suited soils should be selected.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope and erodibility. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* High for cove hardwoods and northern hardwoods

*Suitability:* Poorly suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the slope and erodibility. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope. The local Health Department should be contacted for additional guidance.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope and erodibility. A site on better suited soils should be selected.

#### **Lawns and landscaping**

*Suitability:* Unsited

*Management concerns:*

• This map unit is severely limited for lawns and landscaping because of the slope and erodibility. A site on better suited soils should be selected.

**Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* 9R, based on yellow-poplar as the indicator species

**RoA—Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded****Setting**

*Landscape:* Valleys of mountains and intermountain hills

*Elevation range:* 2,000 to 2,700 feet

*Landform:* Flood plains dominantly along Cane Creek, the North Toe River, and the Nolichucky River

*Landform position:* Planar to slightly convex bottomland slopes

*Shape of areas:* Long and narrow

*Size of areas:* 1 to 82 acres

**Composition**

Rosman soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

**Typical Profile**

*Surface layer:*

0 to 10 inches—black fine sandy loam

*Subsoil:*

10 to 25 inches—dark yellowish brown fine sandy loam

*Underlying material:*

25 to 42 inches—dark yellowish brown fine sandy loam

42 to 62 inches—dark yellowish brown fine sandy loam that has mottles in shades of gray

**Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* 3.5 to more than 6.0 feet from December through May

*Hazard of flooding:* Occasional, throughout the year with standing water for less than 2 days

*Shrink-swell potential:* Low

*Slope class:* Nearly level or gently sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* None or slight

*Organic matter content (surface layer):* Moderate or high

*Potential frost action:* Low

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Strongly acid to neutral throughout the profile

*Parent material:* Alluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Depth to contrasting material:* More than 40 inches to deposits of cobbles and gravel that are stratified with sandy or loamy material

*Other distinctive properties:* Soil subject to scouring and deposition during flooding

**Minor Components**

*Dissimilar inclusions:*

- Soils that are rarely flooded, on the wider flood plains
- The well drained Biltmore soils that have a sandy subsoil, on streambanks and along sharp river bends
- The somewhat poorly drained Bandana soils that have a subsoil that is loamy in the upper part and have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- The moderately well drained Dellwood and Reddies soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 8 to 40 inches, along drainageways
- Saunook soils that have a loamy subsoil, on toeslopes
- Somewhat poorly drained and poorly drained soils that have a loamy to clayey subsoil on low terraces, in low-lying depressions in backwater areas, and on toeslopes
- Poorly drained soils that have a loamy to clayey subsoil, in depressions, old stream channels, and backwater areas

*Similar inclusions:*

- Rosman soils that have a surface layer of fine sandy loam, very fine sandy loam, loam, or silt loam
- Random areas of soils that are similar to the Rosman soil but have less organic matter in the surface layer

**Land Use**

**Dominant Uses:** Cropland and ornamental crops

**Other Uses:** Pasture and hayland

## ***Agricultural Development***

### **Cropland**

*Suitability:* Well suited

*Management concerns:* Flooding, droughtiness, soil fertility, nutrient leaching, pesticide retention, and climate

*Management measures and considerations:*

- Although most flooding occurs during the winter months, there is a risk of crop loss during the growing season.
- This soil has a low available water capacity and becomes droughty during periods of low rainfall.
- Using conservation tillage, winter cover crops, crop residue management, and crop rotations which include grasses and legumes helps to increase the available water capacity and improve soil fertility.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Using split applications of lime and fertilizer helps to increase their effectiveness.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the plant roots.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Flooding, droughtiness, pesticide retention, soil fertility, nutrient leaching, and erodibility

*Management measures and considerations:*

- Although most flooding occurs during the winter months, there is a risk of crop loss during the growing season.
- This soil has a low available water capacity and becomes droughty during periods of low rainfall.
- Using supplemental irrigation and crop varieties that are adapted to droughty conditions helps to increase crop production.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are

applied to the plant rather than the soil may increase their effectiveness.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using split applications of fertilizer helps to increase its effectiveness.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.

### **Orchards and ornamental crops**

*Suitability for orchards:* Unsited

*Suitability for ornamental crops:* Suited

*Management concerns:* Flooding, droughtiness, climate, soil fertility, nutrient leaching, pesticide retention, and ball and burlap harvesting

*Management measures and considerations:*

- This map unit may be difficult to manage for ornamental crops because of the potential for flooding.
- This soil has a low available water capacity and becomes droughty during periods of low rainfall.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the plant roots.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by the low moisture and minimal clay contents.
- Because of the flooding, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as toeslopes and drainageways, Fraser fir and other

ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for yellow-poplar and very high for eastern white pine

*Suitability:* Well suited

*Management concerns:* Flooding

*Management measures and considerations:*

- This map unit is not used for woodland.
- The potential for flooding is a consideration in the placement of haul roads and log landings.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the flooding and the seasonal high water table. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the flooding and the potential for a seasonal high water table. The local Health Department should be contacted for additional guidance.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the flooding. A site on better suited soils should be selected.

#### **Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Flooding, droughtiness, pesticide retention, soil fertility, nutrient leaching, and climate

*Management measures and considerations:*

- This map unit is difficult to manage for lawns and landscaping because of the flooding, and use is severely limited during periods of inundation.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Using split applications of lime and fertilizer helps to increase their effectiveness.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the plant roots.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Because of the flooding, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as toeslopes and drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 2w

*Woodland ordination symbol:* 9A, based on yellow-poplar as the indicator species

### **SaB—Saunook silt loam, 2 to 8 percent slopes**

#### **Setting**

*Landscape:* Intermountain hills and low mountains throughout the county

*Elevation range:* 2,000 to 3,600 feet

*Landform:* Coves, colluvial fans, and benches

*Landform position:* Foothills and toeslopes

*Shape of areas:* Irregular or oblong

*Size of areas:* 3 to 58 acres

#### **Composition**

Saunook soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

#### **Typical Profile**

*Surface layer:*

0 to 10 inches—very dark brown silt loam

*Subsoil:*

10 to 15 inches—dark yellowish brown loam

15 to 38 inches—dark yellowish brown silt loam

38 to 50 inches—dark yellowish brown gravelly loam

50 to 99 inches—dark yellowish brown very cobbly sandy loam

#### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Gently sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Moderate

*Organic matter content (surface layer):* Moderate to very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B and C horizons

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Dillsboro soils that have more clay in the subsoil than the Saunook soil
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- The somewhat poorly drained Bandana soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Areas of soils that are occasionally flooded for very brief periods, along stream channels
- Thunder soils that have more rock fragments in the subsoil than the Saunook soil, in drainageways
- Soils that are poorly drained, in areas of seeps and springs

*Similar inclusions:*

- Saunook soils that have a surface layer of fine sandy loam, sandy loam, loam, or sandy clay loam
- Saunook soils that have a surface layer with less organic matter, in cropped fields

### **Land Use**

**Dominant Uses:** Cropland, pasture, hayland, and ornamental crops

**Other Uses:** Building site development, woodland, and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Well suited

*Management concerns:* Erodibility, tillth, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

#### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increase germination.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to

increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.

- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Well suited

*Management concerns:* Erodibility, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Well suited

*Management concerns:* Erodibility

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the

slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.

- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

## **Urban Development**

### **Dwellings**

*Suitability:* Well suited

*Management concerns:* Erodibility, seeps and springs, corrosivity, and large stones

*Management measures and considerations:*

- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- Large stones and boulders may be a problem during excavation.

### **Septic tank absorption fields**

*Suitability:* Suited

*Management concerns:* Restricted permeability, seeps and springs, slope, and large stones

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Large stones and boulders may be a problem during excavation.

### **Local roads and streets**

*Suitability:* Well suited

*Management concerns:* Low strength, erodibility, frost action, seeps and springs, and large stones

*Management measures and considerations:*

- Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Large stones and boulders may be a problem during excavation.

### **Lawns and landscaping**

*Suitability:* Well suited

*Management concerns:* Erodibility, soil compaction, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 2e

*Woodland ordination symbol:* 8A, based on yellow-poplar as the indicator species

### **ScC—Saunook silt loam, 8 to 15 percent slopes, stony**

#### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains throughout the county

*Elevation range:* 2,200 to 3,800 feet

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Footslopes and toeslopes

*Shape of areas:* Irregular or oblong

*Size of areas:* 3 to 210 acres

#### **Composition**

Saunook soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

#### **Typical Profile**

*Surface layer:*

0 to 10 inches—very dark brown silt loam

*Subsoil:*

10 to 15 inches—dark yellowish brown loam

15 to 38 inches—dark yellowish brown silt loam

38 to 50 inches—dark yellowish brown gravelly loam

50 to 99 inches—dark yellowish brown very cobbly sandy loam

#### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Strongly sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Moderate to very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B and C horizons

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Dillsboro soils that have more clay in the subsoil than the Saunook soil
- Random areas of Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Saunook soil
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions, on toeslopes, and along stream channels
- The somewhat poorly drained Bandana soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Areas of soils that are occasionally flooded for very brief periods, along stream channels

*Similar inclusions:*

- Saunook soils that have a surface layer of fine sandy loam, sandy loam, loam, or sandy clay loam
- Saunook soils that have a surface layer with less organic matter, in cropped fields

### **Land Use**

**Dominant Uses:** Cropland, pasture, hayland, and ornamental crops

**Other Uses:** Building site development, woodland, and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Suited

*Management concerns:* Erodibility, equipment use, tillage, pesticide retention, soil fertility, and climate

*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.

- The slope may limit equipment use in the steeper areas.

- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.

- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.

- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

#### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope may limit equipment use in the steeper areas when harvesting hay crops.

- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increase germination.

- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.

- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.

- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.

- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability:* Well suited

*Management concerns:* Erodibility, equipment use, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- The slope may limit equipment use in the steeper areas.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Well suited

*Management concerns:* Erodibility and equipment use

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.
- Avoiding logging operations during periods when the soil is saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.

- Livestock should not be allowed to graze in areas managed for woodland.

## **Urban Development**

### **Dwellings**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, seeps and springs, corrosivity, and large stones

*Management measures and considerations:*

- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- Large stones and boulders may be a problem during excavation.

### **Septic tank absorption fields**

*Suitability:* Suited

*Management concerns:* Restricted permeability, slope, seeps and springs, and large stones

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Large stones and boulders may be a problem during excavation.

### **Local roads and streets**

*Suitability:* Suited

*Management concerns:* Low strength, slope, erodibility, frost action, seeps and springs, and large stones

*Management measures and considerations:*

- Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.
- Designing roads on the contour and installing water-

control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.

- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Large stones and boulders may be a problem during excavation.

### **Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, soil compaction, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 4e

*Woodland ordination symbol:* 8A, based on yellow-poplar as the indicator species

## **SdD—Saunook-Thunder complex, 15 to 30 percent slopes, stony**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains throughout the county

*Elevation range:* 2,200 to 4,000 feet

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Shape of areas:* Irregular or oblong

*Size of areas:* 3 to 191 acres

### **Composition**

Saunook soil and similar inclusions: 50 percent

Thunder soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Saunook**

*Surface layer:*

0 to 10 inches—very dark brown silt loam

*Subsoil:*

10 to 15 inches—dark yellowish brown loam

15 to 38 inches—dark yellowish brown silt loam

38 to 50 inches—dark yellowish brown gravelly loam

50 to 99 inches—dark yellowish brown very cobbly sandy loam

#### **Thunder**

*Surface layer:*

0 to 8 inches—dark brown cobbly loam

*Subsoil:*

8 to 21 inches—strong brown very cobbly loam

21 to 52 inches—strong brown very cobbly sandy clay loam

*Underlying material:*

52 to 80 inches—strong brown extremely cobbly loamy sand

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Saunook—loamy; Thunder—loamy with many rock fragments

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Moderate to very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Saunook—very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B and C horizons; Thunder—very strongly acid to slightly acid throughout the profile

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments in areas of the Thunder soil

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Dillsboro soils that have more clay in the subsoil than the Saunook and Thunder soils
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- The somewhat poorly drained Bandana soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Areas of soils that are rarely flooded for very brief periods, along stream channels
- Random areas of moderately eroded to severely eroded soils

*Similar inclusions:*

- Saunook soils that have a surface layer of fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam
- Thunder soils that have a surface layer of fine sandy loam, sandy loam, sandy clay loam, or clay loam
- Saunook and Thunder soils that have surface layers with less organic matter, in cropped fields

### **Land Use**

**Dominant Uses:** Pasture and hayland

**Other Uses:** Cropland, woodland, wildlife habitat, ornamental crops, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, tillage, soil fertility, pesticide retention, and climate

*Management measures and considerations:*

- This map unit is difficult to manage for cultivated crops because the slope limits equipment use.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Because of the high content of rock fragments in the surface layer, the Thunder soil is difficult to till.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using

pesticides that are applied to the plant rather than the soil may increase their effectiveness.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Saunook—suited; Thunder—poorly suited

*Management concerns:* Equipment use, erodibility, climate, pesticide retention, soil fertility, and plant shape and ball and burlap harvesting in areas of the Thunder soil

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Areas of the Thunder soil are severely limited for ball and burlap harvesting because of the high content of rock fragments in the root zone.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Erodibility and equipment use

*Management measures and considerations:*

- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Saunook—slope, erodibility, seeps and springs, large stones, and corrosivity; Thunder—slope, erodibility, seeps and springs, large stones, and cutbanks cave

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Large stones and boulders may be a problem during excavation.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

- Installing permanent retaining walls helps to improve soil stability.

### Septic tank absorption fields

*Suitability:* Saunook—poorly suited; Thunder—unsuited

*Management concerns:* Saunook—slope, seeps and springs, and restricted permeability; Thunder—slope, seeps and springs, and poor filtering capacity

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
- Large stones and boulders are a problem during excavation.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Saunook—slope, erodibility, frost action, large stones, seeps and springs, and low strength; Thunder—slope, erodibility, frost action, large stones, seeps and springs, and differential settling

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- Large stones and boulders may be a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Incorporating sand and gravel into the soil and compacting roadbeds help to improve soil strength.
- The Thunder soil is subject to uneven settling and may be unstable if not properly compacted.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil compaction, climate, pesticide retention, and soil fertility and large stones in areas of the Thunder soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Areas of the Thunder soil are severely limited for lawns and landscaping because of the high content of rock fragments in the root zone.

### Interpretive Groups

*Land capability classification:* Saunook—6e; Thunder—6s

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

### SdE—Saunook-Thunder complex, 30 to 50 percent slopes, stony

#### Setting

*Landscape:* Low and intermediate mountains throughout the county

*Elevation range:* 2,800 to 4,600 feet

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, and footslopes

*Shape of areas:* Oblong or irregular

*Size of areas:* 3 to 53 acres

### **Composition**

Saunook soil and similar inclusions: 50 percent

Thunder soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Saunook**

*Surface layer:*

0 to 10 inches—very dark brown silt loam

*Subsoil:*

10 to 15 inches—dark yellowish brown loam

15 to 38 inches—dark yellowish brown silt loam

38 to 50 inches—dark yellowish brown gravelly loam

50 to 99 inches—dark yellowish brown very cobbly sandy loam

#### **Thunder**

*Surface layer:*

0 to 8 inches—dark brown cobbly loam

*Subsoil:*

8 to 21 inches—strong brown very cobbly loam

21 to 52 inches—strong brown very cobbly sandy clay loam

*Underlying material:*

52 to 80 inches—strong brown extremely cobbly loamy sand

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Saunook—loamy; Thunder—loamy with many rock fragments

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered

cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Moderate to very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Saunook—very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B and C horizons; Thunder—very strongly acid to slightly acid throughout the profile

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments in areas of the Thunder soil

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Dillsboro soils that have more clay in the subsoil than the Saunook and Thunder soils
- Random areas of moderately eroded to severely eroded soils
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and along stream channels

*Similar inclusions:*

- Saunook soils that have a surface layer of fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam
- Thunder soils that have a surface layer of fine sandy loam, sandy loam, sandy clay loam, or clay loam
- Saunook and Thunder soils that have surface layers with less organic matter, in cropped fields

### **Land Use**

**Dominant Uses:** Pasture and hayland

**Other Uses:** Ornamental crops, woodland, wildlife habitat, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, climate, pesticide retention, soil fertility, and plant shape and ball and burlap harvesting in areas of the Thunder soil

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- The Thunder soil is severely limited for ball and burlap harvesting because of the high content of rock fragments in the root zone.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to

increase the availability of plant nutrients and maximize productivity.

- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.
- Soil-applied herbicides are retained due to herbicide-organic matter bonding, and they may damage tree seedlings when cropland or pastureland is converted to woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Saunook—slope, large stones, erodibility, seeps and springs, and

corrosivity; Thunder—slope, large stones, erodibility, seeps and springs, and cutbanks cave

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Large stones and boulders may be a problem during excavation.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- Installing permanent retaining walls helps to improve soil stability.

#### **Septic tank absorption fields**

*Suitability:* Saunook—poorly suited; Thunder—unsuited

*Management concerns:* Saunook—slope, seeps and springs, and restricted permeability; Thunder—slope, seeps and springs, and poor filtering capacity

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
- Large stones and boulders are a problem during excavation.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Saunook—slope, erodibility, frost action, large stones, seeps and springs, and low strength; Thunder—slope, erodibility, frost

action, large stones, seeps and springs, and differential settling

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- Large stones and boulders may be a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- The Thunder soil is subject to uneven settling and may be unstable if not properly compacted.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil compaction, climate, pesticide retention, and soil fertility and large stones in areas of the Thunder soil

*Management measures and considerations:*

- This map unit is limited for lawns and landscaping because of the slope and the high content of rock fragments in the Thunder soil.
- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.

- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* Saunook—7e;  
Thunder—7s

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

## **SrF—Sylco-Rock outcrop complex, 50 to 95 percent slopes**

### **Setting**

*Landscape:* Low and intermediate mountains in the Nolichucky Gorge

*Elevation range:* 1,800 to 3,600 feet

*Landform:* South- to west-facing mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of area:* 564 acres

### **Composition**

Sylco soil and similar inclusions: 50 percent

Rock outcrop: 30 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Sylco**

*Surface layer:*

0 to 5 inches—brown very channery loam

*Subsoil:*

5 to 11 inches—dark yellowish brown very channery loam

11 to 22 inches—yellowish brown very channery loam

22 to 39 inches—yellowish brown very flaggy loam

*Bedrock:*

39 to 50 inches—unweathered, slightly fractured, low-grade metasandstone

#### **Rock outcrop**

*Composition:* Dominantly metasandstone bedrock

### **Properties and Qualities of the Sylco Soil**

*Depth class:* Moderately deep

*Drainage class:* Well drained

*General texture class:* Loamy with many rock fragments

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* The entire map unit is within Nolichucky Gorge and subject to frequent fog in summer and frost in winter and to high winds throughout the year

*Soil reaction:* Extremely acid to strongly acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Depth to bedrock:* 20 to 40 inches to hard bedrock

*Other distinctive properties:* Soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material; low natural fertility

### **Minor Components**

*Dissimilar inclusions:*

- Soco and Stecoah soils that have soft bedrock at a depth of less than 60 inches, on spur ridges and in areas adjacent to rock outcrops
- Lostcove soils that have bedrock at a depth of more than 60 inches, in drainageways and on benches below rock outcrops
- Random areas of soils that have hard bedrock at a depth of less than 20 inches
- Random areas where landslides have occurred

*Similar inclusions:*

- Sylco soils that have a silt loam surface layer

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, and the extent of rock outcrops. A site on better suited soils should be selected.

**Pasture and hayland***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the slope, erodibility, and the extent of rock outcrops. A site on better suited soils should be selected.

**Orchards and ornamental crops***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, the skeletal subsoil, depth to bedrock, and the extent of rock outcrops. A site on better suited soils should be selected.

**Woodland Management and Productivity***Potential for commercial species:* Not used*Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for timber production because of the slope, low productivity, low volume, depth to bedrock, and the extent of rock outcrops. A site on better suited soils should be selected.

**Urban Development****Dwellings***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for dwellings because of the slope, erodibility, depth to bedrock, and the extent of rock outcrops. A site on better suited soils should be selected.

**Septic tank absorption fields***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for septic tanks because of the slope, depth to bedrock, and the extent of rock outcrops. A site on better suited soils should be selected.

**Local roads and streets***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for roads and

streets because of the slope, erodibility, depth to bedrock, and the extent of rock outcrops. A site on better suited soils should be selected.

**Lawns and landscaping***Suitability:* Unsited*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope, erodibility, the skeletal soils, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

**Interpretive Groups***Land capability classification:* Sylco—7s; Rock outcrop—8s*Woodland ordination symbol:* Sylco—9R, based on eastern white pine as the indicator species; Rock outcrop—none assigned**SsD—Sylco-Soco complex, 10 to 30 percent slopes, stony****Setting***Landscape:* Low and intermediate mountains in the far northwestern part of the county*Elevation range:* 2,200 to 4,400 feet*Landform:* Ridges*Landform position:* Summits and the upper side slopes*Shape of areas:* Long and narrow*Size of areas:* 2 to 37 acres**Composition**

Sylco soil and similar inclusions: 45 percent

Soco soil and similar inclusions: 35 percent

Dissimilar inclusions: 20 percent

**Typical Profile****Sylco***Surface layer:*

0 to 5 inches—brown very channery loam

*Subsoil:*

5 to 11 inches—dark yellowish brown very channery loam

11 to 22 inches—yellowish brown very channery loam

22 to 39 inches—yellowish brown very flaggy loam

*Bedrock:*

39 to 50 inches—unweathered, slightly fractured, low-grade metasandstone

**Soco***Surface layer:*

0 to 4 inches—dark brown fine sandy loam

*Subsoil:*

4 to 26 inches—brownish yellow fine sandy loam

*Underlying material:*

26 to 34 inches—multicolored cobbly fine sandy loam saprolite

*Bedrock:*

34 to 62 inches—weathered, moderately fractured, low-grade metasandstone

### **Soil Properties and Qualities**

*Depth class:* Moderately deep

*Drainage class:* Well drained

*General texture class:* Sylco—loamy with many rock fragments; Soco—loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Strongly sloping or moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe or very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges, rime ice in winter and high winds

*Soil reaction:* Extremely acid to strongly acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Depth to bedrock:* Sylco—20 to 40 inches to hard bedrock; Soco—20 to 40 inches to soft bedrock

*Other distinctive properties:* Soils subject to downslope movement when lateral support is removed and to differential settling when used as fill material; low natural fertility

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Stecoah soils that have soft bedrock at a depth of 40 to 60 inches
- Lostcove soils that have bedrock at a depth of more than 60 inches, in drainageways and on benches below rock outcrops
- Keener soils that have more clay in the subsoil than the Sylco and Soco soils and have bedrock at a depth of more than 60 inches, on benches, in concave areas at the head of drains, and in saddles and gaps

- Widely scattered areas of rock outcrop
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Sylco soils that have a silt loam surface layer
- Soco soils that have a surface layer of fine sandy loam, loam, or silt loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation

### **Agricultural Development**

#### **Cropland**

*Suitability:* Sylco—unsuited; Soco—poorly suited

*Management concerns:* Equipment use, erodibility, soil fertility, droughtiness, and rooting depth

*Management measures and considerations:*

- This map unit is difficult to manage for cultivated crops because of the depth to bedrock and the slope, which limits equipment use.

#### **Pasture and hayland**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, rooting depth, droughtiness, erodibility, and soil fertility

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing this map unit for the production of pasture and hay crops is difficult.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability:* Sylco—unsuited; Soco—poorly suited

*Management concerns:*

- This map unit is not managed for orchards and ornamental crops.

### **Woodland Management and Productivity**

*Potential for commercial species:* Low for upland hardwoods and high for eastern white pine

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, and windthrow hazard

*Management measures and considerations:*

- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit for access roads.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.
- Extensive blasting, shaping, and grading are needed if roads are to be constructed on the contour.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited because of the limited rooting depth.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Depth to bedrock, slope, erodibility, slippage, and differential settling and corrosivity in areas of the Soco soil

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Sylco soil.
- The soft bedrock underlying the Soco soil is not difficult to excavate but chunks are hard to vegetate and pack into a fill slope.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.
- These soils are subject to uneven settling and may be unstable if not properly compacted.
- Using corrosion-resistant materials for foundations

and basements helps to reduce the risk of damage to concrete.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Sylco—depth to bedrock, slope, and poor filtering capacity; Soco—depth to bedrock and slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- This map unit is difficult to manage for septic tank absorption fields because of the moderate depth to bedrock.
- Measures that improve the filtering capacity should be considered; the Sylco soil readily absorbs but does not adequately filter effluent.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Depth to bedrock, slope, erodibility, slippage, differential settling, and frost action

*Management measures and considerations:*

- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit for access roads.
- Extensive blasting, shaping, and grading are needed if roads are to be constructed on the contour.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.
- The soft bedrock underlying the Soco soil is not difficult to excavate but chunks are hard to vegetate and pack into a fill slope.
- These soils are subject to uneven settling and may be unstable if not properly compacted.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, depth to bedrock, soil fertility, and droughtiness

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Areas of the Sylco soil are limited for lawns and landscaping because of the high content of rock fragments in the root zone.
- Because of the moderately deep rooting depth, managing this map unit for lawns and landscaping is difficult, especially if the soil has been disturbed.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

**Interpretive Groups**

*Land capability classification:* Sylco—7s; Soco—6e  
*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 9X in areas of the Sylco soil and 11R in areas of the Soco soil

**StE—Soco-Stecoah complex, 30 to 50 percent slopes, very stony****Setting**

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Elevation range:* 1,800 to 4,600 feet

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow summits and irregular side slopes

*Size of areas:* 5 to 356 acres

**Composition**

Soco soil and similar inclusions: 45 percent

Stecoah soil and similar inclusions: 35 percent

Dissimilar inclusions: 20 percent

**Typical Profile****Soco**

*Surface layer:*

0 to 4 inches—dark brown fine sandy loam

*Subsoil:*

4 to 26 inches—brownish yellow fine sandy loam

*Underlying material:*

26 to 34 inches—multicolored cobbly fine sandy loam saprolite

*Bedrock:*

34 to 62 inches—weathered, moderately fractured, low-grade metasandstone

**Stecoah**

*Surface layer:*

0 to 5 inches—dark yellowish brown fine sandy loam

*Subsoil:*

5 to 31 inches—yellowish brown fine sandy loam

31 to 44 inches—brownish yellow channery fine sandy loam

44 to 50 inches—yellow channery fine sandy loam

*Bedrock:*

50 to 62 inches—weathered, moderately fractured, low-grade metasandstone

**Soil Properties and Qualities**

*Depth class:* Soco—moderately deep; Stecoah—deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On prominent ridges and upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to strongly acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Depth to bedrock:* Soco—20 to 40 inches to soft bedrock; Stecoah—40 to 60 inches to soft bedrock

*Other distinctive properties:* Soils subject to downslope movement when lateral support is

removed and to differential settling when used as fill material; low natural fertility

### **Minor Components**

#### *Dissimilar inclusions:*

- Keener soils that have more clay in the subsoil than the Soco and Stecoah soils and have bedrock at a depth of more than 60 inches, on benches, on footslopes, and in concave areas at the head of drains
- Lostcove soils that have a higher clay content than the Soco and Stecoah soils and have more rock fragments in the subsoil, in drainageways and on benches below rock outcrops
- Random areas of Harmiller and Shinbone soils that have more clay in the subsoil than the Soco and Stecoah soils and have soft bedrock at a depth of 20 to 60 inches
- Sylco soils that have more rock fragments in the subsoil than the Soco and Stecoah soils and have hard bedrock at a depth of 20 to 40 inches, in areas adjacent to rock outcrops
- Widely scattered areas of rock outcrop
- Areas on prominent ridges and upper side slopes that are windswept
- Random areas where landslides have occurred

#### *Similar inclusions:*

- Soco and Stecoah soils that have surface layers of fine sandy loam, loam, or silt loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, and the very stony surface. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:*

- This map unit is not managed for pasture and hayland.

#### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for orchards and ornamental crops.

### **Woodland Management and Productivity**

*Potential for commercial species:* Low for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Soco—equipment use, erodibility, and windthrow hazard; Stecoah—equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit for access roads.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Soco soil because of the limited rooting depth.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for dwellings.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, slippage,



**Figure 5.—Low-grade metasedimentary rock underlies the Soco and Stecoah soils. This bedrock is unstable when lateral support is removed during the construction of roads.**

differential settling, depth to bedrock, low strength, and frost action

*Management measures and considerations:*

- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit (fig. 5).
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as

possible help to prevent slippage and excessive soil erosion.

- Because of the low natural fertility and droughty nature of these soils, cut and fill slopes may be difficult to revegetate.
- The soft bedrock underlying these soils is not difficult to excavate but is difficult to vegetate and pack into a fill slope.
- These soils are subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that

they conform to the natural slope help to improve soil strength.

- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for lawns and landscaping.

### Interpretive Groups

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 11R in areas of the Soco soil and 12R in areas of the Stecoah soil

## StF—Soco-Stecoah complex, 50 to 95 percent slopes, very stony

### Setting

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Elevation range:* 2,000 to 4,600 feet

*Landform:* South- to west-facing mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 5 to 572 acres

### Composition

Soco soil and similar inclusions: 45 percent

Stecoah soil and similar inclusions: 35 percent

Dissimilar inclusions: 20 percent

### Typical Profile

#### Soco

*Surface layer:*

0 to 4 inches—dark brown fine sandy loam

*Subsoil:*

4 to 26 inches—brownish yellow fine sandy loam

*Underlying material:*

26 to 34 inches—multicolored cobbly sandy loam saprolite

*Bedrock:*

34 to 62 inches—weathered, moderately fractured, low-grade metasandstone

#### Stecoah

*Surface layer:*

0 to 5 inches—dark yellowish brown fine sandy loam

*Subsoil:*

5 to 31 inches—yellowish brown fine sandy loam

31 to 44 inches—brownish yellow channery fine sandy loam

44 to 50 inches—yellow channery fine sandy loam

*Bedrock:*

50 to 62 inches—weathered, moderately fractured, low-grade metasandstone

### Soil Properties and Qualities

*Depth class:* Soco—moderately deep; Stecoah—deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent

cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Special climatic conditions:* On the prominent upper side slopes, rime ice in winter and high winds

*Soil reaction:* Extremely acid to strongly acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Depth to bedrock:* Soco—20 to 40 inches to soft bedrock; Stecoah—40 to 60 inches to soft bedrock

*Other distinctive properties:* Soils subject to downslope movement when lateral support is removed and to differential settling when used as fill material; low natural fertility

### Minor Components

*Dissimilar inclusions:*

- Keener soils that have more clay in the subsoil than the Soco and Stecoah soils and have bedrock at a depth of more than 60 inches, on benches, on footslopes, and in concave areas at the head of drains
- Lostcove soils that have a higher clay content than the Soco and Stecoah soils and have more rock fragments in the subsoil, in drainageways and on benches below rock outcrops
- Random areas of Harmiller and Shinbone soils that have more clay in the subsoil than the Soco and

Stecoah soils and have soft bedrock at a depth of 20 to 60 inches

- Sylco soils that have more rock fragments in the subsoil than the Soco and Stecoah soils and have hard bedrock at a depth of 20 to 40 inches, in areas adjacent to rock outcrops
- Widely scattered areas of rock outcrop
- Areas on the prominent upper side slopes that are windswept
- Random areas where landslides have occurred

*Similar inclusions:*

- Soco and Stecoah soils that have surface layers of fine sandy loam, loam, or silt loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, and the very stony surface. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, and the very stony surface. A site on better suited soils should be selected.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, and the very stony surface. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Low for hardwoods and high for eastern white pine

*Suitability:* Poorly suited

*Management concerns:* Soco—equipment use, erodibility, and windthrow hazard; Stecoah—equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome

equipment limitations and prevents the acceleration of erosion caused by road construction, use of skid trails, and disturbance of the forest floor by heavy machinery.

- The underlying bedrock may be susceptible to mass movement. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit for access roads.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Soco soil because of the limited rooting depth.

### **Urban Development**

#### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the slope, instability of the underlying bedrock, and erodibility. A site on better suited soils should be selected.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope and the depth to bedrock in the Soco soil. The local Health Department should be contacted for additional guidance.

#### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope, erodibility, instability of the underlying bedrock, and the depth to bedrock of the Soco soil. A site on better suited soils should be selected.

#### **Lawns and landscaping**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope and the depth to bedrock of the Soco soil. A site on better suited soils should be selected.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* Based on eastern white pine as the indicator species, 11R in areas of the Soco soil and 12R in areas of the Stecoah soil

### **TbD—Tanasee-Balsam complex, 15 to 30 percent slopes, very bouldery**

#### **Setting**

*Landscape:* High mountains from Roan High Bluff to Roan High Knob

*Elevation range:* 5,800 to 6,200 feet

*Landform:* Coves and drainageways

*Landform position:* Side slopes, footslopes, and head slopes

*Shape of areas:* Irregular

*Size of areas:* 9 to 70 acres

#### **Composition**

Tanasee soil and similar inclusions: 60 percent

Balsam soil and similar inclusions: 25 percent

Dissimilar inclusions: 15 percent

#### **Typical Profile**

##### **Tanasee**

*Surface layer:*

0 to 5 inches—black loam

5 to 13 inches—very dark grayish brown loam

13 to 19 inches—very dark grayish brown gravelly fine sandy loam

*Subsoil:*

19 to 50 inches—strong brown gravelly sandy loam

50 to 70 inches—strong brown gravelly coarse sandy loam

*Underlying material:*

70 to 82 inches—multicolored gravelly coarse sandy loam

82 to 92 inches—multicolored gravelly loamy coarse sand

##### **Balsam**

*Surface layer:*

0 to 3 inches—black sandy loam

3 to 13 inches—very dark grayish brown gravelly fine sandy loam

*Subsoil:*

13 to 27 inches—strong brown very gravelly loamy coarse sand

27 to 42 inches—strong brown very gravelly sandy loam

42 to 63 inches—strong brown extremely gravelly sandy loam

63 to 74 inches—strong brown extremely gravelly coarse sandy loam

*Underlying material:*

74 to 90 inches—strong brown very gravelly loamy coarse sand

#### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Tanasee—loamy; Balsam—loamy with many rock fragments

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart

*Organic matter content (surface layer):* Very high

*Potential frost action:* Moderate

*Special climatic conditions:* Extreme freezing and rime ice in winter, high winds, high rainfall, and short growing season

*Soil reaction:* Tanasee—extremely acid to strongly acid throughout the profile; Balsam—extremely acid to moderately acid throughout the profile

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments in areas of the Balsam soil

#### **Minor Components**

*Dissimilar inclusions:*

- Random areas of soils that are similar to the Tanasee soil but have more clay in the subsoil
- Areas of rubble land in drainageways and below rock outcrops
- Wayah soils that have a loamy subsoil, on residual landforms within the map unit
- Burton soils that have hard bedrock at a depth of 20 to 40 inches, along the outer edge of map unit delineations
- Unprotected areas that are windswept
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations

*Similar inclusions:*

- Tanasee soils that have a surface layer of sandy loam, fine sandy loam, or silt loam
- Balsam soils that have a surface layer of loamy sand, loamy coarse sand, coarse sandy loam, fine sandy loam, or loam

**Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation

**Agricultural Development****Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, the very bouldery surface, and short growing season. A site on better suited soils should be selected.

**Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the very bouldery surface and short growing season. A site on better suited soils should be selected.

**Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the very bouldery surface and short growing season. A site on better suited soils should be selected.

**Woodland Management and Productivity**

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the very bouldery surface and short growing season. A site on better suited soils should be selected.

**Urban Development****Dwellings**

*Suitability:* Tanasee—poorly suited; Balsam—unsited

*Management concerns:*

- This map unit is not managed for dwellings.

**Septic tank absorption fields**

*Suitability:* Tanasee—poorly suited; Balsam—unsited

*Management concerns:*

- This map unit is not managed for septic tank absorption fields.

**Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large

stones, seeps and springs, and frost action and differential settling in areas of the Balsam soil

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Large stones and boulders may be a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The Balsam soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

**Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for lawns and landscaping.

**Interpretive Groups**

*Land capability classification:* Tanasee—6e; Balsam—7s

*Woodland ordination symbol:* 10R, based on red spruce as the indicator species

**TbE—Tanasee-Balsam complex, 30 to 50 percent slopes, very bouldery****Setting**

*Landscape:* High mountains from Little Rock Knob to Roan Mountain and south to Spears Top

*Elevation range:* 4,200 to 6,000 feet

*Landform:* Coves and drainageways

*Landform position:* Side slopes, footslopes, and head slopes

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 5 to 1,304 acres

### **Composition**

Tanasee soil and similar inclusions: 60 percent

Balsam soil and similar inclusions: 25 percent

Dissimilar inclusions: 15 percent

### **Typical Profile**

#### **Tanasee**

*Surface layer:*

0 to 5 inches—black loam

5 to 13 inches—very dark grayish brown loam

13 to 19 inches—very dark grayish brown gravelly fine sandy loam

*Subsoil:*

19 to 50 inches—strong brown gravelly sandy loam

50 to 70 inches—strong brown gravelly coarse sandy loam

*Underlying material:*

70 to 82 inches—multicolored gravelly coarse sandy loam

82 to 92 inches—multicolored gravelly loamy coarse sand

#### **Balsam**

*Surface layer:*

0 to 3 inches—black sandy loam

3 to 13 inches—very dark grayish brown gravelly fine sandy loam

*Subsoil:*

13 to 27 inches—strong brown very gravelly loamy coarse sand

27 to 42 inches—strong brown very gravelly sandy loam

42 to 63 inches—strong brown extremely gravelly sandy loam

63 to 74 inches—strong brown extremely gravelly coarse sandy loam

*Underlying material:*

74 to 90 inches—strong brown very gravelly loamy coarse sand

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Tanasee—loamy; Balsam—loamy with many rock fragments

*Permeability:* Moderately rapid

*Available water capacity:* Low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart

*Organic matter content (surface layer):* Very high

*Potential frost action:* Moderate

*Special climatic conditions:* Extreme freezing and rime ice in winter, high winds, high rainfall, and short growing season

*Soil reaction:* Tanasee—extremely acid to strongly acid throughout the profile; Balsam—extremely acid to moderately acid throughout the profile

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments in areas of the Balsam soil

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of soils that are similar to the Tanasee soil but that have more clay in the subsoil
- Areas of rubble land in drainageways and below rock outcrops
- Wayah soils that have a loamy subsoil, on residual landforms within the map unit
- Burton soils that have hard bedrock at a depth of 20 to 40 inches, along the outer edge of map unit delineations
- Unprotected areas that are windswept
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations

*Similar inclusions:*

- Tanasee soils that have a surface layer of sandy loam, fine sandy loam, or silt loam
- Balsam soils that have a surface layer of loamy sand, loamy coarse sand, coarse sandy loam, fine sandy loam, or loam

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Recreation

## ***Agricultural Development***

### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, the very bouldery surface, and short growing season. A site on better suited soils should be selected.

### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the very bouldery surface and short growing season. A site on better suited soils should be selected.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, the very bouldery surface, and short growing season. A site on better suited soils should be selected.

### ***Woodland Management and Productivity***

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the very bouldery surface and short growing season. A site on better suited soils should be selected.

## ***Urban Development***

### **Dwellings**

*Suitability:* Tanasee—poorly suited; Balsam—unsited

*Management concerns:*

- This map unit is not managed for dwellings.

### **Septic tank absorption fields**

*Suitability:* Tanasee—poorly suited; Balsam—unsited

*Management concerns:*

- This map unit is not managed for septic tank absorption fields.

### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, seeps and springs, and frost action and differential settling in areas of the Balsam soil

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Large stones and boulders are a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The Balsam soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for lawns and landscaping.

### ***Interpretive Groups***

*Land capability classification:* Tanasee—7e; Balsam—7s

*Woodland ordination symbol:* 10R, based on red spruce as the indicator species

## **TsB—Thunder-Saunook complex, 2 to 8 percent slopes, very bouldery**

### ***Setting***

*Landscape:* Intermountain hills and low mountains throughout the county

*Elevation range:* 2,400 to 4,500 feet

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Footslopes and toeslopes

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 3 to 58 acres

### ***Composition***

Thunder soil and similar inclusions: 50 percent

Saunook soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### Typical Profile

#### Thunder

*Surface layer:*

0 to 8 inches—dark brown cobbly loam

*Subsoil:*

8 to 21 inches—strong brown very cobbly loam  
21 to 52 inches—strong brown very cobbly sandy clay loam

*Underlying material:*

52 to 80 inches—strong brown extremely cobbly loamy sand

#### Saunook

*Surface layer:*

0 to 10 inches—very dark brown silt loam

*Subsoil:*

10 to 15 inches—dark yellowish brown loam  
15 to 38 inches—dark yellowish brown silt loam  
38 to 50 inches—dark yellowish brown gravelly loam  
50 to 99 inches—dark yellowish brown very cobbly sandy loam

### Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Thunder—loamy with many rock fragments; Saunook—loamy

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Gently sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Moderate

*Rock fragments on the surface:* About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart (fig. 6)

*Organic matter content (surface layer):* Moderate to very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Thunder—very strongly acid to slightly acid throughout the profile; Saunook—very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B and C horizons

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments in areas of the Thunder soil

### Minor Components

*Dissimilar inclusions:*

- Soils that have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and along stream channels
- Areas of the Thunder soil where the surface fragments have been removed
- Random areas of Dillsboro soils that have more clay in the subsoil than the Thunder and Saunook soils
- Areas of soils that are rarely flooded for very brief periods, along stream channels
- The somewhat poorly drained Bandana soils that are loamy in the upper part and have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Soils that are poorly drained, in areas of seeps and springs

*Similar inclusions:*

- Thunder soils that have a surface layer of fine sandy loam, sandy loam, sandy clay loam, or clay loam
- Saunook soils that have a surface layer of fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam
- Thunder and Saunook soils that have surface layers with less organic matter, in cropped fields

### Land Use

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, cropland, and building site development

### Agricultural Development

#### Cropland

*Suitability:* Thunder—unsuited; Saunook—suited

*Management concerns:* Equipment use, erodibility, tillage, soil fertility, pesticide retention, and climate

*Management measures and considerations:*

- This map unit is severely limited for crop production because of the very bouldery surface and the high content of rock fragments of the Thunder soil.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.



**Figure 6.—Boulders are a major management concern for any use in areas of the Thunder-Saunook complex, 2 to 8 percent slopes, very bouldery.**

- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

### Pasture and hayland

*Suitability for pasture:* Suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- Surface stones and boulders limit the use of equipment and may be hazardous.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### Orchards and ornamental crops

*Suitability:* Thunder—unsited; Saunook—suited

*Management concerns:* Equipment use, ball and burlap harvesting, erodibility, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is severely limited for orchards and ornamental crops because of the very bouldery surface and the high content of rock fragments of the Thunder soil.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to

increase the availability of plant nutrients and maximize productivity.

- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### Woodland Management and Productivity

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### Urban Development

#### Dwellings

*Suitability:* Thunder—poorly suited; Saunook—suited

*Management concerns:* Thunder—large stones, erodibility, seeps and springs, and cutbanks cave; Saunook—large stones, erodibility, seeps and springs, and corrosivity

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.

- Large stones and boulders are a problem during excavation.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Installing permanent retaining walls helps to improve soil stability.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

### **Septic tank absorption fields**

*Suitability:* Thunder—unsuited; Saunook—suited

*Management concerns:* Thunder—large stones, seeps and springs, and poor filtering capacity; Saunook—large stones, seeps and springs, and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Large stones and boulders are a problem during excavation.
- Excavations may cut into seeps and springs. These areas should not be used.
- Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Thunder—large stones, erodibility, seeps and springs, frost action, and differential settling; Saunook—large stones, erodibility, seeps and springs, frost action, and low strength

*Management measures and considerations:*

- Large stones and boulders are a problem during excavation.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.

- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The Thunder soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

### **Lawns and landscaping**

*Suitability:* Thunder—poorly suited; Saunook—suited

*Management concerns:* Large stones, erodibility, soil compaction, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is limited for lawns and landscaping because of the very bouldery surface and the high content of rock fragments in the Thunder soil.
- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* Thunder—6s; Saunook—2e

*Woodland ordination symbol:* Based on yellow-poplar as the indicator species, 8X in areas of the Thunder soil and 8A in areas of the Saunook soil

## **TsC—Thunder-Saunook complex, 8 to 15 percent slopes, very bouldery**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains throughout the county

*Elevation range:* 2,400 to 4,500 feet

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Footslopes and toeslopes

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 5 to 192 acres

### **Composition**

Thunder soil and similar inclusions: 50 percent

Saunook soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Thunder**

*Surface layer:*

0 to 8 inches—dark brown cobbly loam

*Subsoil:*

8 to 21 inches—strong brown very cobbly loam

21 to 52 inches—strong brown very cobbly sandy clay loam

*Underlying material:*

52 to 80 inches—strong brown extremely cobbly loamy sand

#### **Saunook**

*Surface layer:*

0 to 10 inches—very dark brown silt loam

*Subsoil:*

10 to 15 inches—dark yellowish brown loam

15 to 38 inches—dark yellowish brown silt loam

38 to 50 inches—dark yellowish brown gravelly loam

50 to 99 inches—dark yellowish brown very cobbly sandy loam

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Thunder—loamy with many rock fragments; Saunook—loamy

*Permeability:* Moderate in the surface layer and

subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Strongly sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Rock fragments on the surface:* About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart

*Organic matter content (surface layer):* Moderate to very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Thunder—very strongly acid to slightly acid throughout the profile; Saunook—very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B and C horizons

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments in areas of the Thunder soil

### **Minor Components**

*Dissimilar inclusions:*

- Soils that have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and along stream channels
- Areas of the Thunder soil where the surface fragments have been removed
- Random areas of rubble land
- Random areas of Dillsboro soils that have more clay in the subsoil than the Thunder and Saunook soils
- Areas of soils that are rarely flooded for very brief periods, along stream channels

*Similar inclusions:*

- Thunder soils that have a surface layer of fine sandy loam, sandy loam, sandy clay loam, or clay loam
- Saunook soils that have a surface layer of fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam
- Thunder and Saunook soils that have surface layers with less organic matter, in cropped fields

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, building site development, and cropland

### ***Agricultural Development***

#### **Cropland**

*Suitability:* Thunder—unsuited; Saunook—suited

*Management concerns:* Equipment use, erodibility, tillage, soil fertility, pesticide retention, and climate

*Management measures and considerations:*

- This map unit is severely limited for crop production because of the very bouldery surface and the high content of rock fragments of the Thunder soil.
- The slope may limit equipment use in the steeper areas.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

#### **Pasture and hayland**

*Suitability for pasture:* Suited

*Suitability for hayland:* Unsuited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope and surface stones and boulders limit the use of equipment and may be hazardous.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of

pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.

- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

#### **Orchards and ornamental crops**

*Suitability:* Thunder—unsuited; Saunook—suited

*Management concerns:* Equipment use, erodibility, ball and burlap harvesting, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is severely limited for orchards and ornamental crops because of the very bouldery surface and the high content of rock fragments of the Thunder soil.
- The slope may limit equipment use in the steeper areas.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

#### ***Woodland Management and Productivity***

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Thunder—poorly suited; Saunook—suited

*Management concerns:* Thunder—large stones, slope, erodibility, seeps and springs, and cutbanks cave; Saunook—large stones, slope, erodibility, seeps and springs, and corrosivity

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Large stones and boulders are a problem during excavation.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Installing permanent retaining walls helps to improve soil stability.

- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

#### **Septic tank absorption fields**

*Suitability:* Thunder—unsuited; Saunook—suited

*Management concerns:* Thunder—large stones, slope, seeps and springs, and poor filtering capacity; Saunook—large stones, slope, seeps and springs, and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Large stones and boulders are a problem during excavation.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Thunder—large stones, slope, erodibility, seeps and springs, frost action, and differential settling; Saunook—large stones, slope, erodibility, seeps and springs, frost action, and low strength

*Management measures and considerations:*

- Large stones and boulders are a problem during excavation.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The Thunder soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

### Lawns and landscaping

*Suitability:* Thunder—poorly suited; Saunook—suited

*Management concerns:* Large stones, slope, erodibility, soil compaction, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is limited for lawns and landscaping because of the very bouldery surface and the high content of rock fragments in the Thunder soil.
- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### Interpretive Groups

*Land capability classification:* Thunder—6s; Saunook—4e

*Woodland ordination symbol:* Based on yellow-poplar as the indicator species, 8X in areas of the Thunder soil and 8A in areas of the Saunook soil

### TsD—Thunder-Saunook complex, 15 to 30 percent slopes, very bouldery

#### Setting

*Landscape:* Intermountain hills and low and intermediate mountains throughout the county

*Elevation range:* 2,400 to 4,400 feet

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 5 to 516 acres

### Composition

Thunder soil and similar inclusions: 50 percent

Saunook soil and similar inclusions: 30 percent

Dissimilar inclusions: 20 percent

### Typical Profile

#### Thunder

*Surface layer:*

0 to 8 inches—dark brown cobbly loam

*Subsoil:*

8 to 21 inches—strong brown very cobbly loam

21 to 52 inches—strong brown very cobbly sandy clay loam

*Underlying material:*

52 to 80 inches—strong brown extremely cobbly loamy sand

#### Saunook

*Surface layer:*

0 to 10 inches—very dark brown silt loam

*Subsoil:*

10 to 15 inches—dark yellowish brown loam

15 to 38 inches—dark yellowish brown silt loam

38 to 50 inches—dark yellowish brown gravelly loam

50 to 99 inches—dark yellowish brown very cobbly sandy loam

### Soil Properties and Qualities

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Thunder—loamy with many rock fragments; Saunook—loamy

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent

stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart

*Organic matter content (surface layer):* Moderate to very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Thunder—very strongly acid to slightly acid throughout the profile; Saunook—very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B and C horizons

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments in areas of the Thunder soil

### **Minor Components**

*Dissimilar inclusions:*

- Soils that have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and along stream channels
- Areas of the Thunder soil where the surface fragments have been removed
- Random areas of rubble land
- Random areas of Dillsboro soils that have more clay in the subsoil than the Thunder and Saunook soils
- Areas of soils that are rarely flooded for very brief periods, along stream channels
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations

*Similar inclusions:*

- Thunder soils that have a surface layer of fine sandy loam, sandy loam, sandy clay loam, or clay loam
- Saunook soils that have a surface layer of fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam
- Thunder and Saunook soils that have surface layers with less organic matter, in cropped fields

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, building site development, and cropland

### **Agricultural Development**

#### **Cropland**

*Suitability:* Thunder—unsuited; Saunook—poorly suited

*Management concerns:* Equipment use, erodibility, tillage, soil fertility, pesticide retention, and climate

*Management measures and considerations:*

- This map unit is severely limited for crop production because of the slope, erodibility, the very bouldery surface, and the high content of rock fragments of the Thunder soil.
- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- Avoiding tillage during wet periods, incorporating crop residue into the soil, or leaving crop residue on the soil surface helps to minimize clodding and crusting and increase the infiltration of rainfall.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsuited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope and surface stones and boulders limit the use of equipment and may be hazardous.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.

- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Thunder—unsuited; Saunook—suited

*Management concerns:* Equipment use, ball and burlap harvesting, erodibility, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, the very bouldery surface, and the high content of rock fragments of the Thunder soil.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water

directly onto fill slopes help to stabilize logging roads, skid trails, and landings.

- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.
- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Thunder—poorly suited; Saunook—suited

*Management concerns:* Thunder—slope, large stones, erodibility, seeps and springs, and cutbanks cave; Saunook—slope, large stones, erodibility, seeps and springs, and corrosivity

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Large stones and boulders are a problem during excavation.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Installing permanent retaining walls helps to improve soil stability.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

#### **Septic tank absorption fields**

*Suitability:* Thunder—unsuited; Saunook—poorly suited

*Management concerns:* Thunder—large stones, slope, seeps and springs, and poor filtering capacity;

Saunook—large stones, slope, seeps and springs, and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Large stones and boulders are a problem during excavation.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Thunder—slope, erodibility, large stones, seeps and springs, frost action, and differential settling; Saunook—slope, erodibility, large stones, seeps and springs, frost action, and low strength

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Large stones and boulders are a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The Thunder soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, soil compaction, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is limited for lawns and landscaping because of slope, the very bouldery surface, and the high content of rock fragments in the Thunder soil.
- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

#### **Interpretive Groups**

*Land capability classification:* Thunder—6s;  
Saunook—6e

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

### **TsE—Thunder-Saunook complex, 30 to 50 percent slopes, very bouldery**

#### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains throughout the county

*Elevation range:* 2,400 to 4,600 feet

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Shape of areas:* Oblong or irregular

*Size of areas:* 5 to 124 acres

### **Composition**

Thunder soil and similar inclusions: 50 percent  
 Saunook soil and similar inclusions: 30 percent  
 Dissimilar inclusions: 20 percent

### **Typical Profile**

#### **Thunder**

*Surface layer:*

0 to 8 inches—dark brown cobbly loam

*Subsoil:*

8 to 21 inches—strong brown very cobbly loam  
 21 to 52 inches—strong brown very cobbly sandy clay loam

*Underlying material:*

52 to 80 inches—strong brown extremely cobbly loamy sand

#### **Saunook**

*Surface layer:*

0 to 10 inches—very dark brown silt loam

*Subsoil:*

10 to 15 inches—dark yellowish brown loam  
 15 to 38 inches—dark yellowish brown silt loam  
 38 to 50 inches—dark yellowish brown gravelly loam  
 50 to 99 inches—dark yellowish brown very cobbly sandy loam

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Thunder—loamy with many rock fragments; Saunook—loamy

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart

*Organic matter content (surface layer):* Moderate to very high

*Potential frost action:* Moderate

*Special climatic conditions:* Slow air drainage which allows late spring and early fall frosts

*Soil reaction:* Thunder—very strongly acid to slightly

acid throughout the profile; Saunook—very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B and C horizons

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Random areas of seeps and springs; subsoil that has a high content of rock fragments in areas of the Thunder soil

### **Minor Components**

*Dissimilar inclusions:*

- Areas of rubble land below rock outcrops and in drainageways
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and along stream channels
- Random areas of Dillsboro soils that have more clay in the subsoil than the Thunder and Saunook soils
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations
- Areas of the Thunder soil where the surface fragments have been removed

*Similar inclusions:*

- Thunder soils that have a surface layer of fine sandy loam, sandy loam, sandy clay loam, or clay loam
- Saunook soils that have a surface layer of fine sandy loam, sandy loam, loam, sandy clay loam, or clay loam
- Random areas of soils that are similar to the Thunder and Saunook soils but have a surface layer with less organic matter

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, and the very bouldery surface. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, pesticide retention, and soil fertility

*Management measures and considerations:*

- The slope and surface stones and boulders limit the use of equipment and may be hazardous.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, the very bouldery surface, and the high content of rock fragments of the Thunder soil. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderately high for cove hardwoods and northern hardwoods

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails and unsurfaced roads are highly erodible and very slick due to the

slope, the high content of organic matter in the surface layer, and the clay content of the subsoil.

- Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots due to soil compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

## **Urban Development**

### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Thunder—slope, large stones, erodibility, seeps and springs, and cutbanks cave;

Saunook—slope, large stones, erodibility, seeps and springs, and corrosivity

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Large stones and boulders are a problem during excavation.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage caused by overland flow of storm water.
- Installing permanent retaining walls helps to improve soil stability.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

### **Septic tank absorption fields**

*Suitability:* Thunder—unsited; Saunook—poorly suited

*Management concerns:* Thunder—large stones, slope, seeps and springs, and poor filtering capacity;

Saunook—large stones, slope, seeps and springs, and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.

- Large stones and boulders are a problem during excavation.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Excavations may cut into seeps and springs. These areas should not be used.
- Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Thunder—slope, erodibility, large stones, seeps and springs, frost action, and differential settling; Saunook—slope, erodibility, large stones, seeps and springs, frost action, and low strength

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Large stones and boulders are a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- The Thunder soil is subject to uneven settling and may be unstable if not properly compacted.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, large stones, soil compaction, climate, pesticide retention, and soil fertility

*Management measures and considerations:*

- This map unit is limited for lawns and landscaping because of slope, the very bouldery surface, and the high content of rock fragments in the Thunder soil.
- Designing plantings on natural contours helps to increase water infiltration.

- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### Interpretive Groups

*Land capability classification:* Thunder—7s;  
Saunook—7e

*Woodland ordination symbol:* 8R, based on yellow-poplar as the indicator species

## Ud—Udorthents, loamy

### Setting

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central and southern parts of the county

*Elevation range:* 2,400 to 4,600 feet

*Landform:* Ridges, hillslopes, mountain slopes, coves, stream terraces, and flood plains

*Landform position:* Summits, side slopes, footslopes, toeslopes, and bottomland

*Shape of areas:* Irregular

*Size of areas:* 3 to 351 acres

### Composition

Udorthents and similar inclusions: 85 percent

Dissimilar inclusions: 15 percent

### Typical Profile

Udorthents, loamy, consists of cut and fill areas where soil and the underlying material have been

removed and placed on an adjacent site. Areas include highway right-of-way corridors and building sites. Other areas included in the map unit are landfills, borrow pits, recreational areas such as ball fields, and small mica and feldspar mines. A typical pedon is not given due to the variable nature of the soil.

### **Soil Properties and Qualities**

*Note: Properties are variable and dependent on the type of fill material used or the type of rock exposed at the surface.*

*Depth class:* Deep or very deep

*Drainage class:* Somewhat excessively drained to moderately well drained

*General texture class:* Loamy

*Permeability:* Very rapid to slow

*Available water capacity:* Low or moderate

*Depth to seasonal high water table:* Variable, occasionally 3 to 6 feet; more commonly more than 6 feet from January through December

*Hazard of flooding:* Variable, commonly none or rare throughout the year with standing water for less than 2 days

*Shrink-swell potential:* Low

*Slope class:* Nearly level to moderately steep; sides of excavated areas can be very steep to nearly vertical

*Hazard of water erosion:* Moderate to very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones about 3 to 24 inches in diameter and more than 100 feet apart

*Organic matter content (surface layer):* Low

*Potential frost action:* Low or moderate

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Loamy fill material

*Depth to bedrock:* Excavated areas—bedrock commonly exposed at or near the soil surface; fill areas—40 to more than 60 inches

*Other distinctive properties:* Soils subject to downslope movement when lateral support is removed and to differential settling

### **Minor Components**

*Dissimilar inclusions:*

- Urban land
- Areas that contain asphalt, wood, glass, and other waste material
- Areas of undisturbed soils around the edge of the map unit
- Areas of soils that have bedrock at a depth of less than 60 inches

- Mine holes and pits that are filled with water
- Areas that have boulders on the soil surface
- Abandoned mines with buried shafts
- Areas adjacent to streams that are subject to frequent or occasional flooding
- Areas that are somewhat poorly drained or poorly drained

*Similar inclusions:*

- Soils that are similar to Udorthents but that have sandy or clayey underlying material

### **Land Use**

**Dominant Uses:** Highway right-of-way corridors and abandoned or active mines

**Other Uses:** Building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the highly variable soil properties. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Poorly suited

*Management concerns:* Highly disturbed soils

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the highly variable soil properties. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Undetermined

*Suitability:* Poorly suited

*Management concerns:* Highly disturbed soils

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

## Urban Development

### Dwellings

*Suitability:* Poorly suited

*Management concerns:* Erodibility and highly disturbed soils

*Management measures and considerations:*

- This map unit is severely limited for dwellings and small commercial buildings because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.

### Septic tank absorption fields

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the highly variable soil properties. The local Health Department should be contacted for additional guidance.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Erodibility and highly disturbed soils

*Management measures and considerations:*

- This map unit is severely limited for roads and streets because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Erodibility and highly disturbed soils

*Management measures and considerations:*

- This map unit is severely limited for lawns and landscaping because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

## Interpretive Groups

*Land capability classification:* 7s

*Woodland ordination symbol:* None assigned

## Un—Udorthents, loamy, stony

### Setting

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central and southern parts of the county

*Elevation range:* 2,400 to 4,000 feet

*Landform:* Ridges, hillslopes, mountain slopes, coves, stream terraces, and flood plains

*Landform position:* Summits, side slopes, footslopes, and toeslopes

*Size of areas:* 3 to 417 acres

### Composition

Udorthents and similar inclusions: 85 percent

Dissimilar inclusions: 15 percent

### Typical Profile

Udorthents, loamy, stony, consists of mine holes and the associated spoil dominantly in the Spruce Pine mining district. Some areas have been abandoned since the 1920's and are overgrown with vegetation. Also included in this map unit are gravel pits where material has been removed for use as building material. A typical pedon is not given due to the variable nature of the soil.

### Soil Properties and Qualities

*Note:* Properties are variable and dependent on the type of fill material used or the type of rock exposed at the surface.

*Depth class:* Deep or very deep

*Drainage class:* Somewhat excessively drained to moderately well drained

*General texture class:* Loamy

*Permeability:* Very rapid to slow

*Available water capacity:* Low or moderate

*Depth to seasonal high water table:* Variable, commonly more than 6 feet from January through December

*Hazard of flooding:* Variable, commonly none or rare throughout the year with standing water for less than 2 days

*Shrink-swell potential:* Low

*Slope class:* Nearly level to steep; sides can be very steep to vertical

*Hazard of water erosion:* Moderate to very severe  
*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low

*Potential frost action:* Low or moderate

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Loamy fill material

*Depth to bedrock:* Excavated areas—bedrock commonly exposed at or near the soil surface; fill areas—40 to more than 60 inches

*Other distinctive properties:* Soils subject to downslope movement when lateral support is removed and to differential settling

### **Minor Components**

*Dissimilar inclusions:*

- Areas that contain asphalt, wood, glass, and other waste material
- Areas of undisturbed soils around the edge of the map unit
- Areas of soils that have bedrock at a depth of less than 60 inches
- Mine holes and pits that are filled with water
- Areas that have boulders on the soil surface
- Abandoned mines with buried shafts
- Areas adjacent to streams that are subject to frequent or occasional flooding
- Areas that are somewhat poorly drained or poorly drained

*Similar inclusions:*

- Soils that are similar to Udorthents but that have sandy or clayey underlying material

### **Land Use**

**Dominant Uses:** Active or abandoned mining operations

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the highly variable soil properties. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the highly variable soil properties. A site on better suited soils should be selected.

#### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the highly variable soil properties. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Undetermined

*Suitability:* Poorly suited

*Management concerns:* Highly disturbed soils

*Management measures and considerations:*

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Erodibility and highly disturbed soils

*Management measures and considerations:*

- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- This map unit is severely limited for dwellings or small commercial buildings because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.

#### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the highly variable soil properties. The local Health Department should be contacted for additional guidance.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Erodibility and highly disturbed soils

*Management measures and considerations:*

- This map unit is severely limited for roads and streets because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.

**Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Erodibility and highly disturbed soils

*Management measures and considerations:*

- This map unit is severely limited for lawns and landscaping because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

**Interpretive Groups**

*Land capability classification:* 7s

*Woodland ordination symbol:* None assigned

**Ur—Urban land****Setting**

*Landscape:* Intermountain hills and low mountains dominantly in the towns of Bakersville and Spruce Pine

*Elevation range:* 2,300 to 2,700 feet

*Landform:* Ridges, hillslopes, coves, stream terraces, and flood plains

*Landform position:* Summits, side slopes, footslopes, toeslopes, and bottomland

*Shape of areas:* Irregular

*Size of areas:* 5 to 95 acres

**Composition**

Urban land: 85 percent

Dissimilar inclusions: 15 percent

**Typical Profile**

Urban land consists of areas where 85 percent of the surface is covered with buildings, streets, parking lots, and other impervious material. The natural soils are paved over, covered, or greatly altered by cutting, filling, or grading during the process of urban development. The original landscape and topography and, commonly, the drainage pattern have been changed. Runoff is very rapid and increases the flooding hazard in low-lying areas.

A typical pedon is not given due to the variable nature of the soil. An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.

**Minor Components**

*Dissimilar inclusions:*

- Random areas of Udorthents, loamy
- Random areas of undisturbed or partially disturbed soils that are used for gardens, lawns, woodlands, drainageways, cemeteries, or building sites
- Areas adjacent to stream channels that are subject to frequent, occasional, or rare flooding
- Random areas of short, steep slopes

**Interpretive Groups**

*Land capability classification:* 8s

*Woodland ordination symbol:* None assigned

**W—Water**

This map unit consists of bodies of water, such as lakes and ponds. It also includes areas of wide perennial streams or rivers. No interpretations are given for this map unit.

**WgC—Watauga sandy loam, 8 to 15 percent slopes, stony****Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central and southern parts of the county

*Elevation range:* 2,500 to 3,200 feet

*Landform:* Ridges

*Landform position:* Summits

*Shape of areas:* Long and narrow

*Size of areas:* 3 to 109 acres

**Composition**

Watauga soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

**Typical Profile**

*Surface layer:*

0 to 5 inches—brown sandy loam

*Subsurface layer:*

5 to 20 inches—yellowish brown coarse sandy loam

*Subsoil:*

20 to 58 inches—brown sandy clay loam

58 to 70 inches—reddish yellow coarse sandy loam

*Underlying material:*

70 to 87 inches—brownish yellow coarse sandy loam saprolite

87 to 99 inches—white loamy coarse sand saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Strongly sloping

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Micaville and Chandler soils that have less clay in the subsoil than the Watauga soil and have soft bedrock at a depth of 40 to more than 60 inches
- Random areas of Edneytown and Evard soils that have less mica in the subsoil than the Watauga soil
- Cowee and Pigeonroost soils that have less mica in the subsoil than the Watauga soil and have soft bedrock at a depth of 20 to 40 inches, on nose slopes and shoulder slopes
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Saunook soils that have a thicker surface layer with more organic matter than that of the Watauga soil, in saddles and gaps
- Random areas of severely eroded soils where the underlying material is exposed at the surface
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Watauga soils that have a surface layer of sandy loam, fine sandy loam, loam, or silt loam
- Random areas of Fannin soils that have a red subsoil

### **Land Use**

**Dominant Uses:** Pasture and hayland

**Other Uses:** Woodland, wildlife habitat, ornamental crops, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Suited

*Management concerns:* Erodibility, equipment use, and soil fertility

*Management measures and considerations:*

- Using conservation practices, such as contour farming, winter cover crops, and crop rotations which include grasses and legumes, helps to minimize soil erosion, maximize the infiltration of rainfall, increase the available water capacity, and improve soil fertility.
- The slope may limit equipment use in the steeper areas.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes crop productivity.

#### **Pasture and hayland**

*Suitability:* Well suited

*Management concerns:* Equipment use, erodibility, and soil fertility

*Management measures and considerations:*

- The slope may limit equipment use in the steeper areas when harvesting hay crops.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increase germination.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### Orchards and ornamental crops

*Suitability:* Suited

*Management concerns:* Erodibility, equipment use, soil fertility, and ball and burlap harvesting

*Management measures and considerations:*

- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- The slope may limit equipment use in the steeper areas.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### Woodland Management and Productivity

*Potential for commercial species:* Moderate for upland hardwoods and high for eastern white pine

*Suitability:* Well suited

*Management concerns:* Erodibility and equipment use

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of mica, and the clay content of the subsoil.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Livestock should not be allowed to graze in areas managed for woodland.

### Urban Development

#### Dwellings

*Suitability:* Suited

*Management concerns:* Slope, erodibility, low strength, slippage, and differential settling

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures that conform with the natural slope helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

#### Septic tank absorption fields

*Suitability:* Suited

*Management concerns:* Restricted permeability and slope

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.

#### Local roads and streets

*Suitability:* Suited

*Management concerns:* Low strength, slope, slippage, erodibility, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.

- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### **Lawns and landscaping**

*Suitability:* Suited

*Management concerns:* Slope, erodibility, soil fertility, droughtiness, and soil compaction

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, irrigation, and selecting plant varieties that are adapted to droughty conditions help to establish lawns and landscape plants.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 4e

*Woodland ordination symbol:* 11A, based on eastern white pine as the indicator species

### **WgD—Watauga sandy loam, 15 to 30 percent slopes, stony**

#### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central and southern parts of the county

*Elevation range:* 2,500 to 4,000 feet

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow on summits and oblong or irregular on side slopes

*Size of areas:* 10 to 133 acres

### **Composition**

Watauga soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

### **Typical Profile**

*Surface layer:*

0 to 5 inches—brown sandy loam

*Subsurface layer:*

5 to 20 inches—yellowish brown coarse sandy loam

*Subsoil:*

20 to 58 inches—brown sandy clay loam

58 to 70 inches—reddish yellow coarse sandy loam

*Underlying material:*

70 to 87 inches—brownish yellow coarse sandy loam saprolite

87 to 99 inches—white loamy coarse sand saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Moderately steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Micaville and Chandler soils that have less clay in the subsoil than the Watauga soil

and have soft bedrock at a depth of 40 to more than 60 inches

- Random areas of Edneytown and Evard soils that have less mica in the subsoil than the Watauga soil
- Cowee and Pigeonroost soils that have less mica in the subsoil than the Watauga soil and have soft bedrock at a depth of 20 to 40 inches, on nose slopes and shoulder slopes
- Saunook soils that have a thicker surface layer with more organic matter than that of the Watauga soil and have a thicker subsoil, in concave areas at the head of drains, on footslopes, in drainageways, and in saddles and gaps
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Saunook soils that have a thicker surface layer with more organic matter than that of the Watauga soil, in saddles and gaps, in concave areas at the head of drains, and on footslopes
- Random areas of severely eroded soils where the underlying material is exposed at the surface
- Areas on prominent ridges that are windswept

*Similar inclusions:*

- Watauga soils that have a surface layer of coarse sandy loam, fine sandy loam, loam, or silt loam
- Random areas of Fannin soils that have a red subsoil

### **Land Use**

**Dominant Uses:** Pasture, hayland, woodland, and wildlife habitat

**Other Uses:** Ornamental crops and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Poorly suited

*Management concerns:*

- This map unit is not managed for cropland.

#### **Pasture and hayland**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, and soil fertility

*Management measures and considerations:*

- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to

recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.

- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Suited

*Management concerns:* Equipment use, erodibility, soil fertility, ball and burlap harvesting, and plant shape

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing roads on the contour, installing water-

control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.

- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of mica, and the clay content of the subsoil.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Livestock should not be allowed to graze in areas managed for woodland.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, low strength, slippage, and differential settling

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Low strength, slope, slippage, erodibility, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, droughtiness, and soil compaction

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Interpretive Groups**

*Land capability classification:* 6e

*Woodland ordination symbol:* 11R, based on eastern white pine as the indicator species

## **WgE—Watauga sandy loam, 30 to 50 percent slopes, stony**

### **Setting**

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central and southern parts of the county

*Elevation range:* 2,500 to 4,000 feet

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Shape of areas:* Long and narrow on summits and irregular on side slopes

*Size of areas:* 10 to 133 acres

### **Composition**

Watauga soil and similar inclusions: 75 percent

Dissimilar inclusions: 25 percent

### **Typical Profile**

*Surface layer:*

0 to 5 inches—brown sandy loam

*Subsurface layer:*

5 to 20 inches—yellowish brown coarse sandy loam

*Subsoil:*

20 to 58 inches—brown sandy clay loam

58 to 70 inches—reddish yellow coarse sandy loam

*Underlying material:*

70 to 87 inches—brownish yellow coarse sandy loam saprolite

87 to 99 inches—white loamy coarse sand saprolite

### **Soil Properties and Qualities**

*Depth class:* Very deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Available water capacity:* Moderate

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

*Organic matter content (surface layer):* Low to high

*Potential frost action:* Moderate

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic rock with a high mica content

*Depth to bedrock:* More than 60 inches

*Other distinctive properties:* Subsoil that has a high mica content; soil subject to downslope movement when lateral support is removed and to differential settling when used as fill material

### **Minor Components**

*Dissimilar inclusions:*

- Random areas of Micaville and Chandler soils that have less clay in the subsoil than the Watauga soil and have soft bedrock at a depth of 40 to more than 60 inches
- Random areas of Edneytown and Evard soils that have less mica in the subsoil than the Watauga soil
- Cowee and Pigeonroost soils that have less mica in the subsoil than the Watauga soil and have soft bedrock at a depth of 20 to 40 inches, on nose slopes and shoulder slopes
- Saunook soils that have a thicker surface layer with more organic matter than that of the Watauga soil, in concave areas at the head of drains and on footslopes
- Udorthents, loamy, and Udorthents, loamy, stony, associated with abandoned mica and feldspar mines in the Spruce Pine area
- Widely scattered areas of rock outcrop

*Similar inclusions:*

- Watauga soils that have a surface layer of coarse sandy loam, fine sandy loam, loam, or silt loam
- Random areas of Fannin soils that have a red subsoil

### **Land Use**

**Dominant Uses:** Woodland and wildlife habitat

**Other Uses:** Pasture, ornamental crops, and building site development

### **Agricultural Development**

#### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope and erodibility. A site on better suited soils should be selected.

#### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, and soil fertility

*Management measures and considerations:*

- This map unit is difficult to manage for pasture and hayland because of the slope.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.

### **Orchards and ornamental crops**

*Suitability:* Poorly suited

*Management concerns:* Equipment use, erodibility, soil fertility, ball and burlap harvesting, and plant shape

*Management measures and considerations:*

- This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.

### **Woodland Management and Productivity**

*Potential for commercial species:* Moderate for upland hardwoods and high for eastern white pine

*Suitability:* Suited

*Management concerns:* Equipment use and erodibility

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope, the high content of mica, and the clay content of the subsoil.
- Avoiding logging operations during wet periods helps to prevent rutting of the soil surface and possible root damage from compaction.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.

## **Urban Development**

### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, low strength, slippage, and differential settling

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.

### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Slope and restricted permeability

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.

- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.

### Local roads and streets

*Suitability:* Poorly suited

*Management concerns:* Low strength, slope, slippage, erodibility, differential settling, and frost action

*Management measures and considerations:*

- This soil is highly erodible, droughty, difficult to compact, and unstable, especially when used as fill, due to the high mica content of the subsoil and underlying material.
- Incorporating sand and gravel into the soil, compacting roadbeds, and designing roads so that they conform to the natural slope help to improve soil strength.
- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, soil fertility, droughtiness, and soil compaction

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- The use of native landscape plants that are tolerant of droughty, acidic soils is recommended.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit may be limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are

susceptible to phytophthora root disease. These areas should not be used.

### Interpretive Groups

*Land capability classification:* 7e

*Woodland ordination symbol:* 11R, based on eastern white pine as the indicator species

### WhD—Wayah-Burton complex, windswept, 15 to 30 percent slopes, stony

#### Setting

*Landscape:* High mountains from Little Rock Knob to Roan Mountain and south to Spears Top

*Elevation range:* 4,400 to 6,000 feet

*Landform:* Ridges

*Landform position:* Summits and the upper side slopes

*Shape of areas:* Long and narrow or irregular

*Size of areas:* 3 to 215 acres

#### Composition

Wayah soil and similar inclusions: 60 percent

Burton soil and similar inclusions: 20 percent

Dissimilar inclusions: 20 percent

#### Typical Profile

##### Wayah

*Surface layer:*

0 to 4 inches—very dark brown clay loam

4 to 18 inches—black loam

*Subsoil:*

18 to 26 inches—brown loam

26 to 41 inches—strong brown gravelly fine sandy loam

41 to 63 inches—strong brown fine sandy loam

*Underlying material:*

63 to 77 inches—multicolored fine sandy loam saprolite

*Bedrock:*

77 to 86 inches—weathered, moderately fractured biotite hornblende gneiss

##### Burton

*Surface layer:*

0 to 10 inches—very dark gray gravelly sandy loam

10 to 18 inches—black gravelly loam

*Subsoil:*

18 to 26 inches—yellowish brown gravelly loam

26 to 30 inches—yellowish brown cobbly loam

**Bedrock:**

30 to 41 inches—unweathered, moderately fractured  
biotite hornblende gneiss

**Soil Properties and Qualities**

**Depth class:** Wayah—very deep; Burton—moderately deep

**Drainage class:** Well drained

**General texture class:** Loamy

**Permeability:** Moderately rapid

**Available water capacity:** Wayah—moderate; Burton—very low

**Depth to seasonal high water table:** More than 6.0 feet

**Hazard of flooding:** None

**Shrink-swell potential:** Low

**Slope class:** Moderately steep

**Extent of erosion:** Slight, less than 25 percent of the original surface layer has been removed

**Hazard of water erosion:** Very severe

**Rock fragments on the surface:** Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and 25 to 75 feet apart

**Organic matter content (surface layer):** Very high

**Potential frost action:** Moderate

**Special climatic conditions:** Extreme freezing and rime ice in winter, high winds, high rainfall, and short growing season

**Soil reaction:** Extremely acid to moderately acid throughout the profile

**Parent material:** Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

**Depth to bedrock:** Wayah—more than 60 inches; Burton—20 to 40 inches to hard bedrock

**Other distinctive properties:** Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

**Minor Components****Dissimilar inclusions:**

- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas adjacent to rock outcrops
- Balsam soils that have more rock fragments in the subsoil than the Wayah and Burton soils, in concave areas at the head of drains and in saddles and gaps
- Tanasee soils that have a loamy subsoil and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and in saddles and gaps
- Widely scattered areas of rock outcrop
- Protected areas that are nonwindswept

**Similar inclusions:**

- Wayah soils that have a surface layer of sandy loam, fine sandy loam, or loam

- Burton soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam

- Random areas of similar soils that have bedrock at a depth of 40 to 60 inches

**Land Use**

**Dominant Uses:** Woodland, wildlife habitat, and recreation

**Other Uses:** Pasture and building site development

**Agricultural Development****Cropland**

**Suitability:** Unsited

**Management concerns:**

- This map unit is severely limited for crop production because of the slope, erodibility, damaging high winds, and short growing season. A site on better suited soils should be selected.

**Pasture and hayland**

**Suitability:** Poorly suited

**Management concerns:** Equipment use, erodibility, climate, pesticide retention, soil fertility, and rooting depth and droughtiness in areas of the Burton soil

**Management measures and considerations:**

- This map unit is limited for pasture and hayland because of the slope, erodibility, damaging high winds, and short growing season.
- The slope limits equipment use in the steeper areas.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing

areas of the Burton soil for the production of pasture and hay crops is difficult.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the damaging high winds, short growing season, and the depth to bedrock and droughtiness of the Burton soil. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the damaging high winds, short growing season, low productivity, and the depth to bedrock of the Burton soil (fig. 7). A site on better suited soils should be selected.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, climate, and corrosivity and depth to bedrock in areas of the Burton soil

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Design modifications are needed to overcome the limitations of extreme freezing and high winds.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Burton soil.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Wayah—slope and extreme freezing; Burton—slope, extreme freezing, and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.



**Figure 7.—Windswept hardwoods are twisted, stunted, and gnarled by exposure to high winds and frequent ice storms. These conditions are common on high mountains and prominent ridgetops of intermediate mountains.**

- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Design modifications are needed to overcome the limitation of extreme freezing.
- Locating and using areas of the deeper Wayah soil may improve the performance of filter fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Wayah—slope, erodibility, and frost action; Burton—slope, erodibility, frost action, and depth to bedrock

*Management measures and considerations:*

- Designing roads on the contour and installing water-

control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.

- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- Blasting or special grading equipment is needed to construct roads in areas of the Burton soil.

### Lawns and landscaping

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, climate, pesticide retention, soil fertility, and depth to bedrock and droughtiness in areas of the Burton soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of a short growing season, the use of native, winter-hardy landscape plants is recommended.
- This map unit is subject to damaging high winds and may be unsuitable for some types of landscaping.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Burton soil for lawns and landscaping is difficult, especially if the soil has been disturbed.

### Interpretive Groups

*Land capability classification:* 6e

*Woodland ordination symbol:* 2R, based on red spruce as the indicator species

## WyE—Wayah-Burton complex, windswept, 30 to 50 percent slopes, very stony

### Setting

*Landscape:* High mountains from Little Rock Knob to Roan Mountain and south to Spears Top

*Elevation range:* 4,200 to 6,000 feet

*Landform:* Mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 10 to 179 acres

### Composition

Wayah soil and similar inclusions: 60 percent

Burton soil and similar inclusions: 20 percent

Dissimilar inclusions: 20 percent

### Typical Profile

#### Wayah

*Surface layer:*

0 to 4 inches—very dark brown clay loam

4 to 18 inches—black loam

*Subsoil:*

18 to 26 inches—brown loam

26 to 41 inches—strong brown gravelly fine sandy loam

41 to 63 inches—strong brown fine sandy loam

*Underlying material:*

63 to 77 inches—multicolored fine sandy loam saprolite

*Bedrock:*

77 to 86 inches—weathered, moderately fractured biotite hornblende gneiss

#### Burton

*Surface layer:*

0 to 10 inches—very dark gray gravelly sandy loam

10 to 18 inches—black gravelly loam

*Subsoil:*

18 to 26 inches—yellowish brown gravelly loam

26 to 30 inches—yellowish brown cobbly loam

*Bedrock:*

30 to 41 inches—unweathered, moderately fractured biotite hornblende gneiss

### Soil Properties and Qualities

*Depth class:* Wayah—very deep; Burton—moderately deep

*Drainage class:* Well drained

*General texture class:* Loamy  
*Permeability:* Moderately rapid  
*Available water capacity:* Wayah—moderate; Burton—very low  
*Depth to seasonal high water table:* More than 6.0 feet  
*Hazard of flooding:* None  
*Shrink-swell potential:* Low  
*Slope class:* Steep  
*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed  
*Hazard of water erosion:* Very severe  
*Rock fragments on the surface:* About 3 percent cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart  
*Organic matter content (surface layer):* Very high  
*Potential frost action:* Moderate  
*Special climatic conditions:* Extreme freezing and rime ice in winter, high winds, high rainfall, and short growing season  
*Soil reaction:* Extremely acid to moderately acid throughout the profile  
*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock  
*Depth to bedrock:* Wayah—more than 60 inches; Burton—20 to 40 inches to hard bedrock  
*Other distinctive properties:* Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

### **Minor Components**

#### *Dissimilar inclusions:*

- Craggy soils that have hard bedrock at a depth of 10 to 20 inches, in areas adjacent to rock outcrops
- Balsam soils that have more rock fragments in the subsoil than the Wayah and Burton soils, in concave areas at the head of drains and in saddles and gaps
- Tanasee soils that have a loamy subsoil and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and in saddles and gaps
- Widely scattered areas of rock outcrop
- Protected areas that are nonwindswept

#### *Similar inclusions:*

- Wayah soils that have a surface layer of sandy loam, fine sandy loam, or loam
- Burton soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam
- Random areas of similar soils that have bedrock at a depth of 40 to 60 inches

### **Land Use**

**Dominant Uses:** Woodland, wildlife habitat, and recreation

**Other Uses:** Pasture and building site development

## **Agricultural Development**

### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, damaging high winds, and short growing season. A site on better suited soils should be selected.

### **Pasture and hayland**

*Suitability for pasture:* Poorly suited

*Suitability for hayland:* Unsited

*Management concerns:* Equipment use, erodibility, climate, pesticide retention, soil fertility, and rooting depth and droughtiness in areas of the Burton soil

*Management measures and considerations:*

- This map unit is severely limited for pasture and hayland because of the slope, erodibility, very stony surface, damaging high winds, and short growing season.
- Growing adapted plants helps to ensure the production of high-quality forage and minimize soil erosion.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to future crops. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, managing areas of the Burton soil for the production of pasture and hay crops is difficult.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, damaging high winds, short growing season, and the depth to bedrock and droughtiness of the Burton soil. A site on better suited soils should be selected.

### **Woodland Management and Productivity**

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the damaging high winds, short growing season, low productivity, and the depth to bedrock of the Burton soil. A site on better suited soils should be selected.

### **Urban Development**

#### **Dwellings**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, climate, and corrosivity and depth to bedrock in areas of the Burton soil

*Management measures and considerations:*

- Designing structures on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Design modifications are needed to overcome the limitations of extreme freezing and high winds.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Burton soil.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management concerns:* Wayah—slope and extreme freezing; Burton—slope, extreme freezing, and depth to bedrock

*Management measures and considerations:*

- The local Health Department should be contacted for guidance in developing sanitary facilities.
- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Design modifications are needed to overcome the limitation of extreme freezing.
- Locating and using areas of the deeper Wayah soil may improve the performance of filter fields.

#### **Local roads and streets**

*Suitability:* Poorly suited

*Management concerns:* Wayah—slope, erodibility, and frost action; Burton—slope, erodibility, frost action, and depth to bedrock

*Management measures and considerations:*

- Designing roads on the contour and installing water-control structures, such as broad-based dips, water bars, and culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- Blasting or special grading equipment is needed to construct roads in areas of the Burton soil.

#### **Lawns and landscaping**

*Suitability:* Poorly suited

*Management concerns:* Slope, erodibility, climate, pesticide retention, soil fertility, and depth to bedrock and droughtiness in areas of the Burton soil

*Management measures and considerations:*

- Designing plantings on natural contours helps to increase water infiltration.
- Vegetating cleared and graded areas as soon as possible and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site.
- Because of a short growing season, the use of native, winter-hardy landscape plants is recommended.
- This map unit is subject to damaging high winds and may be unsuitable for some types of landscaping.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should not be used.
- Because of the moderately deep rooting depth, managing areas of the Burton soil for lawns and landscaping is difficult, especially if the soil has been disturbed.

### **Interpretive Groups**

*Land capability classification:* 7e

*Woodland ordination symbol:* 2R, based on red spruce as the indicator species

**WyF—Wayah-Burton complex,  
windswept, 50 to 95 percent slopes,  
very stony**

**Setting**

*Landscape:* High mountains from Little Rock Knob to Roan Mountain and south to Spears Top

*Elevation range:* 4,200 to 6,000 feet

*Landform:* Mountain slopes

*Landform position:* Side slopes

*Shape of areas:* Irregular

*Size of areas:* 10 to 535 acres

**Composition**

Wayah soil and similar inclusions: 60 percent

Burton soil and similar inclusions: 20 percent

Dissimilar inclusions: 20 percent

**Typical Profile**

**Wayah**

*Surface layer:*

0 to 4 inches—very dark brown clay loam

4 to 18 inches—black loam

*Subsoil:*

18 to 26 inches—brown loam

26 to 41 inches—strong brown gravelly fine sandy loam

41 to 63 inches—strong brown fine sandy loam

*Underlying material:*

63 to 77 inches—multicolored fine sandy loam saprolite

*Bedrock:*

77 to 86 inches—weathered, moderately fractured biotite hornblende gneiss

**Burton**

*Surface layer:*

0 to 10 inches—very dark gray gravelly sandy loam

10 to 18 inches—black gravelly loam

*Subsoil:*

18 to 26 inches—yellowish brown gravelly loam

26 to 30 inches—yellowish brown cobbly loam

*Bedrock:*

30 to 41 inches—unweathered, moderately fractured biotite hornblende gneiss

**Soil Properties and Qualities**

*Depth class:* Wayah—very deep; Burton—moderately deep

*Drainage class:* Well drained

*General texture class:* Loamy

*Permeability:* Moderately rapid

*Available water capacity:* Wayah—moderate; Burton—very low

*Depth to seasonal high water table:* More than 6.0 feet

*Hazard of flooding:* None

*Shrink-swell potential:* Low

*Slope class:* Very steep

*Extent of erosion:* Slight, less than 25 percent of the original surface layer has been removed

*Hazard of water erosion:* Very severe

*Rock fragments on the surface:* About 3 percent cobbles and stones that average about 3 to 24 inches in diameter and 3 to 25 feet apart

*Organic matter content (surface layer):* Very high

*Potential frost action:* Moderate

*Special climatic conditions:* Extreme freezing and rime ice in winter, high winds, high rainfall, and short growing season

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Depth to bedrock:* Wayah—more than 60 inches; Burton—20 to 40 inches to hard bedrock

*Other distinctive properties:* Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

**Minor Components**

*Dissimilar inclusions:*

- Craggy soils that have hard bedrock at a depth of 10 to 20 inches, in areas adjacent to rock outcrops
- Tanasee soils that have a loamy subsoil and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and in drainageways
- Balsam soils that have more rock fragments in the subsoil than the Wayah and Burton soils, in concave areas at the head of drains and in drainageways
- Widely scattered areas of rock outcrop
- Protected areas that are nonwindswept

*Similar inclusions:*

- Wayah soils that have a surface layer of sandy loam, fine sandy loam, or loam
- Burton soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam
- Random areas of similar soils that have bedrock at a depth of 40 to 60 inches

**Land Use**

**Dominant Uses:** Woodland and wildlife habitat

## ***Agricultural Development***

### **Cropland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for crop production because of the slope, erodibility, damaging high winds, and short growing season. A site on better suited soils should be selected.

### **Pasture and hayland**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for the production of pasture and hay crops because of the slope, erodibility, very stony surface, damaging high winds, and short growing season. A site on better suited soils should be selected.

### **Orchards and ornamental crops**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, damaging high winds, short growing season, and the depth to bedrock and droughtiness of the Burton soil. A site on better suited soils should be selected.

### ***Woodland Management and Productivity***

*Potential for commercial species:* Not used

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for timber production because of the damaging high winds, short growing season, low productivity, and the depth to bedrock of the Burton soil. A site on better suited soils should be selected.

## ***Urban Development***

### **Dwellings**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for dwellings because of the slope, damaging high winds, extreme freezing, and the depth to bedrock of the Burton soil. A site on better suited soils should be selected.

### **Septic tank absorption fields**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for septic tank absorption fields because of the slope, extreme freezing, and the depth to bedrock of the Burton soil. A site on better suited soils should be selected.

### **Local roads and streets**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for roads and streets because of the slope, erodibility, and the depth to bedrock of the Burton soil. A site on better suited soils should be selected.

### **Lawns and landscaping**

*Suitability:* Unsited

*Management concerns:*

- This map unit is severely limited for lawns and landscaping because of the slope, erodibility, damaging high winds, short growing season, and the depth to bedrock and droughtiness of the Burton soil. A site on better suited soils should be selected.

### ***Interpretive Groups***

*Land capability classification:* 7e

*Woodland ordination symbol:* 2R, based on red spruce as the indicator species

# Use and Management of the Soils

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

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

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

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

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

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

## Interpretive Ratings

The interpretive tables in this survey rate the soils in the survey area for various uses. Many of the tables identify the limitations that affect specified uses and

indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

### Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited*, *slightly limited*, *somewhat limited*, and *very limited*. The suitability ratings are expressed as *well suited*, *moderately well suited*, *poorly suited*, and *unsuited* or as *good*, *fair*, and *poor*.

### Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

## Crops and Pasture

Cliff Vinson, District Conservationist, Natural Resources Conservation Service; Gary Hyatt, County Extension Chairman, North Carolina Cooperative Extension Service; and Bobby Brock, Agronomist, and Kelley Jo Driggins, Grassland Management Specialist, Natural Resources Conservation Service, helped prepare this section.

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

Planners of management systems for individual

fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units" and in the tables. Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

*Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.*

## Managing Cropland

In 1999, according to the North Carolina Cooperative Extension Service of Mitchell County, Mitchell County had approximately 800 acres of cropland.

The major crops grown in Mitchell County include burley tobacco, silage corn, vegetables, landscaping ornamentals, berries, and apples. Cultivated lands occur on nearly level bottomland soils and gently sloping and strongly sloping terrace soils along the North Toe River and most of the major tributaries. Soils managed include Rosman, Bandana, Dellwood, Reddies, and Dillsboro. Gently sloping and strongly sloping soils on intermountain hills and low mountains (such as Evard, Clifton, and Fannin soils) and on terraces and in coves (such as Dillsboro and Saunook soils) are farmed in the Red Hill, Tipton Hill, Brummets Creek, Pigeonroost, Harrell Hill, Snow Hill, Kona, Estatoe, Altapass, Clarrissa, White Oak, and Poplar communities. The Buladean community is a major agricultural area where soils on high terraces and in coves (such as Dillsboro and Saunook soils) are intensively managed. Other areas of cultivated land are scattered throughout the county.

The following paragraphs discuss several points related to soil quality. Improving soil quality can help to reduce the onsite and offsite cost of soil erosion, improve nutrient utilization, and ensure that the soil resource is sustained for future use. The soil's physical, chemical, and biological properties must be at optimal levels for high yields to be maintained on a sustainable basis. More specific information can be obtained from the Natural Resources Conservation Service, the Mitchell Soil and Water Conservation District, and the North Carolina Cooperative Extension Service.

*Erosion control.*—Water erosion is a major concern on most of the soils used for cropland in Mitchell County. As the slope increases, the hazard of erosion and the difficulty of controlling erosion also increase.

Erosion on farmland reduces soil productivity while runoff pollutes streams, lakes, and reservoirs with sediment, agricultural chemicals, and nutrients. Controlling erosion improves the quality of water for municipal use and recreation and for fish and wildlife. Mitchell County's trout streams are especially sensitive to damage caused by runoff and sediment.

Erosion-control practices provide a protective surface cover, increase the rate of water infiltration, control overland flow of water, and minimize runoff. For example, stripcropping includes the use of crop rotations, crop residue management, contouring, and cover crops. These methods can be adapted to a wide range of slope patterns. Control of overland flow of water across plowed fields and runoff from adjacent land onto cultivated lands is also needed. Grassed waterways and diversions help to reduce problems involving surface water and maintain water quality in adjacent waterways. Onsite investigations are essential to determine the proper method of control.

*Water management.*—Soils on bottomlands and low terraces are subject to flooding in varying frequencies and duration. Biltmore soils are frequently flooded (the chance of flooding is greater than 50 percent in any year); Bandana, Rosman, Reddies, and Dellwood soils are occasionally flooded (the chance of flooding is 5 to 50 percent in any year); and Dillsboro soils are rarely flooded (the chance of flooding is 0 to 5 percent in any year). Although the duration of flooding is very brief, lasting less than 2 days, the risk of crop loss due to flooding during the growing season is always a possibility on these soils.

Bandana soils are on bottomlands and may require maintenance of existing artificial drainage systems. Subsurface drainage tile is used to control the water table in these soils. Wet areas resulting from seeps and springs occur in map units of Dillsboro, Thunder, Reddies, Rosman, and Saunook soils. These areas are commonly identified on the soil map by a "wet spot" symbol. Subsurface drainage tile and surface ditching are methods used to control water in these areas.

*Federal and State regulations require that any area designated as wetlands cannot be altered without prior approval. Contact the local office of the Natural Resources Conservation Service for identification of hydric soils and potential wetlands.*

*Soil tilth.*—Soils with good tilth have good aeration, a high rate of water infiltration, a good water-holding capacity, and low seedling mortality. Soil properties associated with good tilth are loamy surface layers and a medium or high content of organic matter in the surface layer. Continuous cropping, lack of erosion

control, excessive cultivation, and surface compaction by farm equipment result in the depletion of organic matter, which adversely affects soil tilth.

Tilth can also be affected by periods of heavy rainfall, which can result in the formation of a crust on the soil surface. The crust is hard when dry and nearly impervious to water. It reduces the rate of water infiltration and increases the runoff rate. Regular additions of crop residue, manure, and other organic material can improve soil structure and prevent the formation of a crust.

Because of crusting during winter and spring, fall plowing is generally not recommended. Many of the soils that are plowed in fall are almost as dense and hard at planting time as they were before they were plowed. More than 90 percent of the cropland in the survey area consists of sloping soils that are subject to erosion if they are plowed in fall. Severely eroded, clayey soils, such as Clifton and Fannin soils, become cloddy if they are plowed outside a narrow range in moisture content. Fall plowing on these soils generally results in better tilth in spring.

Some soils in the survey area have poor tilth because of gravel in the surface layer. These soils are in small, isolated areas along river bottoms and terraces. The content and size of the gravel affect the use of tillage implements. Stones and boulders are common in many of the colluvial soils in the survey area, especially in Thunder soils. In some places the rock fragments prevent tillage. In other places they can be and have been removed.

*Soil fertility.*—The soils in Mitchell County are generally low in natural fertility and are naturally acidic. Soil amendments of lime, fertilizer, and organic matter are needed for the production of most kinds of crops and pasture plants. A soil test is used as a guide to indicate how much and what kind of lime and fertilizer should be used. Appropriate rates depend on the crop, soil properties, and the potential productivity of the soil. Excess fertilizer application creates an unnecessary expense and can result in the pollution of surface water and ground water.

Liming requirements are a major concern because the acidity level in the soil affects the availability of many of the nutrients to plants, the activity of beneficial bacteria, and other components of the soil's biological community. Lime also neutralizes exchangeable aluminum. This counteracts the adverse effects of high levels of aluminum on many crops. Liming adds calcium (calcitic lime) or calcium and magnesium (dolomitic lime) to the soil. Incorporating lime into the soil before planting is important because lime moves slowly into the root zone when applied to the surface.

Soil tests also indicate the need for phosphorus and potassium fertilizer. These tests are important because land in long-term agricultural uses often has higher than expected levels of these nutrients. Although levels of naturally occurring phosphorus and potassium are often very low, phosphorus and potassium have a tendency to build up in the soil.

*Pest control.*—Herbicides and other pesticides may be necessary for controlling weeds, harmful insects, and disease. They should be applied by banding or spot treatment where possible. Following label directions ensures that target organisms are controlled and that the contamination of soil, water, air, and non-target organisms is minimized. Soil properties, such as organic matter content and clay content of the surface layer, affect the rate of soil-applied applications. Estimates for these properties were determined for the soils in this survey area. The thickness and texture of the soil layers is shown in the USDA texture column in table 17. Table 18 shows the general ranges of clay content and organic matter content of the surface layer.

In some areas, the organic matter content of a soil may be outside the range shown in table 18. Soils that have recently been brought into cultivation (through pasture conversion) may have a higher organic matter content in the surface layer than similar soils that have been cultivated. Lower levels of organic matter are common in soils where the surface layer has been partly or completely removed by erosion, land smoothing, or other activities such as woodland clearing.

Soils such as Dellwood, Saunook, Reddies, and Rosman have enough organic matter in the surface layer to inhibit the activity of some soil-applied pesticides. Current soil tests should be used to measure the organic matter content before soil-applied rates are determined. Eroded soils, such as Clifton and Fannin, may have enough clay in the surface layer to bind pesticides.

The wet conditions of Bandana soils and areas with seeps and springs may reduce the effectiveness of pesticides and allow the contamination of surface water and ground water. Saturated soils and areas with excess surface water from prolonged rains or irrigation can carry herbicides and other pesticides to surface waters. The contamination of surface water and ground water is also a concern for Rosman, Dellwood, and Reddies soils due to a high leaching rate caused by a low clay content. Table 20 shows erosion depth to water table and flooding rates for soils in the survey area.

Erosion-control practices, such as maintaining permanent ground cover and establishing grassed

filter strips in drainageways and field borders, help to minimize soil loss and runoff that can carry absorbed or dissolved herbicides and other pesticides to surface waters. Utilizing weather forecasts and scheduling irrigation so it does not conflict with herbicide and pesticide use help to reduce contamination problems.

The pesticide product labels show specific application rates based on the organic matter content and clay content of the soil. Please refer to the "Detailed Soil Map Units" section for information on map unit composition, soil properties and behavior, and management concerns and considerations.

Using integrated pest management programs avoids unnecessary pesticide applications. Crops are scouted to determine if pests are present and then monitored to determine when populations require control in order to prevent economic loss. This allows for the most timely, and thus the most cost-effective, use of the pesticide.

Other methods of weed, pest, and disease control include the use of goats, biological agents, mulching, hand weeding, and mowing. These viable alternatives can be used alone or in combination with chemical control. The latest information on these types of control can be obtained at the local office of the North Carolina Cooperative Extension Service, the Mitchell Soil and Water Conservation District, or the Natural Resources Conservation Service.

*Soil biological improvements.*—The "soil food web," or biological community, is the living component of soil. Soil is a living system. Optimum soil quality and productivity cannot be achieved unless the soil supports a diverse, strongly active biological community. A single handful of healthy soil contains countless microbes, bacteria, fungi, protozoa, beneficial nematodes, micro-arthropods, and larger animals, such as earthworms. These soil organisms support plant health as they decompose organic matter, cycle nutrients, and control soil organisms considered crop pests. They also decompose or fix pesticides and nutrients that might otherwise enter water and become pollutants. Many organisms enhance soil aggregation and porosity (soil structure), thus increasing infiltration rates and reducing runoff rates.

Organic matter is the key to the biological health of soil. It serves as the food source for the numerous types of beneficial soil organisms. Biological improvements require additions of organic matter, reduction in tillage, and more careful selection and application of fertilizers and pesticides. These improvements in turn support a growing population of soil organisms that steadily enhance the soil's physical and chemical properties and support plant health. As a

result, agricultural productivity and air and water quality are improved.

## Managing Pasture and Hayland

In 1999, according to the North Carolina Cooperative Extension Service of Mitchell County, Mitchell County had approximately 14,000 acres of pasture and hayland.

A successful livestock enterprise depends on a forage program that provides large quantities of good-quality feed. In most areas of pasture and hayland in Mitchell County, renovation, brush control, and measures that prevent overgrazing are needed. The soils in the survey area vary widely in their ability to produce grasses and legumes due to differences in properties such as depth to bedrock or strata of gravel, internal drainage, and available water-holding capacity. Great differences in soil properties can occur within short distances and commonly within the same field. For example, wet bottomland soils, such as Bandana, commonly join steeper, drier soils on uplands, such as Evard and Fannin (fig. 8). Growers should review the "Detailed Soil Map Units" section for information on map unit composition, soil properties and behavior, management concerns and considerations, and suitability ratings.

*Soil fertility.*—A soil test is recommended to determine proper application rates of lime and fertilizer. Other considerations are cropping history and the hay or forage crop to be planted or maintained. Timing of fertilizer application is very important in achieving maximum yields. A general guideline for cool-season forage is to fertilize at or just before periods of growth. Depending on elevation, aspect, and the season's weather, fertilizer should be applied between late February and late March before spring growth occurs and between mid-August and mid-September before fall growth occurs.

*Pest control.*—Herbicides and other pesticides may be necessary for controlling weeds and harmful insects in the production of forage crops. The organic matter content and clay content of the surface layer and the depth to the water table affect the amount and frequency of soil-applied herbicides and other pesticides. Soils such as Dellwood, Dillsboro, Reddies, Rosman, Saunook, Thunder, and Wayah have enough organic matter in the surface layer to inhibit the activity of soil-applied pesticides. Eroded soils such as Clifton and Fannin may have enough clay in the surface layer to bind pesticides. Table 18 shows the general ranges of clay content and organic matter content of the surface layer.



**Figure 8.**—Pasture and hayland management often utilizes several different soils in the same field. Evard-Cowee complex, 15 to 30 percent slopes, is in the foreground and background. Saunook silt loam, 2 to 8 percent slopes, and Bandana sandy loam, 0 to 3 percent slopes, occasionally flooded, occupy the middle ground in this picture.

The wet conditions of Bandana soils and areas with seeps and springs may reduce the effectiveness of soil-applied pesticides and allow the contamination of surface water and ground water. Saturated soils and areas with excess surface water from prolonged rains or irrigation can carry herbicides and other pesticides to surface water. The contamination of surface water and ground water is also a concern for Dellwood, Rosman, and Reddies soils due to a high leaching rate caused by a low clay content. Table 20 shows depth to water table and flooding frequency for soils in the survey area.

Using integrated pest management programs avoids unnecessary pesticide applications. Crops are scouted to determine if pests are present and then monitored to determine when populations require

control in order to prevent economic loss. This allows for the most timely, and thus the most cost-effective, use of the pesticide.

Other methods of weed control include the use of goats, biological agents, and mowing. These viable alternatives can be used alone or in combination with chemical weed control. The latest information on these types of weed control can be obtained from the local office of the North Carolina Cooperative Extension Service, the Mitchell Soil and Water Conservation District, or the Natural Resources Conservation Service.

*Species.*—The intended use should be considered when forage species are selected. The selected species should provide maximum quality and versatility in the forage program. Legumes generally

produce higher quality feed than grasses. The taller legumes, such as alfalfa and red clover, are more versatile than legumes that are used primarily for grazing, such as white clover. Orchardgrass, timothy, and tall fescue are well suited grasses. Care must be taken to minimize the effects of fescue toxicity caused by the fungus *Acremonium coenophilum*, which occurs on fescue plants. This fungus causes large reductions in animal weight gain.

The forage species selected for planting should be appropriate for the soil. Deep and very deep, well drained soils should be planted with the highest-producing crops, such as alfalfa, or a mixture of alfalfa and orchardgrass or alfalfa and timothy. Evard, Edneytown, Clifton, Dillsboro, Fannin, Watauga, Saunook, and Hunt Dale soils are examples. Sod-forming grasses, such as tall fescue and orchardgrass, minimize erosion in the steeper areas. The more poorly drained soils and the soils that are less than 2 feet deep are suited to clover-grass mixtures or to pure stands of clover or grasses.

Native bluegrass is in pastures throughout the county and is a preferred species for horses and sheep. Bluegrass production could be improved by the use of high-analysis phosphate fertilizer, which encourages the growth of native White Dutch clover and increases the nutrition and quality of forage.

Orchardgrass, another important species, can grow anywhere that fescue thrives, except in wet areas, such as on Bandana soils. Orchardgrass has requirements similar to those of fescue but is more sensitive to overgrazing and weed competition. Rotational grazing helps to extend the life of this species. Orchardgrass is not infected by fescue fungus.

Warm-season grasses help to supplement cool-season grasses, such as tall fescue. They grow well during warm periods, when the growth of cool-season grasses is slow. Examples of warm-season grasses are switchgrass, big bluestem, eastern gamagrass, indiagrass, and Caucasian bluestem. Annual summer grasses such as sudangrass, pearl millet, and sorghum can be valuable in providing silage and hay in a forage program. Cattle producers can use these grasses for summer forage when cool-season grasses become dormant.

*Erosion control.*—The majority of pasture and hayland in Mitchell County is located on land that is too steep or wet to row crop. This can lead to a variety of erosion problems. For instance, severe streambank erosion and downstream sedimentation occur where livestock travel streambanks. Trout streams are particularly vulnerable to damage by sedimentation.

Pasture rotation helps to prevent erosion. Fencing cattle away from streams and installing watering systems which utilize local water sources help to prevent overgrazing.

*Maintenance of pasture and hayland.*—Using rotational grazing, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity. Following lime and fertilizer recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.

Renovation can increase forage yields in areas that support a good stand of grass. This process includes partially destroying the sod, applying lime and fertilizer, and seeding desirable forage species. Plowing is not recommended for forage establishment or rejuvenation. In plowed areas, the soil can crust over after rain, resulting in a high seedling mortality rate, and the bare soil is susceptible to severe erosion. Sowing seed directly into the existing sod is the preferred method. Adding legumes to the stand of grass provides high-quality feed and reduces the amount of nitrogen fertilizer needed. Legumes increase summer productivity and transfer nitrogen from the air into the soil.

## Managing Orchards and Ornamental Crops

Jeffrey H. Owen, Area Extension Forestry Specialist, Christmas Tree Production, North Carolina State University, helped prepare this section.

Ornamental crops are grown throughout the county on intermediate and low mountains and intermountain hills (in areas of Plott, Hunt Dale, Evard, Watauga, and Chandler soils), in coves and on terraces (in areas of Dillsboro and Saunook soils), and on flood plains (in areas of Rosman, Bandana, Dellwood, and Reddies soils). The mountains and coves of the Roan Valley are major areas of Christmas tree production. Commercial orchards are in the Bakersville, Buladean, and Snow Hill communities on terraces, in coves (in areas of Dillsboro and Saunook soils), and on ridgetops and side slopes of intermountain hills and low and intermediate mountains (in areas of Evard, Clifton, and Fannin soils) (fig. 9).

A variety of soils in Mitchell County have been managed very successfully for ornamental crops, including some which have been flagged as potential problems soils. The North Carolina Cooperative



**Figure 9.—Commercial apple orchards are on a variety of soils, including Fannin, Evard, and Saunook soils in the communities of Bakersville, Buladean, and Snow Hill.**

Extension Service of Mitchell County estimates that Mitchell County had approximately 1,500 acres of ornamental crops in 1999.

Table 5 shows the suitability of soils in the survey area for apple orchards, Fraser fir production, ball and burlap harvesting, line-out beds, and vegetable production.

Growers should review the “Detailed Soil Map Units” section for information on map unit composition, soil properties and behavior, management concerns and considerations, and suitability ratings. The thickness and texture of soil layers is shown in the

USDA texture column in table 17. Table 18 shows the general ranges of clay content and organic matter content. Table 20 shows depth to water table and flooding frequency.

The following paragraphs discuss several points related to the management of orchards and ornamental crops. More detailed information and technical assistance may be obtained from the North Carolina Cooperative Extension Service, the Natural Resources Conservation Service, and the Mitchell Soil and Water Conservation District.

### Map Unit Suitabilities

Suitability ratings are guides for consideration by commercial operations with goals that include maintaining the integrity of the ecosystem, a sustainable harvest, and a cost-effective level of management. Ratings are based on land that is presently cleared. The cost of land clearing and the impact on the soil resource lower the suitability rating. Size of a management area and condition of the soil resource due to past management decisions were not considered. Two examples of soil conditions that negatively affect current productivity and suitability are severe erosion and soil compaction. See Glossary for definitions of suitability ratings.

In table 5, "slope" is considered a limitation affecting safe equipment use. "Depth to rock" indicates the presence of soft or hard bedrock at a depth of 40 inches or less. The limitation of "climate" is based on the harsh conditions on sites at high elevations and on those that are exposed and windswept.

### Soil-Plant-Landscape-Climate Relationships

Orchard and ornamental crops are grown throughout Mitchell County and include Christmas trees, mountain laurel, rhododendron, hemlock, boxwood, and other species of native trees, shrubs, and herbaceous plants used in landscaping. Hybrid trees and shrubs such as holly, juniper, and yews are also grown. The selection of species to plant depends on soil, plant, landscape, and climatic variables and their interactions. These variables include individual species requirements, past land management, elevation, aspect, landscape position, soil type, and rainfall. Site preparation, maintenance and related management costs, and market demand should also be considered. An onsite investigation is recommended to determine site-specific conditions, especially on flood plains, in drainageways, and in coves; for map units with greater than 30 percent slopes; and for sites with elevations above 4,000 feet.

*Elevation and aspect.*—It is important to consider naturally occurring site factors due to their influence on site productivity and a wide variety of management decisions. In general, the most productive sites are below 4,000 feet in elevation. At the higher elevations, growing seasons are shorter and climates are comparatively harsh. Aspect affects the amount of sunlight a site receives and the rate of evaporation. Soils on cool, north- to east-facing aspects generally have a surface layer that is thicker and has more organic matter than that of soils on warm slopes. Due

to the cooler air temperatures associated with these aspects, there is the potential that late spring frost will damage new growth in some years. Slow air drainage or frost pockets, or both, may allow late spring frost to damage new plant growth on flood plains, in drainageways, and in coves. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. Evard, Chandler, and Buladean soils occur on warm side slopes. Hunt Dale and Plott soils occur on cool side slopes. Saunook and Dillsboro soils occur in coves and on footslopes. Rosman, Reddies, and Dellwood soils occur on flood plains.

*Rainfall and droughty soils.*—The amount of rainfall, elevation, and length of growing season influence site productivity. Summer rainfall in the survey area is fairly even and abundant. While the amount of rainfall generally increases as elevation increases, productivity gains may be offset by the shorter growing season and climatic conditions at the higher elevations. Growth on soils that are shallow or moderately deep to bedrock, such as Cleveland, Ashe, Burton, Chestnut, Cowee, Soco, and Sylco soils, is limited by a low water-holding capacity. Chandler and Micaville soils have a high mica content and are also limited due to a low water-holding capacity.

*Landform and soil water.*—Landform position, steepness and length of slope, and landform shape (such as convex or concave) affect water movement and availability. A healthy ground cover helps to control runoff, allows greater water infiltration into the soil, and reduces evaporation losses. In areas where water ponds or concentrates, such as on toeslopes and footslopes, in drainageways, and in concave and depressional areas, plants are susceptible to phytophthora root disease, especially Fraser fir and other ornamentals. These areas should be avoided. Phytophthora root disease is a concern for sites on uplands, in coves, and on flood plains regardless of landform or soil type. If the fungus has been introduced to any site and the soils at that site become saturated with water during an extended rainy period, root disease can develop and spread.

*Other soil-site properties.*—Native and hybrid ornamental crops grow well on well drained, loamy soils. These soils do not have as many surface stones or boulders or coarse fragments in the soil profile as other soils. These properties hinder cultivation and ball and burlap harvesting. Ornamental crops should not be grown where depth to bedrock limits rooting depth. Sites should be protected, especially at the higher elevations, from northwest winter winds which can desiccate plants. Flooding, even occasionally, is a

concern due to the extended length of time ornamental crops remain in the field.

*Clay content.*—The clay content should be between 15 and 30 percent for optimum growth and ball and burlap harvesting. Soils with a low clay content may need supplemental irrigation because of a low water-holding capacity and droughtiness. Soils that have a clay content of less than 15 percent in the upper 20 inches should not be used for ornamental species that are to be ball and burlap harvested. These soils do not cling together and thus ball poorly. Soils that have a clay content of more than about 30 percent should not be used for ornamental species. These soils hold excess moisture around roots, which can result in poor growth and increased susceptibility to phytophthora root disease. Access with machinery is limited when the soil is wet. In addition, soils that have a high clay content should only be dug within in a narrow range of soil moisture to prevent damage to the root ball. Periods of desired soil moisture conditions, however, may not coincide with harvesting schedules.

Upland soils, such as Evard, Edneytown, Fannin, Watauga, Cashiers, Chandler, Hunt Dale, and Plott soils, and the colluvial Saunook soils are suitable for adapted ornamental crops. Flood plain soils, such as Rosman, Dellwood, and Reddies soils, are also used for certain adapted ornamentals. The flood plain soils have special management concerns because of a low water-holding capacity, moderately rapid or rapid internal drainage, and frost and flooding frequencies.

### **Erosion Control, Site Preparation, and Access**

Disturbing as little of the planting area as possible helps to prevent excessive erosion, maintain water quality, and protect the beneficial soil surface layer. Once a site is prepared and planted, areas between plant rows should remain in permanent vegetative cover. Planting in a grid arrangement allows easy access for hand labor and for the use of mowing or harvesting equipment. Sites should be selected in areas that have an adequate supply of clear water for irrigation.

#### **Roads**

Access roads should be carefully planned and constructed on the contour. They should not be constructed in natural drainageways, in wet areas, or where the grade of the roadbed would exceed 10 percent. Limitations based on depth to bedrock, the presence of rocky areas, and the quantity of surface stones and boulders should also be considered. Vegetating cleared, graded, and cut and fill slopes as

construction proceeds and using erosion-control structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site. Roads should be graveled or seeded with perennial vegetation. This allows year-round use. Lime and fertilizer should be applied regularly to maintain the sod. More detailed information is available in the “Engineering” section.

#### **Marginal Sites**

Areas that are forested and require major timber and stump removal are less suitable for the production of ornamental crops and Christmas trees. Clearing and converting woodland to ornamental crop production creates a severe hazard of erosion and therefore is not recommended. A positive cost-benefit ratio, especially where slopes greater than 30 percent need clearing, is uncertain.

Map units that have slopes of more than 30 percent are marginal due to limitations affecting the safe use of equipment. Access roads can be built and maintained, but this increases the cost of production. Labor costs and the amount of time needed for harvest increase on these steep and very steep slopes. Also, plant shape (especially the lower branches) can be detrimentally affected on the uphill side of tree trunks or plant stems. Loss of the bottom whorl of a Christmas tree adds 1 or 2 years to a rotation.

#### **Line-Out Beds**

Line-out beds should be located near an adequate supply of clear water for use in irrigation. They require soils that have about 10 to 15 percent clay in the upper 8 to 12 inches. Soils that have more clay hold seedling roots so tightly that tearing and breaking can result during harvesting. Such soils also hold water longer, thus providing adequate time for phytophthora root rot to develop. Flood plain soils that have dark, sandy surface layers, such as Rosman, Dellwood, and Reddies, are suited to line-out beds but require irrigation. Cove and upland soils that have dark surface layers, such as Saunook, Plott, and Cashiers, may also be suited to line-out beds. Their relatively high clay content and organic matter content may be prohibitive due to a high water-holding capacity and the related susceptibility to phytophthora root disease.

#### **Soil Quality**

The following paragraphs discuss several points related to soil quality improvements. Enhancing soil quality helps to reduce the onsite and offsite costs of soil erosion, improve nutrient utilization, and ensure

that the soil resource is sustained for future use. The soil's physical, chemical, and biological properties must be at optimal levels for production levels to be maintained on a sustainable basis.

#### Soil Fertility

Because the soils in Mitchell County are acidic and generally low in natural fertility, ornamental crops benefit from soil amendments of lime, fertilizer, and organic matter. Following lime and fertilizer recommendations based on soil tests and plant tissue analysis helps to increase the availability of nutrients and is a critical aspect of all management plans. Since calcium and phosphorus tend to remain in the surface layer of the soil when topdressed, incorporation of lime and fertilizer into the soil prior to planting is beneficial.

Both organic and chemical fertilizers increase nutrient levels in the soil. Application rates are plant specific. Applying lime and fertilizer to access roads and erosion-control structures helps to maintain the ground cover. Hand application may be required on steep slopes. The wet conditions of Bandana soils and upland areas with seeps and springs may reduce the effectiveness of fertilizer and lime or allow the contamination of surface water and ground water. The contamination of surface water and ground water is also a concern in Dellwood and Reddies soils due to a high leaching rate and the depth to a seasonal high water table. Table 20 shows depth to water table and the flooding frequency for soils in the survey area.

Liming requirements are a major concern because high acidity in the soil reduces the availability of nutrients to plants and affects the activity of beneficial bacteria and other components of the soil's biological community. Lime neutralizes exchangeable aluminum which can adversely affect many crops. Liming with calcitic lime adds calcium to the soil, and liming with dolomitic lime adds both calcium and magnesium.

Soil tests also indicate the need for nitrogen, phosphorus, and potassium fertilizer. Phosphorus and potassium levels vary from field to field due to soil type and past management. Unlike nitrogen, phosphorus and potassium tend to build up in the soil over time if fertilizer has been applied on a regular basis.

Nitrogen fertilizer is required for most crops. Appropriate rates depend on the crop and the potential productivity of the soil. Excessive application of nitrogen beyond what the plant can use during the growing season is not a recommended practice. The excess fertilizer not utilized by the crop creates an unnecessary expense and can result in water pollution through leaching or runoff. Nitrogen can be readily leached from the more sandy soils, such as Rosman, Dellwood, Reddies, and Chandler soils, and become

deficient in wet seasons. Split applications of nitrogen may be more effective on these soils during the growing season. Nitrogen rates may be reduced on fields provided that organic matter levels are high. Where the ground cover has been removed by tillage or with herbicides, organic matter tends to break down more rapidly. Erosion-control practices, such as establishing permanent ground cover and grassed filter strips in drainageways and planting field borders, help to increase the organic matter content and minimize soil loss and runoff that can carry adsorbed or dissolved fertilizer to surface waters.

#### Soil Biological Improvements

Optimum soil quality supports a sustainable harvest and a cost-effective level of management. It cannot be achieved unless the soil can support a diverse, strongly active biological community. A single handful of healthy soil contains more individual microbes, micro-arthropods, and other life forms than there are people on earth. Organic matter is the key to the biological health of the soil. It serves as the food source for numerous types of beneficial bacteria, fungi, protozoa, nematodes, micro-arthropods, and larger animals. Biological improvements require more organic matter, healthy cover crops, and the careful selection and application of herbicides and other pesticides. These improvements also benefit the soil's physical and chemical components. The available supply of nutrients for plant growth is affected by several soil properties, including the organic matter content of the surface layer. The decomposition of organic matter into humus and the mineralization of humus release nitrogen and other nutrients, such as calcium, magnesium, and potassium, to plants. Organic matter (composted or decayed) can be added to the soil or allowed to build up in place under cover crops. Removing the cover crop with herbicides or tillage allows for the rapid breakdown of organic matter.

#### Pest Control

Herbicides and other pesticides may be necessary for controlling weeds, harmful insects, and disease and should be applied by banding or spot treatment. Following label directions ensures the control of target organisms and minimizes the contamination of soil, water, air, and non-target organisms. Soil properties, such as organic matter content and clay content of the surface layer, affect the rate of soil-applied pesticides. Estimates for these properties were determined for the soils in Mitchell County. The thickness and texture of the soil layers are shown in the USDA texture column in table 17. Table 18 shows the range of clay content

and the range of organic matter content in the surface layer.

In some areas, the organic matter content of a soil may be outside the range shown in table 18. The content may be higher in soils that have received high amounts of animal or manmade waste. Soils that have recently been brought into cultivation (as through pasture conversion) may have a higher content of organic matter in the surface layer than similar soils that have been cultivated (as through cropland conversion). Lower contents of organic matter are common in soils where the surface layer has been partly or completely removed by erosion, land smoothing, or other activities, such as woodland clearing.

#### Pesticide Effectiveness

Soils such as Cashiers, Plott, Wayah, Saunook, Dellwood, Reddies, and Rosman have enough organic matter in the surface layer to inhibit the activity of the soil-applied pre-emergent herbicides and other pesticides. Current soil tests should be used to measure the organic matter content before soil-applied rates are determined. Eroded soils, such as Clifton and Fannin, may have enough clay in the surface layer to bind pre-emergent herbicides and other soil-applied pesticides. Where these types of soils are managed, growers should refer to the label on the pesticide container for specific instructions and application rates.

The wet conditions of Bandana soils and areas with seeps and springs may reduce the effectiveness of some pesticides and allow the contamination of surface water and ground water. On saturated soils and in areas with excess surface water from prolonged rains or irrigation, herbicides and other pesticides can be transported to surface waters. The contamination of surface water and ground water is also a concern for Rosman, Dellwood, and Reddies soils due to a high leaching rate caused by a low clay content. Table 20 shows depth to the water table and flooding frequency for soils in the survey area.

Erosion-control practices, such as maintaining permanent ground cover and establishing grassed filter strips in drainageways and field borders, help to minimize soil loss and runoff that can carry absorbed or dissolved pesticides to surface waters. Utilizing weather forecasts and scheduling irrigation so that it does not conflict with pesticide use helps to reduce the hazard of contamination.

#### Integrated Pest Management

Integrated pest management programs prevent unnecessary pesticide applications. Crops are

scouted to determine if pests are present and then monitored to determine when populations require control for the prevention of economic loss. This practice ensures the most timely use of the pesticide and thus the most cost-effective approach to the chemical control of pests.

Other methods of weed, animal, and disease control include the use of goats, biological agents, mulching, hand weeding, and mowing. These viable alternatives can be used alone or in combination with chemical control. The latest information on these types of control can be obtained at the local office of the North Carolina Cooperative Extension Service, the Natural Resources Conservation Service, or the Mitchell Soil and Water Conservation District.

#### Phytophthora

Phytophthora root rot is a soil-borne disease caused by the fungus *Phytophthora cinnamomi*. It is a problem where the movement of air and water is restricted in the soil. The restricted movement may result from a high content of organic matter in the surface layer, clay content, soil compaction, a seasonal high water table, or soil wetness caused by flooding, ponding, overland flow of storm water, or an extended wet period that keeps the soil saturated.

In areas that receive high amounts of water, a high content of organic matter in the surface layer may hold water long enough and frequently enough to allow phytophthora to develop. The fungus is also a concern where the soil is compacted or the clay contents of the surface layer and subsoil differ enough that percolation is slowed or stopped and water perches.

In landscape positions where water concentrates, such as on toeslopes, on footslopes, in drainageways, in areas below wet-weather seeps and springs, and in concave and depressional spots, plants are susceptible to phytophthora root rot. All map units potentially contain these areas. These areas should be avoided.

The fungus can also be transported from field to field on equipment and by flooding and storm water runoff. Potential contamination of irrigation ponds and streams by storm runoff from contaminated fields should also be considered.

There is also a possibility of transporting phytophthora to the field on plants from infected line-out beds. The before mentioned soil-site conditions and considerations apply to the location and establishment of line-out beds. Proper drainage and protection from flooding, overland flow, and ponding of storm water are critical in establishing and maintaining healthy line-out beds.

## 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. Soil quality and the effects of past management also affect present-day yields. The land capability classification of each map unit also is shown in the table.

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

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

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

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

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed

because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

## Land Capability Classification

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

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

*Capability classes*, the broadest groups, are designated by numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

*Capability subclasses* are soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2*e*. The letter *e* shows that the main hazard is the 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; *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

### **Prime Farmland and Farmland of Statewide Importance**

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

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forestland, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops when proper management, including water management, and acceptable farming methods are applied. In general, prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods, and it either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 8 percent. More detailed information about the criteria for prime farmland is available at the

local office of the Natural Resources Conservation Service.

About 4,361 acres in Mitchell County, or 3 percent of the total acreage, meets the soil requirements for prime farmland. About 5,793 acres, or 4 percent of the total acreage, meets the soil requirements for farmland of statewide importance.

A recent trend in land use in some parts of the survey area has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 8. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures used to overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

The map units that are considered farmland of statewide importance are listed in table 9. The extent of each map unit listed in tables 8 and 9 is shown in table 4. The location is shown on the detailed soil maps. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

### **Hydric Soils**

In this section, hydric soils are defined and described and the hydric soils in the survey area are listed.

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and hydrology (5, 7, 11, 14). Areas identified as wetlands must meet criteria for each of the characteristics. Undrained hydric soils that have natural vegetation support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses are capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part of the profile (8). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. To

determine whether a specific soil is a hydric or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Criteria which identify the estimated soil properties that are unique to hydric soils have been established (9). These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria are selected estimated soil properties, which are described in "Soil Taxonomy" (18) and in the "Soil Survey Manual" (20).

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators that can be used to make onsite determinations of hydric soils in Mitchell County are specified in "Field Indicators of Hydric Soils in the United States" (10).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. The determination of an appropriate indicator may require a greater depth. Soil scientists excavate and describe the soils deep enough to understand the redoximorphic processes. After completing the soil description, soil scientists can compare the soil features required by each indicator and the conditions observed in the soil and determine which indicators occur. The soil can be identified as a hydric soil if one or more of the approved indicators occur.

This survey can be used to locate probable areas of hydric soils. Map units consisting of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions of the landform, and map units consisting of nonhydric soils may have inclusions of hydric soils in the lower positions of the landform.

The map units listed in table 10 generally do not meet the requirements for hydric soils because they do not have one of the hydric soil indicators. A portion of these map units, however, may include hydric soils. Onsite investigation is needed to determine whether or not hydric soils occur and the location of included hydric soils (10, 11).

## Forestland Management and Productivity

Albert Coffey, Forester, Natural Resources Conservation Service, Wendell Biddix, County Ranger, North Carolina Forest Service, and Dan Manning, Soil Scientist, U.S. Forest Service, helped prepare this section.

Owners of forestland in Mitchell County have many objectives. These objectives include producing timber; conserving wildlife, soil, and water; preserving esthetic

values; and providing opportunities for recreational activities such as camping and hunting. Public demand for clean water and recreational areas creates pressures and opportunities for owners of forestland.

The landowner interested in timber production is faced with the challenge of producing greater yields from smaller areas. Meeting this challenge requires intensive management and silvicultural practices. Many modern silvicultural techniques resemble those long practiced in agriculture. They include establishing, weeding, and thinning a desirable young stand and propagating the more productive species or genetic varieties. Even though timber crops require decades to grow, the goal of intensive management is similar to that of intensive agriculture. This is to produce the greatest yield of the most valuable crop as quickly as possible while maintaining the integrity of the ecosystem.

Forestland covers about 106,085 acres, or 75 percent of the land area of Mitchell County (16). Of this, timberland or commercial forest covers about 105,101 acres, or 74 percent of the land area of the county. Timberland is land that is producing or is capable of producing crops of industrial wood and that has not been withdrawn from timber production. Northern red oak, yellow-polar, and eastern white pine are the most important commercial timber species in the county because they are adapted to the soil and climate and bring the highest average sale value per acre.

For purposes of forest inventory, the predominant forest types identified in Mitchell County are as described in the following paragraphs:

*Spruce-fir.* This forest type is predominantly red spruce or Fraser fir, or both. Commonly included trees are sugar maple and yellow birch. Acreage is not included in the inventory due to the removal of this forest type from timber utilization by statute or administrative designation.

*Oak-pine.* This forest type covers 8,701 acres. It is predominantly hardwoods, usually upland oaks. Pine species (mainly eastern white pine) make up 25 to 50 percent of the stand. Commonly included trees are hickory, red maple, and yellow-poplar.

*Maple-beech-birch.* This forest type covers 27,810 acres. It is predominantly sugar maple, American beech, yellow birch, or a combination of these species. Commonly included trees are northern red oak, white ash, and hemlock.

*Oak-hickory.* This forest type covers 68,590 acres. It is predominantly upland oaks or hickory, or both. Commonly included trees are yellow-poplar, red maple, and black locust.

For purposes of forest management, forest types are generally grouped as follows: yellow pine, eastern white pine, upland hardwoods, cove hardwoods, northern hardwoods, and spruce-fir (13). The characteristics of a given site indicate which forest type will grow best on that site. The Society of American Foresters forest cover type is given in parentheses.

*Yellow pine (SAF Virginia Pine)*. This forest type generally occurs on soils of low productivity on dry, hot ridges and side slopes. Shortleaf pine and Virginia pine are the dominant species. Elevations are below about 3,000 feet. Total acreage is very small. Various dry-site hardwoods, such as scarlet oak, chestnut oak, blackgum, and sourwood, are associated with this forest type. Soils that commonly support this forest type are Soco, Stecoah, Sylco, Shinbone, and Harmiller soils in areas underlain by metasedimentary parent material and Chandler and Micaville soils in areas with a high mica content.

*Eastern white pine (SAF Eastern White Pine)*. This forest type occurs on a wide range of upland sites. It produces a higher volume of wood and has a shorter rotation period than other upland forest types. In Mitchell County, eastern white pine regenerates naturally where there is a seed source; however, in many areas it is planted. Soils that commonly support this forest type are Clifton, Evard, Cowee, Fannin, Chandler, Micaville, Buladean, Chestnut, Pigeonroost, and Edneytown.

*Upland hardwoods (SAF White Oak-Black Oak-Northern Red Oak)*. This forest type occurs on upland side slopes and ridges on various aspects at elevations as high as about 4,000 feet. The dominant species vary from northern red oak, white oak, and yellow-poplar on cool, moist, north- to east-facing slopes and those shaded by the higher mountains to scarlet oak, chestnut oak, black oak, and hickory on hot, dry, west- to south-facing slopes. Major soils on warm aspects are Evard, Fannin, Clifton, Pigeonroost, Buladean, Chandler, Ashe, Soco, Stecoah, Sylco, Shinbone, and Harmiller. Major soils on cool aspects are Hunt Dale, Plott, Cashiers, and Cheoah.

*Cove hardwoods (SAF Yellow-Poplar)*. This forest type is in coves and drainageways at elevations below about 4,800 feet. It has the potential to produce the highest volume of wood per acre of any of the forest types. The most common species is yellow-poplar. Stands also include northern red oak, white oak, black cherry, sweet birch, hemlock, white pine, American basswood, yellow buckeye, and white ash. Above about 4,000 feet in elevation, poplar is less dominant and northern red oak, black cherry, white ash, sweet birch, yellow buckeye, yellow birch, and sugar maple

are more common. Soils that commonly support this forest type include Saunook, Thunder, Dillsboro, Cullasaja, Lostcove, and Keener.

*Northern hardwoods (SAF Sugar Maple-Beech-Yellow Birch)*. This forest type is on cool landscapes at elevations ranging from about 3,500 to 5,000 feet. Below an elevation of 4,200 feet, it is on north- to east-facing slopes or those shade by the higher mountains. Above that elevation, it is on side slopes and ridges on various aspects. Prominent ridgetops, upper side slopes, and areas at elevations above 4,800 feet have trees that exhibit slow growth and poor form due to frequent ice storms and high winds. Common species are northern red oak, mountain magnolia, white ash, beech, sweet birch, yellow birch, black cherry, and sugar maple. A large percentage of the trees on this forest type are commercially valuable species. Major soils are Plott, Hunt Dale, Cashiers, and Cheoah on side slopes and Saunook, Thunder, and Cullasaja in coves. Above about 5,000 feet in elevation, major soils include Burton, Craggey, and Wayah on side slopes and ridges and Tanasee and Balsam in coves.

*Spruce-fir (SAF Red Spruce-Fraser Fir)*. This forest type is limited to landscapes above about 5,000 feet in elevation on Unaka Mountain and Roan Mountain. The present acreage is limited due to past fires, insect infestation, and management. Red spruce is currently the dominant species. In recent years, the mature Fraser fir component has been severely damaged by infestations of the balsam woolly adelgid. However, there are many healthy Fraser fir seedlings and saplings in the understory. The population of red spruce is also in decline due to various climatic and environmental factors. Various heath and northern hardwood tree species are interspersed with this forest type. All species usually show poor form and stunted growth on landscapes exposed to high winds and severe climatic conditions. Soils that commonly support this forest type are Burton, Craggey, and Wayah on side slopes and ridges and Tanasee and Balsam in coves.

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

The potential productivity of forestland in Mitchell County depends on physiography, soil properties,



**Figure 10.—Improved eastern white pine in an area of Watauga sandy loam, 30 to 50 percent slopes, stony. This species is well adapted to the conditions of this soil and this site.**

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

these soil properties and site characteristics determine the potential site productivity (fig. 10).

Examples of past management decisions that limit productivity are overgrazing and timber high-grading. These factors can affect forest health, vitality, species composition, and, ultimately, the quantity, quality, and

value of the timber produced. The potential volume of wood produced by a stand of timber is not always the best indicator of the value of a site. Species composition and quality are as important as volume.

Naturally occurring site factors are also important to consider. The steepness and length of slopes and landform position affect water movement and availability. Elevation and aspect affect the amount of sunlight a site receives and the rate of evaporation. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. The amount of rainfall and the length of growing season influence site productivity. While rainfall generally increases as elevation increases, productivity gains may be offset by a shorter growing season. The most productive sites are generally below 4,000 feet in elevation, on north- to east-facing slopes or on those shaded by the higher mountains, in sheltered coves, or in concave areas on footslopes and toeslopes. Most of the soils on these cool slopes have an A horizon that is thicker and has more organic matter than that of soils on warm slopes. Hunt Dale and Plott soils are examples of soils on cool side slopes, and Saunook and Thunder soils are examples of soils in coves and on footslopes.

Soils on warm slopes include minor components such as areas in narrow, unmapped drainageways. These areas can produce yields higher than those indicative of the soil map unit as a whole. Soils on cool slopes include minor components such as areas on exposed spur ridges. These areas can produce yields lower than those indicative of the soil map unit as a whole. In either case, different tree species may occur in these areas of minor components.

A knowledge of soils helps to provide a basic understanding of the distribution and growth of tree species on the landscape. For example, yellow-poplar grows well on deep or very deep, moist soils and scarlet oak or pine is common in areas where the rooting depth is restricted or the moisture supply is limited.

Availability of water and nutrients, parent material, and landform position largely determine which tree species grow on a particular soil.

Soil serves as a reservoir for moisture, provides an anchor for roots, and supplies most of the available nutrients. These three qualities are directly or indirectly affected by organic matter content, soil reaction (pH), fertility, drainage, texture, structure, depth, parent material, and landform position. Elevation and aspect are of particular importance in mountainous areas.

The ability of a soil to serve as a reservoir for moisture, as measured by the available water capacity, is primarily influenced by texture, organic

matter content, rooting depth, and content of rock fragments or mica. Because of the fairly even and abundant summer rainfall in the survey area, available water capacity is a limitation affecting tree growth only on shallow and moderately deep soils, such as Cleveland, Ashe, Burton, Chestnut, Cowee, Soco, and Sylco soils. Chandler and Micaville are examples of droughty soils that have a high mica content.

For soils on steep uplands, much of the water movement during periods of saturation occurs as lateral flow downslope. As a result, soils on the lower slopes receive additional moisture due to internal waterflow.

In the survey area all of the soils, except for the shallowest, provide an adequate anchor for tree roots. The susceptibility to windthrow, or the uprooting of trees by the wind, is not a major management concern on most soils. Soils that have a moderate or severe windthrow hazard include Ashe, Burton, Cowee, Soco, Craggey, Sylco, and Cleveland (fig. 11).

The available supply of nutrients for tree growth is affected by several soil properties, including organic matter content of the surface layer. The decomposition of organic matter to humus and the mineralization of humus release nitrogen and other nutrients, such as calcium, magnesium, and potassium, to plants.

Natural fertility is also dependent on the parent material of the soil and local geology. Most of the upland soils have been leached and contain small amounts of nutrients below the surface layer. Only small amounts of nutrients are made available by the weathering of clay and silt particles. In general, most of the soils in Mitchell County have good rooting depth, receive adequate amounts of rainfall, and are relatively productive. Exceptions are soils with a high mica content (Chandler and Micaville) and soils that formed over quartzite and metasandstone (Soco, Stecoah, Sylco, Harmiller, and Shinbone) in the far western part of the county. These soils tend to produce lower quality timber.

The living plant community is also part of the nutrient reservoir. The decomposition of leaves, stems, and other organic material recycles the nutrients that have accumulated in the forest ecosystem. Wildfire, excessive trampling by livestock, and erosion result in the loss of these nutrients. Forestland management should include prevention of wildfires and protection from overgrazing.

This soil survey can be used in planning ways to increase the productivity of forestland. Some soils are more susceptible to landslides and erosion after roads are built and timber is harvested. Some soils require special reforestation efforts. In the section "Detailed Soil Map Units," the description of each map unit in



Figure 11.—Windthrow in an area of Wayah-Burton complex, windswept, 15 to 30 percent slopes, stony. Windthrow is a concern in woodland management on soils that are shallow or moderately deep to bedrock.

the survey area includes information about its suitability for timber, productivity, limitations in harvesting timber, and management concerns in producing timber. Table 11 summarizes this forestry information and rates the soils for a number of factors to be considered in management. *Slight*, *moderate*,

and *severe* are used to indicate the degree of the major soil limitations to be considered in management.

Table 11 lists the *ordination symbol* for each soil. The first part of the ordination symbol, a number, indicates the potential productivity of a soil for the indicator species in cubic meters per hectare per year.

The larger the number, the greater the potential productivity. Potential productivity is based on the site index and the point where mean annual increment is the greatest.

The second part of the ordination symbol, a letter, indicates the major kind of soil limitation affecting use and management. The letter *R* indicates a soil that has a significant limitation because of the slope. The letter *X* indicates that a soil has restrictions because of stones or rocks on the surface. The letter *W* indicates a soil in which excessive water, either seasonal or year-round, causes a significant limitation. The letter *D* indicates a soil that has a limitation because of a restricted rooting depth, such as a shallow soil that is underlain by hard bedrock, a hardpan, or other layers that restrict roots. The letter *S* indicates a dry, sandy soil. The letter *F* indicates a soil that has a high content of coarse fragments. The letter *A* indicates a soil having no significant limitations that affect forest use and management. If a soil has more than one limitation, the priority is as follows: *R*, *X*, *W*, *D*, *S*, and *F*.

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

Ratings of *equipment limitation* indicate limits on the use of forest management equipment, year-round or seasonal, because of such soil characteristics as slope, wetness, stoniness, and susceptibility of the surface layer to compaction. As slope gradient and length increase, the use of wheeled equipment becomes more difficult. On the steeper slopes, tracked equipment is needed. On slopes steeper than 40 percent, cable logging systems are needed. The rating is *slight* if equipment use is restricted by wetness for less than 2 months and if special equipment is not needed. The rating is *moderate* if slopes are so steep that wheeled equipment cannot be operated safely across the slope, if wetness restricts equipment use from 2 to 6 months per year, if stoniness restricts the use of ground-based equipment, or if special

equipment is needed to prevent or minimize compaction. The rating is *severe* if slopes are so steep that tracked equipment cannot be operated safely across the slope, if wetness restricts equipment use for more than 6 months per year, if stoniness restricts the use of ground-based equipment, or if special equipment is needed to prevent or minimize compaction. Ratings of moderate or severe indicate a need to choose the best suited equipment and to carefully plan the timing of harvesting and other management activities.

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

Ratings of *windthrow hazard* indicate the likelihood that trees will be uprooted by the wind. A restricted rooting depth is the main reason for windthrow. The rooting depth can be restricted by a high water table, by a fragipan, by bedrock, or by a combination of such factors as soil wetness, texture, structure, and depth. The risk is *slight* if strong winds break trees but do not uproot them; *moderate* if strong winds blow a few trees over and break many trees; and *severe* if moderate or strong winds commonly blow trees over. Ratings of moderate or severe indicate that care is needed in thinning or that the stand should not be thinned at all. Special equipment may be needed to prevent damage to shallow root systems in partial cutting operations. A plan for the periodic removal of windthrown trees and the maintenance of a road and trail system may be needed.

Ratings of *plant competition* indicate the likelihood of the growth or invasion of undesirable plants. Plant competition is more severe on the more productive soils, on poorly drained soils, and on soils having a

restricted root zone that holds moisture. The risk is *slight* if competition from undesirable plants hinders adequate natural or artificial reforestation but does not necessitate intensive site preparation and maintenance. The risk is *moderate* if competition from undesirable plants hinders natural or artificial reforestation to the extent that intensive site preparation and maintenance are needed. The risk is *severe* if competition from undesirable plants prevents adequate natural or artificial reforestation unless the site is intensively prepared and maintained. A moderate or severe rating indicates the need for site preparation to ensure the development of an adequately stocked stand. Managers should plan site preparation measures to ensure timely reforestation.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. Common trees are listed in table 11. Generally, only two or three tree species dominate. The first tree listed for each soil is the indicator species for that soil. An indicator species is a tree that is common in the area and that is generally the most productive on a given soil.

For soils that are commonly used for timber production, the yield is predicted in cubic feet per acre per year. It is predicted at the point where mean annual increment culminates. The estimates of the productivity of the soils in this survey are based mainly on eastern white pine, yellow-poplar, and northern red oak (3, 6, 12).

The *site index* is determined by taking height measurements and determining the age of selected trees within stands of a given species. This index is the average height, in feet, that the trees attain in a specified number of years (50 years in this survey). This index applies to fully stocked, even-aged, unmanaged stands. Site index may vary considerably among sites with the same soil because of the influence of past management, climate, relief, landform position, aspect, drainage, parent material, and elevation.

The *volume of wood fiber* is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year. Cubic feet per acre can be converted to cubic meters per hectare by dividing by 14.3. It can be converted to board feet by multiplying by a factor of about 5.

*Trees to manage* are those that are used for reforestation or, if suitable conditions exist, natural regeneration. They are suited to the soils and can produce a commercial wood crop. The short- and long-term timber management goals, topographic position (such as cool and warm aspects), and market

value are among the many factors that can influence the choice of trees for use in reforestation.

## Recreation

Bambi Teague, Resource Management Specialist, National Park Service, Blue Ridge Parkway, and Mitchell County Chamber of Commerce helped prepare this section.

The soils in Mitchell County play an important role in determining the suitability of areas for recreational uses, such as picnic and camping grounds and golf fairways. Knowledge of the soils is valuable for managing areas that have the potential for recreational development.

Mitchell County offers diverse recreational opportunities. Movie theaters, restaurants, skating rinks, craft shops, shopping plazas, motels, bed and breakfast inns, and other public attractions are in the towns of Bakersville and Spruce Pine. Public festivals include the Rhododendron Festival in Bakersville and the Mineral and Gem Show in Spruce Pine. Other areas of the county also have riding stables and trails, bed and breakfast inns, country clubs, private residences, and access roads. Pay-by-the-pound trout ponds are on flood plains in upper watersheds.

Pisgah National Forest makes up 17,498 acres in the northern part of the county. The most intensively used areas are Roan Mountain and Unaka Mountain. One of Roan Mountain's main attractions is the Catawba Rhododendron Gardens. Unaka Mountain offers Beauty Spot, a ridgetop where people can picnic and enjoy views to a distance of 40 miles. The National forest offers picnicking; nature study; trails for hiking, bicycling, and horseback riding; and roadway for motor vehicles. The best known trail is the Appalachian Trail. It follows the state line with Tennessee for approximately 20 miles. It crosses Unaka Mountain, Iron Mountain, and Roan Mountain, touching Piney Bald, Little Rock Knob, Round Bald, and Jane Bald (fig. 12).

Pisgah National Forest lands in Mitchell County are also used for hunting, fishing, camping, and white water rafting. They have been designated as State Game Lands by the North Carolina Fish and Game Commission. Most waters in the Pisgah National Forest are also designated as trout streams and are very popular. The U.S. Forest Service allows back-country camping throughout the National forest, and white water rafting access to the Nolichucky Gorge is also provided near the Poplar community.

Soils in the National forest vary in their ability to support recreational development. Soils on the intermediate and high mountains, such as Plott and



**Figure 12.—The Appalachian Trail, a major recreational resource, crosses Wayah, Burton, and Craggey soils on Round Bald and Roan Mountain.**

Wayah, have thick surface layers with high organic matter contents that are subject to compaction and severe erosion when disturbed by machinery or where trails are built. Cove soils, such as Balsam, Thunder, and Lostcove, have a large amount of stones and boulders that limit some recreational development. Because Sylco, Ashe, Cleveland, Burton, and Craggey soils have bedrock near the surface and are associated with rock outcrops, they are limited for most recreational uses. The soils on Unaka Mountain have inherited unstable characteristics from the parent rock. Unstable soils, such as Cheoah, Soco, and

Stecoah and, to a lesser extent, Harmiller and Shinbone, slump and slide when lateral support is removed. The building of trails, access roads, and camp areas may require special design to overcome these limitations.

The Blue Ridge Parkway traverses the southern border of Mitchell County for approximately 12 miles and makes up approximately 600 acres of the county. The highest elevation is 3,450 feet. The Parkway offers opportunities for hiking, picnicking, and sightseeing and access to commercial lodging at Little Switzerland and Spruce Pine. Several trails originate

from scenic overlooks along the Parkway. The Minerals Museum, located south of Spruce Pine at the Parkway, is open year-round and provides information on the county's rocks, minerals, and mining industry. The Blue Ridge Parkway is managed by the National Park Service of the U.S. Department of the Interior.

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

In table 12, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these measures.

The information in table 12 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 14 and interpretations for dwellings without basements and for local roads and streets in table 13.

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

*Picnic areas* are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm

when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

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

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

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

## Wildlife Habitat

Jack Mason, Wildlife Biologist, North Carolina Wildlife Resources Commission, and Matthew Flint, Biologist, Natural Resources Conservation Service, helped prepare this section.

Soils are a major factor in determining the amount and distribution of food, water, and cover available for wildlife. The soils of Mitchell County help to form a diversity of wildlife habitat that can support many wildlife species. Soils affect the kind, amount, and vigor of vegetation available to wildlife as food and cover.

Knowledge of soil types and the plant communities they support is valuable in managing wildlife. Generally, wildlife occupy areas that are the most suitable for their food, water, and cover requirements. Yet, soils that have a good potential for wildlife do not always support a large population of wildlife. Human activities can force wildlife onto soils that support less desirable habitat. This can adversely affect the kinds and numbers of wildlife.

Understanding soil-vegetation relationships is important in creating and maintaining productive areas of wildlife habitat. Soil surveys can be used in management programs, such as habitat improvement, species reintroduction, and creation of wildlife refuges.

A variety of habitat for a variety of wildlife is an important objective in wildlife management. The needs of wildlife habitat should be considered in all decisions involving land use and management.

The soils of the county support vast areas of woodland wildlife habitat. Many areas of woodland consist of immature mixed hardwoods that produce a variety of hard and soft mast. Black bear, turkey, gray squirrel, and woodpeckers, in particular, benefit from such habitat. On the warm, south- to west-facing aspects, Buladean, Evard, Pigeonroost, and Chandler soils provide food and cover, such as oaks, hickory, dogwood, pine, and mountain laurel. On the cooler, north- to east-facing aspects, Plott, Cashiers, and Hunt Dale soils support a plant community consisting of northern red oak, yellow-poplar, American beech, black cherry, and rhododendron. Areas of Ashe and Cleveland soils and rock outcrop support many varieties of lichens, grasses, and forbs. The many twisted and dead trees associated with these areas serve as important denning and nesting places for woodland wildlife. The remoteness of these areas also provides refuge for wildlife.

The availability of water and cover are key elements in wildlife habitat. Soils in coves, such as Cullasaja, Thunder, Saunook, Balsam, and Tanasee, have a cool, moist environment and frequently have seeps, springs, or streams. Boulders, stones, or dense thickets of rhododendron on these soils also provide cover for wildlife. Raccoon and ruffed grouse frequent these areas for food and cover. Salamanders and other amphibians benefit from the moisture in coves. Soils in coves on warm, south- to west-facing aspects contribute to wildlife habitat by providing moisture and a diversity of plants to an otherwise uniform plant community.

Wooded wetlands along the larger rivers and streams contribute to habitat diversity. Uncleared Biltmore, Bandana, Dellwood, and Reddies soils host wetland inclusions. These areas support dense plant cover. A variety of wildlife utilize these areas.

The cool-water streams of the county support brook, brown, and rainbow trout. The Nolichucky River has populations of smallmouth bass and walleye. Largemouth bass, bluegill, crappie, and other sunfish are dominant in warm-water ponds.

The severe climate at the high elevations limits the potential for diversity among tree species. Soils such as Wayah, Burton, and Tanasee support yellow birch, sweet birch, and northern red oak. They also support stands of red spruce and Fraser fir, where red squirrel and several less common species of salamander live. The soils on the high elevations support many

varieties of soft mast, forbs, and grasses, especially on balds and in open areas. Black bear, ruffed grouse, and deer utilize these areas. Hawks and other birds of prey use the open areas for hunting.

The size and remoteness of the habitat at the higher elevations is critical in some wildlife management programs. These areas are becoming increasingly important to species that require large tracts of habitat, such as black bear. The unique grassy balds in areas of Wayah and Burton soils provide wildlife open areas. Shallow, rocky crags in areas of Burton and Craggey soils and areas of rock outcrop have already served as suitable habitat for the reintroduction of the endangered peregrine falcon.

Many open areas are the result of human activities. Generally, open spaces in the county occur mainly on the less sloping landscapes at the lower elevations. The complex soil and vegetation patterns associated with these open areas can provide the most habitat diversity when suitable woodland cover is nearby. These areas are also used for a variety of human activities, including agricultural, residential, industrial, and recreational development. Most of these activities preclude use of the land by many wildlife species.

Wildlife, especially large game, are forced to move to less desirable soils which support less desirable habitat. The result is a decrease in wildlife populations. Soils with a good potential for providing wildlife habitat do not necessarily support a viable wildlife population. For example, Rosman, Dillsboro, Evard, and Clifton soils are rated good as potential habitat for woodland wildlife. However, these soils are intensively used for farming and housing, forcing woodland wildlife elsewhere. Other soils, such as Buladean, Hunt Dale, and Pigeonroost, also have good potential for woodland wildlife habitat, and most of their acreage is in woodland. However, cattle are often given access to woodland and then outcompete wildlife for food.

Wildlife habitat can be created or improved by planting vegetation, maintaining existing plant cover, or by promoting the natural establishment of desirable plants. In open areas, soil conservation measures, such as field borders and vegetative filter strips, provide the needed food and cover. Establishing plant cover along access roads helps to provide food for wildlife and prevent the sedimentation of lakes and streams.

Many woodland management techniques can be used to increase the potential for wildlife habitat. Openings in the forest canopy encourage plant diversity and subsequently increase the potential wildlife habitat for many species. When cutting timber or firewood, some snags or older trees should be left

for use as shelter for cavity nesters, such as woodpeckers, and for use as denning sites for raccoons or squirrels. Unusually large trees, uncommon tree species, and some mast-bearing trees and shrubs should also be left. Keeping well dispersed groups of different aged timber stands with some variety of tree species in every stand is key to providing overall benefits for wildlife.

## Engineering

Howard Tew, Civil Engineer, Natural Resources Conservation Service, helped prepare this section.

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

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

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

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

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

permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

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

In order to effectively evaluate soils for engineering or construction purposes, the factors which limit soils use must be considered. In Mitchell County there are a number of soil-site characteristics which pose engineering difficulties. Among the most important are slope, erodibility, instability (poor bearing strength or shear strength), shrink-swell potential, stoniness, depth to bedrock, freeze-thaw cycles, hydrology, and organic matter content.

*Slope.*—In Mitchell County, slopes range from 0 to more than 95 percent. Most soils are on slopes of more than 15 percent. The steeper the slope the greater a limitation it is. As slope increases, access roads require higher cut faces and longer fill slopes, buildings require stronger foundations, and septic tank filter fields need special design. Some soils may be unsuitable for development because of the slope.

Rainfall runoff from steep watersheds results in high peak rates and flow velocities in receiving streams. Water flow and impoundment structure design must meet exacting standards in order to control the high runoff from these watersheds. Ponds, sediment basins, and waterways are likely to be damaged or may wash out if the complications of steep slopes are not considered in construction design. Downstream damages and subsequent liability should a failure occur are the consequences of a poor design.

*Erodibility.*—Erosion control on steep slopes presents a unique challenge. During construction, surface cover is removed, exposing soil to erosion. Piles of soil around a construction site have no resistance to erosional forces. Whenever runoff is allowed to accumulate and move uncontrolled across



**Figure 13.—Sediment basins should be installed before land disturbing activities begin. They keep eroding soil on site and help to maintain water quality.**

construction sites, severe erosion occurs. Excavations on sloping mountain soils result in severe erosion and offsite sediment damage unless adequate erosion-control measures are taken (fig. 13).

Cuts on mountainsides generally result in high fills with steep and very steep slopes. Construction which requires significant cuts and fills on mountain side slopes needs careful erosion control. Typically, fill slopes consist dominantly of saprolite and rock fragments. Saprolite can be very erosive, droughty, infertile, and very strongly acid or extremely acid. These characteristics make it difficult to stabilize the slope with vegetation.

Fill slopes for which compaction is not carefully monitored and controlled usually have low density and high porosity. As water moves through a fill slope, settling occurs. As the pores fill with water, the fill slope becomes heavier. This results in piping, differential settling, severe slope failure, and offsite sediment damage. Generally, micaceous soils are underlain by micaceous saprolite. Also, soils with a low mica content are commonly underlain by micaceous saprolite. Fill slopes containing micaceous saprolite have slope failure at a lower water content than fill slopes that do not contain a high amount of mica.

*Instability.*—In order to support loads, such as high fills, buildings, or vehicular traffic, undisturbed soils must possess an inherent bearing strength. Undisturbed sloping soils must also provide a degree of shear strength in order to support their own weight. Additional loading puts a greater stress on the soil. When loading stresses exceed bearing strength or shear strength, or both, soils move unpredictably. Loading stresses exceed bearing or shear strengths, or both, more quickly on micaceous soils or on soils derived from metasedimentary rock than on other soils. Any excavation cut across the slope of these soils removes the lateral support holding the soil back. In time the weight of the soil above the cut may cause downslope movement, which damages roads and structures.

Soils, like machines, move more freely when lubricated. Such lubrication of soils occurs where there are high concentrations of mica. Mica can be detected by a slick greasy feel and by a shiny sparkle in the soil when struck by the sun or other bright light. Water also is a soil lubricant. When soil becomes saturated with water, it tends to move away from the loading forces applied to it. Whether lubricated by natural soil particle characteristics or by water, soil that moves provides very little shear strength. Micaceous soils or soils subject to seeps and springs are poor choices for construction sites due to poor strength manifested by downslope movement. Fannin, Watauga, Cashiers, Micaville, and Chandler soils are unstable due to a high mica content. Soils in coves and on toeslopes, such as Saunook, Thunder, Lostcove, Keener, and Cullasaja soils, contain seeps and springs.

Landscapes in northwestern Mitchell County are unstable because of their metasedimentary geologic origin. These areas include Cheoah, Sylco, Soco, and Stecoah soils and, to a lesser extent, Harmiller and Shinbone soils. The underlying rock occurs in layers which run approximately parallel to the natural slope. This rock structure provides very little shear strength and tends to slide when loaded. Soil particles weathered from these rocks tend to be flat and slippery when wet. Any excavation cut across the slope of these soils removes the lateral support holding the soil back. In time the weight of the soil above the cut may cause downslope movement, which damages roads and structures.

Rosman and Biltmore soils occur on flood plains dominantly along the North Toe River. These soils are composed predominantly of fine to coarse sands and silts. They have little natural plasticity and may become unstable when excavated. The soil particles are not bound together by an adhesive of clay and can

flow when subjected to excessive loading while wet. Excavations in such soils are difficult and can be dangerous. In addition, side walls tend to cave in and slough off when lateral support is removed. Extensive shoring of excavation pits and walls is needed if cave-ins are to be prevented.

*Shrink-swell potential.*—Dillsboro soils on terraces and in coves in Mitchell County have clay with a moderate shrink-swell potential. Shrinking and swelling causes soil to push against foundations and buried pipes. Over time, foundations crack and pipes break. Special planning and design of footings, foundations, and underground utilities may be required before construction begins.

*Stoniness.*—Most mountain soils contain rock fragments. These fragments range in size from gravel to boulders. Soils are classified skeletal when 35 percent or more of their volume is rock fragments. Skeletal soils are limited for engineering uses due to the rock content. They need special design to overcome the limitations. Cove soils such as Lostcove, Cullasaja, and Thunder are skeletal. Other cove soils, such as Dillsboro, Keener, and Saunook, have fewer stones in the profile. Flood plain soils are underlain by smooth, water-rounded rock fragments ranging from fine gravel to boulders. Dellwood soils are skeletal beginning at a depth of 10 to 20 inches. Reddies and Bandana soils have 20 to 40 inches of non-skeletal material above the skeletal layer. The skeletal layer in Rosman and Biltmore soils is even deeper.

The stone content of residual soils in Mitchell County, such as Buladean, Hunt Dale, Pigeonroost, Micaville, and Shinbone, varies from only a few rock fragments to as much as 35 percent of the soil volume. The rock fragment content of a soil can vary from place to place in the county and even within the soil profile.

Construction and development require compaction of fill material to provide firm foundations and impervious layers. An excessive amount of rock fragments in fill material inhibits compaction. Unacceptable settlement is likely to occur, resulting in damage to buildings, structures, and roads. Compaction of rocky soils fails to produce the homogeneous density required in the construction of earth dams and other water-retention structures. Shallow excavations and fine grading may be difficult in excessively stony soils.

When analyzing soils for engineering purposes, the content of rock fragments should receive special emphasis. The Unified Soil Classification System (USCS) evaluates textures only for that fraction of the soil passing the No. 200 sieve (grain size 0.074

millimeter and less). The USCS texture for a specific soil may be shown as SC (sand with clay fines) or CL (low plastic clay), which indicates that the soil is ideal for fill material and responds acceptably to compaction. However, the soil may contain rock fragments too large to pass the No. 200 sieve and thus be unsuitable for use as fill. Consult the pedon description in the "Classification of the Soils" section for evidence of excessive stoniness. An onsite investigation may be necessary in order to determine actual conditions.

*Depth to bedrock.*—Hard bedrock is between depths of 10 and 40 inches in Ashe, Cleveland, Sylco, Burton, and Craggey soils. Hard bedrock is indicated in the pedon descriptions of these soils by the horizon designation "R". Chestnut, Soco, Cowee, Pigeonroost, and Harmiller soils have weathered bedrock between depths of 20 and 40 inches. Buladean, Micaville, Stecoah, and Shinbone soils have weathered bedrock at a depth of 40 to 60 inches. Weathered bedrock is indicated in the "Classification of the Soils" section by the horizon designation "Cr."

Hard bedrock cannot be excavated with machinery unless it is highly fractured. Weathered bedrock can be excavated with machinery. The relative hardness of weathered bedrock generally increases as depth increases. Soft, weathered bedrock, which is easily excavated at a depth of 4 feet, may become hard and unrippable at a depth of 8 feet. The surfaces of these restrictive features are undulating below the soil, and onsite investigations are needed to determine their topography before construction begins. Material excavated from weathered bedrock layers will be dry, brittle, and hard to pack.

*Freeze-thaw cycles.*—Soils in Mitchell County located on south- and west-facing slopes are exposed to continual freezing and thawing from November to March. Soils such as Evard, Cowee, Watauga, Fannin, Edneytown, Pigeonroost, Shinbone, Harmiller, and Clifton are susceptible to heaving. Frost action loosens the surface of the soil and heaves it above its normal position. Subsequent thawing may leave the soil surface in a near liquid state. In this condition the soil is subject to erosion and has little load-supporting strength. Unprotected slopes become eroded, and access roads become impassable. At times a thaw may not affect all of the frozen soil. When this happens an unfrozen, heaved layer of soil is on top of frozen soil. Severe erosion can occur when soil is in this condition as water moves across the top of the frozen soil. A soil surface cover such as mulch, vegetation, or gravel can minimize the effects of freezing and thawing.

Frost heaving exerts considerable force on footings and foundations located on susceptible soils. Potential damage from frost heave should be considered in the design of structures. Frozen soil resists compaction and should not be used in fill material when compacted densities are important. Depth of frost penetration varies with elevation and aspect across the county. Soils on north-facing slopes develop frost to greater depths than soils on south-facing slopes but do not cycle as often. Frost penetration may exceed 24 inches in some years at the higher elevations in Mitchell County.

*Hydrology.*—Soil water affects almost all of the other engineering characteristics of soils already discussed. However, water by itself can limit engineering uses of soils in many ways. Dellwood, Reddies, Bandana, Rosman, and Biltmore soils occur on flood plains. Biltmore soils flood frequently, and Dellwood, Reddies, Bandana, and Rosman soils flood occasionally. Dillsboro soils are on low terraces that flood rarely. Any structure may be damaged in a flood. These areas should not be used for urban development, except possibly for ball fields and playgrounds.

Thunder, Cullasaja, Saunook, Lostcove, Keener, and Dillsboro soils are in coves and have seeps and springs underground or at the surface. Excavations in these soils may cut into underground water flows, flooding the hole. Special engineering design is needed to divert the water away from the structure.

Overland flow is a serious water problem on mountain land. Any access road, building, or other structure developed on a mountainside requires a design that diverts surface runoff away from it.

Bandana, Rosman, Reddies, and Dellwood soils have water tables close enough to the soil surface to be a limitation to development. Since these soils flood, land use should be limited to agricultural and recreational uses.

*Organic matter content.*—Wayah, Burton, Craggey, Balsam, Tanasee, Plott, Cashiers, Cheoah, Hunt Dale, Saunook, Thunder, Cullasaja, Dillsboro, Rosman, Dellwood, and Reddies soils have an organic matter content in the surface layer that causes low bearing strength. Access roads and construction sites in areas of these soils are of low quality unless the topsoil is removed or surfaced. It is best to remove the organic-rich topsoil and stockpile it for use during the final grading before using machinery on the area.

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

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

## Building Site Development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

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

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

*Local roads and streets* have an all-weather surface and carry automobile and light truck traffic all year.

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

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

## Access Roads

Establishing and maintaining access roads in the survey area has always been difficult. Sedimentation from roads is the largest source of non-point pollution in the county. A new road is often built along the path of an old one, and past errors are repeated. Currently, road construction in the mountains is at an unprecedented high level. Landowners are reopening old roads to provide access to woodlots and intermittently used farmland. Roads are opened or built each year for logging on private and government-owned lands. The largest effort in road construction, however, is providing access to real estate developments. In all of these situations, the design of a low-cost, nonpolluting, and essentially self-maintaining road is needed (fig. 14).

The U.S. Forest Service has supported research and demonstrations on design for forest access roads for more than 50 years at the Coweeta Hydrologic Laboratory in the Nantahala Mountains in Macon County, North Carolina. Early work demonstrated methods of roadbank stabilization that use brush and native grasses or weed species. Through a series of logging demonstrations, the design of a minimum

standard, intermittent-use road was developed and tested. Features of this design apply to both seldom used and development access roads and are as follows:

1. Soils and geology are identified on maps, and site selection or construction practices, or both, are modified where unstable conditions are located.
2. All exposed soil is revegetated as construction proceeds.
3. The siltation of permanent and intermittent streams is reduced by maintaining a filter strip of undisturbed soil between the road and the stream channel and by building at right angles across channels, always using bridges, open pipe, or stream-crossing fords with geotextile and gravel.
4. Vegetation and brush that are cut from the right-of-way are piled below the roadway prior to construction. This barrier intercepts sediment-laden storm water or slows its movement downslope.
5. A covering is provided for loose soil in fills to help control erosion at critical points, such as stream crossings and dip outlets. Mulch netting or scattered branches, brush, cut weeds, or grass help to protect the soil until new grass is established.
6. Surface water is removed from the roadbed by out-sloping and broad-based dips and inside ditches. (In-sloped roads with ditches and culverts are recommended by NRCS for heavily used areas.)
7. Broad-based dips, which are short sections of reverse grade, intercept storm water and divert it off the roadbed. Dips are spaced about 200 feet apart and placed where they can divert water away from stream crossings or steep grades.
8. Maximum grade is restricted to 8 percent wherever possible.
9. Where roadbeds are not graveled, grass is planted on the entire roadway. Although traffic may kill grass in part of the roadbed, the rest of the roadbed will remain protected against erosion. Gravel is used on the steeper grades, on problem soils, or in high-traffic areas. Large, washed rock (3 inch nominal diameter) provides an effective erosion-control pavement on light-traffic roads. Gravel bonds best to the roadbed if it is added immediately after construction, when the soil is loose.
10. Required maintenance for access roads is increased by traffic in winter and early spring, when the soil is wet and soft. If traffic can be controlled, the annual mowing of grass and brush, supplemented by the periodic cleaning of dip outlets, may be the only maintenance needed. Areas of greater traffic may require that the roadbed be smoothed every 5 to 10 years and the grass and gravel replaced. Areas of



**Figure 14.—A well designed access road minimizes soil erosion and allows year-round use.**

heavy year-round traffic require that the road be upgraded and receive scheduled maintenance.

The road design developed and tested at the Coweeta Hydrologic Laboratory has influenced Federal, State, and forest industry guidelines and has helped to reduce the hazard of erosion and minimize the impact on water quality.

In 1985, the Natural Resources Conservation Service published the booklet "The Layman's Guide to Private Access Road Construction in the Southern Appalachian Mountains." This booklet provides information to home builders and developers on building access roads while minimizing cost and environmental impact. One should consider the detailed information given in the description of each soil under "Detailed Soil Map Units" and in the tables. More specific information can be obtained from the local office of the Natural Resources Conservation Service or the Mitchell Soil and Water Conservation District.

## Sanitary Facilities

Table 14 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 14 also shows the suitability of the soils for use as daily cover for landfill. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

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

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

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to

hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. The animal waste lagoons commonly used in farming operations are not considered in the ratings. They are generally deeper than the lagoons referred to in the table and rely on anaerobic bacteria to decompose waste materials.

Table 14 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, depth to a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

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

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

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

The ratings in table 14 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

*Daily cover for landfill* is the soil material that is used to cover compacted solid waste in an area

sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

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

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

## Construction Materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good*, *fair*, or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

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

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

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a high water table, and slope. How well the

soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

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

*Sand* and *gravel* are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

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

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

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

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a

high water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a high water table, rock fragments, bedrock, and toxic material.

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

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

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

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

## Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and for embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

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

*Pond reservoir areas* hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the

storage capacity of the reservoir area. Ponds that are less than about 2 acres in size are not shown on the maps because of the scale of mapping.

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

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

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

Soils that have a high content of mica, such as Chandler, Micaville, Fannin, and Watauga soils, are poorly suited to use in the construction of embankments. The problems resulting from the high content of mica include difficulty in compaction, poor trafficability, susceptibility to erosion, and low shear strength. Also, piping commonly is a problem if the soil material is used to impound water.

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

*Drainage may be a major management consideration in some areas. Management of drainage in conformance with regulations concerning wetlands may require special permits and extra planning. The local office of the Natural Resources Conservation*

*Service should be contacted for identification of hydric soils and potential wetlands.*

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

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large

stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

*Grassed waterways* are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of soil blowing, a low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.



# Soil Properties

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

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

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

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

## Engineering Index Properties

Table 17 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

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

*Texture* is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages, by weight, of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and

less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, by volume, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

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

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

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

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

*Rock fragments* larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

*Percentage (of soil particles) passing designated*

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

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

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

## Physical Properties

Table 18 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 18, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at  $1/3$ - or  $1/10$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties.

The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity* refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity ( $K_{sat}$ ). The estimates in the table indicate the rate of water movement, in micrometers per second (um/sec), when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

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

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at  $1/3$ - or  $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In table 18, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be

maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in table 18 as the K factor ( $K_w$  and  $K_f$ ) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor  $K_w$*  indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor  $K_f$*  indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

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

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- 4L. Calcareous loams, silt loams, clay loams, and silty clay loams.
4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

## Chemical Properties

Table 19 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

*Cation-exchange capacity* is the total amount of extractable bases 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. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

*Effective cation-exchange capacity* refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

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

## Water Features

Table 20 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

*Hydrologic soil groups* are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when

the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

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

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

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

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a 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.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

*Water table* refers to a saturated zone in the soil. Table 20 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

*Ponding* is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 20 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year);

and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

*Flooding* is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

*Duration* and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year).

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

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

## Soil Features

Table 21 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that restrict roots or otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense

layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation.

*Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

*Subsidence* is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence generally results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. The table shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which results from a combination of factors.

*Potential for frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very

gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

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

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

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



# Classification of the Soils

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The system of soil classification used by the National Cooperative Soil Survey has six categories (18). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 22 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

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

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

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

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

*Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

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

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

## Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The location of the typical pedon is described, and coordinates are identified by longitude and latitude. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (20). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (18) and in "Keys to Soil Taxonomy" (21). Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

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

## Ashe Series

*Depth class:* Moderately deep

*Drainage class:* Somewhat excessively drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Low and intermediate mountains throughout the county

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 30 to 95 percent

*Taxonomic class:* Coarse-loamy, mixed, mesic Typic Dystrochrepts

### Typical Pedon

Ashe very gravelly sandy loam in an area of Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, very bouldery; from Bakersville, 5.6 miles north on North Carolina Highway 226, about 8.4 miles west on Secondary Road 1304, about 0.9 mile west on Secondary Road 1320, about 300 feet north in woodland; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 01 minute 18 seconds N. and long. 82 degrees 20 minutes 06 seconds W.

O<sub>i</sub>—1 inch to 0; slightly decomposed leaf litter.

A<sub>1</sub>—0 to 3 inches; very dark brown (10YR 2/2) very gravelly sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; many very fine and fine and few medium roots; few very fine and fine tubular pores; few fine flakes of mica; 25 percent gravel and 10 percent cobbles; extremely acid; clear wavy boundary.

A<sub>2</sub>—3 to 6 inches; dark yellowish brown (10YR 4/4) very gravelly sandy loam, yellowish brown (10YR 5/5) dry; weak medium granular structure; very friable; many very fine and fine and few medium roots; few very fine and fine tubular pores; few fine flakes of mica; 35 percent gravel and 5 percent cobbles; extremely acid; clear wavy boundary.

B<sub>w</sub>—6 to 21 inches; brown (7.5YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; very friable; few fine and medium and common coarse roots; few very fine, fine, and medium pores; common fine flakes of mica; 20 percent gravel; extremely acid; gradual wavy boundary.

C—21 to 32 inches; brown (10YR 4/3) gravelly sandy loam saprolite; massive; very friable; few very fine, fine, and medium roots; few very fine tubular pores; few fine flakes of mica; 20 percent gravel; extremely acid; abrupt irregular boundary.

R—32 to 43 inches; unweathered, slightly fractured biotite granitic gneiss.

### Range in Characteristics

*Solum thickness:* 14 to 40 inches

*Depth to bedrock:* 20 to 40 inches to hard bedrock

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* 5 to 35 percent; mostly gravel but including cobbles and stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A<sub>1</sub> horizon:*

Color—hue of 10YR or 2.5Y, value of 3 or 4, and chroma of 2 to 6; where value is 3 or less, horizon is less than 7 inches thick

Texture (fine-earth fraction)—sandy loam

*A<sub>2</sub> horizon:*

Color—hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 6

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

*B<sub>w</sub> horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

*C horizon:*

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam saprolite

*Cr layer (if it occurs):*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

*R layer:*

Type of bedrock—unweathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock

## Balsam Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock and metasediment on Unaka Mountain

*Landscape:* High mountains from Little Rock Knob to Roan Mountain, south to Spears Top, and on Unaka Mountain

*Landform:* Coves, drainageways, and colluvial fans

*Landform position:* Head slopes, side slopes, and footslopes

*Slope range:* 15 to 50 percent

*Taxonomic class:* Loamy-skeletal, mixed, frigid Typic Haplumbrepts

### Typical Pedon

Balsam sandy loam in an area of Tanasee-Balsam complex, 15 to 30 percent slopes, very bouldery; from Bakersville, 12.7 miles north on North Carolina Highway 261 to Carver's Gap, 1.0 mile southwest on Secondary Road 1348, about 0.8 mile west on Balsam Road, in a southeast-facing road cut in woodland; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 05 minutes 45 seconds N. and long. 82 degrees 07 minutes 00 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A1—0 to 3 inches; black (10YR 2/1) sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many very fine to medium and common coarse roots; many very fine and fine and common medium and coarse tubular pores; few fine flakes of mica; 10 percent gravel, 2 percent cobbles, and 10 percent stones; very strongly acid; clear smooth boundary.

A2—3 to 13 inches; very dark grayish brown (10YR 3/2) gravelly fine sandy loam, dark brown (10YR 4/3) dry; weak medium granular structure; very friable; many very fine to medium roots; many very fine and fine and common medium and coarse tubular pores; few fine flakes of mica; 20 percent gravel, 1 percent cobbles, and 5 percent stones; very strongly acid; clear smooth boundary.

BA—13 to 27 inches; strong brown (7.5YR 4/6) very gravelly loamy coarse sand; common medium distinct brownish yellow (10YR 6/6) and dark red (2.5YR 3/6) mottles; weak fine subangular blocky structure; friable; common very fine and fine and few medium and coarse roots; common very fine to medium tubular pores; few fine flakes of mica; 40 percent gravel, 10 percent cobbles, and 1 percent stones; moderately acid; gradual wavy boundary.

Bw1—27 to 42 inches; strong brown (7.5YR 4/6) very gravelly sandy loam; weak fine subangular blocky

structure; friable; common very fine and fine and few medium roots; common very fine and fine and few medium pores; few fine flakes of mica; 35 percent gravel, 15 percent cobbles, and 1 percent stones; moderately acid; gradual wavy boundary.

Bw2—42 to 63 inches; strong brown (7.5YR 4/6) extremely gravelly sandy loam; weak fine subangular blocky structure; friable; few very fine and fine roots; common very fine and few fine tubular pores; few fine flakes of mica; 45 percent gravel, 20 percent cobbles, and 1 percent stones; strongly acid; gradual wavy boundary.

Bw3—63 to 74 inches; strong brown (7.5YR 4/6) extremely gravelly coarse sandy loam; weak fine subangular blocky structure; friable; few very fine and fine roots; few very fine tubular pores; few fine flakes of mica; 50 percent gravel, 15 percent cobbles, and 1 percent stones; moderately acid; gradual wavy boundary.

C—74 to 90 inches; strong brown (7.5YR 4/6) very gravelly loamy coarse sand; massive; very friable; few fine flakes of mica; 45 percent gravel, 10 percent cobbles, and 1 percent stones; moderately acid.

### Range in Characteristics

*Solum thickness:* 40 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* 20 to 90 percent; ranging from gravel to boulders, typically increasing in size as depth increases

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A horizon:*

Color—hue of 7.5YR to 2.5Y, value of 2 or 3, and chroma of 0 to 3

Thickness—10 to 20 inches

Texture (fine-earth fraction)—sandy loam

*BA horizon:*

Color—hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 4 to 8

Mottles—shades of red, brown, yellow, or olive

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

*Bw horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

*BC horizon (if it occurs):*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

*C horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, or fine sandy loam

**Bandana Series**

*Depth class:* Very deep

*Drainage class:* Somewhat poorly drained

*Depth to seasonal high water table:* 1.0 to 2.0 feet from December through May

*Permeability:* Moderately rapid in the upper part and rapid or very rapid in the lower part

*Parent material:* Recent alluvium that is loamy in the upper part and sandy-skeletal in the lower part

*Landscape:* Intermountain hills and mountains

*Landform:* Flood plains throughout the county

*Landform position:* Planar to slightly concave bottomland slopes

*Slope range:* 0 to 3 percent

*Taxonomic class:* Coarse-loamy, mixed, nonacid, mesic Aeric Fluvaquents

**Typical Pedon**

Bandana sandy loam, 0 to 3 percent slopes, occasionally flooded; from Bakersville, 2.5 miles north on North Carolina Highway 226 to Loafers Glory, 0.4 mile south on North Carolina Highway 80, about 450 feet west of the highway in pasture; Bakersville USGS topographic quadrangle; lat. 36 degrees 00 minutes 36 seconds N. and long. 82 degrees 10 minutes 06 seconds W.

Ap—0 to 8 inches; brown (10YR 4/3) sandy loam, yellowish brown (10YR 5/4) dry; weak medium granular structure; friable; many very fine and fine roots; common very fine and fine and few medium tubular pores; common fine flakes of mica; 5 percent gravel; slightly acid; clear smooth boundary.

Bw—8 to 18 inches; yellowish brown (10YR 5/4) sandy loam; weak coarse subangular blocky structure; friable; common very fine and fine roots; few very fine to medium tubular pores; few fine faint grayish brown (10YR 5/2) irregularly shaped iron depletions with clear boundaries throughout;

common fine flakes of mica; 5 percent gravel; moderately acid; clear smooth boundary.

Cg1—18 to 27 inches; grayish brown (10YR 5/2) sandy loam; massive; very friable; few very fine and fine roots; few medium tubular pores; common fine distinct strong brown (7.5YR 4/6) irregularly shaped masses of iron accumulation with clear boundaries in the matrix; common fine flakes of mica; 10 percent gravel; moderately acid; abrupt smooth boundary.

Cg2—27 to 37 inches; gray (N 5/0) sandy loam; massive; very friable; few very fine and fine roots; few medium tubular pores; common fine flakes of mica; 10 percent gravel; slightly acid; abrupt wavy boundary.

C—37 to 62 inches; 40 percent dark yellowish brown (10YR 4/4), 30 percent grayish brown (10YR 5/2), and 30 percent strong brown (7.5YR 4/6) very gravelly sand; single grain; loose; strong brown areas are iron accumulations, and grayish brown areas are iron depletions; few sand strata 1 to 3 inches thick; common fine flakes of mica; 45 percent gravel and 5 percent cobbles; slightly acid.

**Range in Characteristics**

*Solum thickness:* 10 to 30 inches

*Depth to contrasting material:* 20 to 40 inches to deposits of cobbles and gravel stratified with sandy or loamy material

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent to a depth of 20 to 40 inches and more than 35 percent in the lower part of the profile; mostly gravel and cobbles but including stones

*Soil reaction:* Strongly acid to slightly acid throughout the profile

*Ap or A horizon:*

Color—hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 3 to 6; where value is 3 or less, horizon is less than 7 inches thick

Texture (fine-earth fraction)—sandy loam

*Bw horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 3 to 8

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron

accumulations in shades of red, brown, yellow, or olive

*Cg horizon:*

Color—horizon has hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 1 or 2 or is neutral in hue and has value of 3 to 8

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

*C horizon:*

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8

Mottles or streaks (if they occur)—shades of black, red, brown, yellow, white, gray, or olive

Texture (fine-earth fraction)—coarse sand, sand, fine sand, loamy coarse sand, loamy sand, or loamy fine sand

Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

## **Biltmore Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* 3.5 to 6.0 feet from December through May

*Permeability:* Rapid

*Parent material:* Recent sandy alluvium

*Landscape:* Mountains

*Landform:* Flood plains dominantly on the North Toe and Nolichucky Rivers

*Landform position:* Planar to slightly convex bottomland slopes

*Slope range:* 0 to 3 percent

*Taxonomic class:* Mixed, mesic Typic Udipsamments

### **Typical Pedon**

Biltmore sand, 0 to 3 percent slopes, frequently flooded; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 0.8 mile south on North Carolina Highway 197 to the North Toe River at the Mitchell-Yancey County line, 100 feet west in an overgrown field; Bakersville USGS topographic quadrangle; lat. 36 degrees 01 minute 18 seconds N. and long. 82 degrees 13 minutes 40 seconds W.

A—0 to 10 inches; yellowish brown (10YR 5/4) sand, brownish yellow (10YR 6/6) dry; weak coarse granular structure; very friable; many very fine and fine, common medium, and few coarse roots; common fine to coarse tubular pores; many fine and few medium and coarse flakes of mica; slightly acid; gradual wavy boundary.

C1—10 to 30 inches; yellowish brown (10YR 5/4) sand; massive; very friable; many very fine, common fine and medium, and few coarse roots; few fine and medium tubular pores; many fine and few medium and coarse flakes of mica; slightly acid; gradual wavy boundary.

C2—30 to 45 inches; yellowish brown (10YR 5/4) sand; single grain; loose; common very fine to medium and few coarse roots; common fine to coarse tubular pores; many fine and few medium and coarse flakes of mica; slightly acid; clear wavy boundary.

C3—45 to 62 inches; yellowish brown (10YR 5/6) fine sand; massive; very friable; few very fine, common fine and medium, and few coarse roots; few fine and medium pores; many fine and few medium and coarse flakes of mica; strongly acid.

### **Range in Characteristics**

*Depth to contrasting material:* 40 to more than 60 inches to deposits of cobbles and gravel stratified with sandy or loamy material

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few to many

*Content and size of rock fragments:* 0 to 10 percent to a depth of 40 inches and variable below a depth of 40 inches; mostly gravel and cobbles

*Soil reaction:* Strongly acid to slightly alkaline throughout the profile

*A, Ab, or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 6; where value is 3 or less, horizon is less than 10 inches thick

Texture—sand

*Bw horizon (if it occurs):*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 6 to 8

Texture—sand, loamy sand, or loamy fine sand

*C horizon (to a depth of 40 inches):*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8

Texture—sand, loamy sand, or loamy fine sand

*C horizon (below a depth of 40 inches):*

Color—hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 1 to 6

Texture—horizon is sand, loamy sand, or loamy fine sand and stratified with layers of cobbles, gravel, or loamy sediments

Redoximorphic features (if they occur)—iron or clay depletions in shades of brown, yellow, olive or gray; iron accumulations in shades of red, brown, yellow, or olive

## ***Buladean Series***

*Depth class:* Deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Low and intermediate mountains dominantly in the northern half of the county

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 15 to 95 percent

*Taxonomic class:* Coarse-loamy, mixed, mesic Typic Dystrochrepts

### **Typical Pedon**

Buladean loam in an area of Buladean-Chestnut complex, 30 to 50 percent slopes, stony; from the Buladean community, 4.0 miles north on North Carolina Highway 226 to Iron Mountain Gap at the North Carolina-Tennessee State line, 0.7 mile southwest on U.S. Forest Service Road 5882 to a fork in the road, 0.2 mile west on the right fork, in a south-facing road cut; Iron Mountain Gap USGS topographic quadrangle; lat. 36 degrees 07 minutes 04 seconds N. and long. 82 degrees 14 minutes 15 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; weak fine granular structure; very friable; many very fine and fine, common medium, and few coarse roots; many very fine to medium and common coarse tubular pores; 2 percent gravel; strongly acid; clear smooth boundary.

Bw1—3 to 20 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; common very fine to medium and few coarse roots; common very fine to medium and few coarse tubular pores; few fine flakes of mica; 5 percent gravel; strongly acid; clear wavy boundary.

Bw2—20 to 26 inches; brown (7.5YR 4/4) coarse sandy loam; weak fine subangular blocky structure; friable; common very fine to coarse roots; common very fine to coarse tubular pores; few very fine flakes of mica; 5 percent gravel; strongly acid; gradual wavy boundary.

C—26 to 50 inches; multicolored coarse sandy loam saprolite; massive; very friable; few very fine to medium and common coarse roots; few very fine to coarse tubular pores; few very fine flakes of mica; 5 percent gravel; strongly acid; abrupt smooth boundary.

Cr—50 to 86 inches; weathered, multicolored, slightly fractured biotite granitic gneiss that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

### **Range in Characteristics**

*Solum thickness:* 20 to 40 inches

*Depth to bedrock:* 40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent; mostly gravel

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A or Ap horizon:*

Color—hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 4; where value is 3 or less, horizon is less than 7 inches thick  
Texture (fine-earth fraction)—loam

*Bw horizon:*

Color—hue of 7.5YR or 10YR and value and chroma of 4 to 6  
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*BC horizon (if it occurs):*

Color—horizon has hue of 7.5YR to 2.5Y, value of 4 to 8, and chroma of 1 to 6, or it is mixed or mottled in shades of these colors; colors with chroma of 2 or less are inherited from the parent material and are not caused by wetness  
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam; some pedons have pockets of loamy sand or sandy loam saprolite

*C horizon:*

Color—horizon is multicolored or has hue of 5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8 and may be mixed or mottled in shades of these colors; colors with chroma of 2 or less

are inherited from the parent material and are not caused by wetness

Texture (fine-earth fraction)—loamy sand or sandy loam saprolite

*Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

## **Burton Series**

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock and metasandstone on Unaka Mountain

*Landscape:* High mountains from Little Rock Knob to Roan Mountain, south to Spears Top, and on Unaka Mountain

*Landform:* Ridges and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 8 to 95 percent

*Taxonomic class:* Fine-loamy, mixed, frigid Typic Haplumbrepts

### **Typical Pedon**

Burton gravelly sandy loam in an area of Burton-Craggy complex, windswept, 8 to 15 percent slopes, extremely bouldery; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 15 miles north on North Carolina Highway 197 to Indian Grave Gap at the Tennessee-North Carolina State line, 4.3 miles east on U.S. Forest Service Road 230 to a hairpin curve near the Appalachian Trail, 0.5 mile up the trail to ridgetop on Unaka Mountain, 25 feet north of the trail in woodland; Unicoi USGS topographic quadrangle; lat. 36 degrees 07 minutes 42 seconds N. and long. 82 degrees 18 minutes 24 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A1—0 to 10 inches; very dark gray (10YR 3/1) gravelly sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; few very fine, common fine and medium, and many coarse roots; few very fine to medium tubular pores; 20 percent gravel, 10 percent cobbles, and 1 percent stones; extremely acid; gradual wavy boundary.

A2—10 to 18 inches; black (10YR 2/1) gravelly loam, dark brown (10YR 3/3) dry; moderate fine granular

structure; friable; few very fine, common fine and medium, and many coarse roots; few very fine and fine tubular pores; 15 percent gravel, 5 percent cobbles, and 1 percent stones; very strongly acid; clear wavy boundary.

Bw1—18 to 26 inches; yellowish brown (10YR 5/8) gravelly loam; moderate fine subangular blocky structure; friable; few very fine and fine roots; few very fine and fine tubular pores; 20 percent gravel, 5 percent cobbles, and 1 percent stones; strongly acid; abrupt wavy boundary.

Bw2—26 to 30 inches; yellowish brown (10YR 5/8) cobbly loam; weak fine subangular blocky structure; very friable; few very fine and fine roots; few very fine tubular pores; 15 percent gravel, 15 percent cobbles, and 4 percent stones; strongly acid; abrupt smooth boundary.

R—30 to 41 inches; unweathered, moderately fractured metasandstone.

### **Range in Characteristics**

*Solum thickness:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches to hard bedrock

*Content of mica flakes:* Few or common

*Content and size of rock fragments:* Less than 35 percent in the A and B horizons and less than 50 percent in the C horizon; including gravel, cobbles, and stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A horizon:*

Color—horizon has hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3 or is neutral in hue and has value of 2 or 3

Thickness—10 to 20 inches

Texture (fine-earth fraction)—sandy loam

*Bw horizon:*

Color—hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*C horizon (if it occurs):*

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam saprolite

*Cr layer (if it occurs):*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock or

metasandstone that can be dug with difficulty with hand tools

*R layer:*

Type of bedrock—unweathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock or metasandstone

## **Cashiers Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the southern part of the county

*Landform:* Ridges, north- to east-facing mountain slopes, and those shaded by the higher mountains

*Landform position:* Summits and side slopes

*Slope range:* 15 to 95 percent

*Taxonomic class:* Fine-loamy, micaceous, mesic Umbric Dystrochrepts

### **Typical Pedon**

Cashiers sandy loam, 50 to 95 percent slopes, stony; from Bakersville, 12.0 miles south on North Carolina Highway 226, about 2.3 miles east on U.S. Highway 19E, 1.2 miles north on Secondary Road 1137 to an unmarked, gravel road, 0.3 mile north on the gravel road, 0.3 mile east on another unmarked, gravel road, in a north-facing road cut; Spruce Pine USGS topographic quadrangle; lat. 35 degrees 56 minutes 14 seconds N. and long. 82 degrees 02 minutes 50 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 9 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 4/3) dry; moderate medium granular structure; friable; common very fine to medium and many coarse roots; common very fine to medium and coarse tubular pores; common fine flakes of mica; 1 percent gravel; very strongly acid; clear smooth boundary.

BA—9 to 13 inches; strong brown (7.5YR 4/6) sandy loam; many medium distinct very dark grayish brown (10YR 3/2) mottles; moderate fine subangular blocky structure; friable; common very fine and fine and many medium and coarse roots;

common very fine to coarse tubular pores; many fine flakes of mica; 5 percent gravel; strongly acid; gradual wavy boundary.

Bw—13 to 68 inches; strong brown (7.5YR 4/6) sandy loam; moderate fine subangular blocky structure; friable; few very fine, common fine to medium, and few coarse roots; few very fine and fine, common medium, and few coarse tubular pores; many fine flakes of mica; 5 percent gravel; strongly acid; gradual wavy boundary.

C—68 to 75 inches; multicolored loamy sand saprolite; massive; friable; few fine and medium roots; few fine and medium tubular pores; many fine flakes of mica; few distinct pockets of strong brown (7.5YR 4/6) loam; 10 percent gravel; moderately acid.

### **Range in Characteristics**

*Solum thickness:* 30 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Common or many in the A horizon and many in the B and C horizons

*Content and size of rock fragments:* Less than 35 percent; mostly gravel

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A or Ap horizon:*

Color—hue of 7.5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3

Thickness—7 to 10 inches

Texture (fine-earth fraction)—sandy loam

*BA horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6

Mottles—shades of red, brown, or yellow

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*Bw horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*BC horizon (if it occurs):*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*C horizon:*

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam saprolite

### **Chandler Series**

*Depth class:* Very deep

*Drainage class:* Somewhat excessively drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the southern part of the county

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 2 to 95 percent

*Taxonomic class:* Coarse-loamy, micaceous, mesic Typic Dystrochrepts

#### **Typical Pedon**

Chandler gravelly sandy loam in an area of Chandler-Micaville complex, 30 to 50 percent slopes, stony (fig. 15); from Bakersville, 12.0 miles south on North Carolina Highway 226, about 1.4 miles east on U.S. Highway 19E, about 1.2 miles north on Secondary Road 1143, about 1.0 mile northeast on an unmarked, gravel road, in a west-facing road cut; Spruce Pine USGS topographic quadrangle; lat. 35 degrees 56 minutes 30 seconds N. and long. 82 degrees 03 minutes 09 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A—0 to 3 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam, yellowish brown (10YR 5/4) dry; weak fine granular structure; very friable; many fine and medium and common coarse roots; common fine tubular pores; many fine flakes of mica; 20 percent gravel and 10 percent channers; moderately acid; abrupt smooth boundary.

Bw1—3 to 12 inches; yellowish brown (10YR 5/6) gravelly sandy loam; moderate medium subangular blocky structure; friable; few medium and coarse and common very fine and fine roots; common fine tubular pores; many fine flakes of mica; 20 percent gravel and 10 percent channers; moderately acid; clear smooth boundary.

Bw2—12 to 26 inches; yellowish brown (10YR 5/6) sandy loam; moderate coarse subangular blocky

structure; friable; few very fine and fine and few medium and coarse roots; few fine tubular pores; many fine flakes of mica; 5 percent gravel; moderately acid; clear smooth boundary.

C1—26 to 38 inches; yellowish brown (10YR 5/6) and brown (10YR 5/3) coarse sand; massive with weak platy relict rock structure; few very fine and fine roots; few fine tubular pores; few distinct iron and manganese accumulations on faces of peds; many fine flakes of mica; 5 percent gravel; strongly acid; clear wavy boundary.

C2—38 to 49 inches; yellowish brown (10YR 5/6), strong brown (7.5YR 5/6), and brown (10YR 5/3) coarse sand; massive with weak platy relict rock structure; few very fine and fine roots; few fine tubular pores; few distinct iron and manganese accumulations on faces of peds; many fine flakes of mica; 5 percent gravel; strongly acid; clear wavy boundary.

C3—49 to 70 inches; strong brown (7.5YR 5/6) and brown (10YR 5/3) coarse sandy loam; massive; few fine tubular pores; many medium flakes of mica; 5 percent gravel; strongly acid.

#### **Range in Characteristics**

*Solum thickness:* 20 to 40 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few to many in the A horizon and many in the B and C horizons

*Content and size of rock fragments:* Less than 35 percent; mostly gravel

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4; where value is 3 or less, horizon is less than 7 inches thick

Texture (fine-earth fraction)—sandy loam

*Bw horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt loam

*C horizon:*

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—coarse sand, sand, loamy sand, loamy fine sand, coarse sandy loam, fine sandy loam, loam, or silt loam saprolite

## **Cheoah Series**

*Depth class:* Deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Landform:* Ridges, north- to east-facing mountain slopes, and those shaded by the higher mountains

*Landform position:* Summits and side slopes

*Slope range:* 10 to 95 percent

*Taxonomic class:* Fine-loamy, mixed, mesic Typic Haplumbrepts

### **Typical Pedon**

Cheoah channery loam, windswept, 10 to 35 percent slopes, stony; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 15.0 miles north on North Carolina Highway 197 to Indian Grave Gap at the Tennessee-North Carolina State line, 2.2 miles east on U.S. Forest Service Road 230, about 70 feet south in woodland; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 07 minutes 00 seconds N. and long. 82 degrees 19 minutes 41 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 12 inches; black (10YR 2/1) channery loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many very fine and fine and common medium and coarse roots; many very fine and fine and few medium tubular pores; few fine flakes of mica; 15 percent channers and 5 percent flagstones; very strongly acid; abrupt wavy boundary.

Bw—12 to 46 inches; dark yellowish brown (10YR 4/6) channery loam; moderate medium subangular blocky structure; friable; few very fine to medium roots; common very fine and few fine tubular pores; few fine flakes of mica; 15 percent channers and 5 percent flagstones; very strongly acid; clear wavy boundary.

Cr—46 to 60 inches; weathered, moderately fractured, low-grade metasandstone that can be dug with difficulty with hand tools; few seams of dark yellowish brown (10YR 4/4) loam in fractures between rocks; few fine and medium roots in cracks that are spaced more than 4 inches apart.

### **Range in Characteristics**

*Solum thickness:* 30 to 59 inches

*Depth to bedrock:* 40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock

*Content of mica flakes:* None or few

*Content and size of rock fragments:* Less than 35 percent; mostly gravel, channers, and flagstones

*Soil reaction:* Extremely acid to strongly in the A horizon, except in limed areas, and extremely acid to moderately acid in the B and C horizons

*A horizon:*

Color—hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3

Thickness—10 to 20 inches

Texture (fine-earth fraction)—loam

*AB or BA horizon (if it occurs):*

Color—hue of 7.5YR or 10YR and value and chroma of 3 or 4

Thickness—10 to 20 inches

Texture (fine-earth fraction)—fine sandy loam, loam, or silt loam

*Bw horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—fine sandy loam, loam, or silt loam

*C horizon (if it occurs):*

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt loam saprolite

*Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic, low-grade metasedimentary rock that can be dug with difficulty with hand tools

## **Chestnut Series**

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Low and intermediate mountains dominantly in the northern half of the county

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 15 to 95 percent

*Taxonomic class:* Coarse-loamy, mixed, mesic Typic Dystrochrepts

### Typical Pedon

Chestnut loam in an area of Buladean-Chestnut complex, 30 to 50 percent slopes, stony; from the Buladean community, 4.0 miles north on North Carolina Highway 226 to Iron Mountain Gap at the Tennessee-North Carolina State line, 0.7 mile southwest on U.S. Forest Service Road 5882 to a fork in the road, 0.2 mile west on the right fork, in a south-facing road cut; Iron Mountain Gap USGS topographic quadrangle; lat. 36 degrees 07 minutes 04 seconds N. and long. 82 degrees 14 minutes 16 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 2 inches; dark yellowish brown (10YR 4/4) loam, yellowish brown (10YR 5/6) dry; weak fine granular structure; very friable; many very fine and fine, common medium, and few coarse roots; many very fine and fine and common medium and coarse tubular pores; few fine flakes of mica; 5 percent gravel; strongly acid; abrupt smooth boundary.

Bw—2 to 20 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; friable; common very fine to coarse tubular pores; common fine flakes of mica; 5 percent gravel; very strongly acid; clear wavy boundary.

BC—20 to 27 inches; strong brown (7.5YR 4/6) coarse sandy loam; weak coarse subangular blocky structure; very friable; few very fine to medium roots; few very fine to medium tubular pores; few fine flakes of mica; 5 percent gravel; strongly acid; abrupt wavy boundary.

Cr—27 to 80 inches; weathered, moderately fractured biotite granitic gneiss that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

### Range in Characteristics

*Solum thickness:* 15 to 39 inches

*Depth to bedrock:* 20 to 40 inches to soft bedrock and more than 40 inches to hard bedrock

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* 5 to less than 35 percent; mostly gravel and cobbles

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A or Ap horizon:*

Color—hue of 7.5YR to 2.5Y, value of 2 to 6, and

chroma of 1 to 6; where value is 3 or less, horizon is less than 7 inches thick  
Texture (fine-earth fraction)—loam

*Bw horizon:*

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8  
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*BC horizon:*

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8  
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*C horizon (if it occurs):*

Color—horizon is multicolored or has hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8  
Texture (fine-earth fraction)—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam saprolite

*Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

### Cleveland Series

*Depth class:* Shallow

*Drainage class:* Somewhat excessively drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Low and intermediate mountains throughout the county

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 30 to 95 percent

*Taxonomic class:* Loamy, mixed, mesic Lithic Dystrochrepts

### Typical Pedon

Cleveland gravelly sandy loam in an area of Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, very bouldery; from Bakersville, 5.6 miles north on North Carolina Highway 226, about 8.4 miles west on Secondary Road 1304, about 0.9 mile west on Secondary Road 1320, about 300 feet north in woodland; Hunt Dale USGS topographic quadrangle;

lat. 36 degrees 01 minute 19 seconds N. and long. 82 degrees 20 minutes 07 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A1—0 to 3 inches; black (10YR 2/1) gravelly sandy loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many very fine and fine and few medium roots; few very fine and fine tubular pores; few fine flakes of mica; 15 percent gravel, 5 percent cobbles, and 1 percent stones; very strongly acid; clear wavy boundary.

A2—3 to 7 inches; dark brown (10YR 4/3) gravelly sandy loam, yellowish brown (10YR 5/4) dry; weak medium granular structure; very friable; many very fine and fine and few medium roots; few very fine and fine tubular pores; few fine flakes of mica; 15 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

Bw—7 to 14 inches; strong brown (7.5YR 4/6) gravelly loam; weak medium subangular blocky structure; very friable; few very fine to medium roots; few very fine to medium tubular pores; few fine flakes of mica; 15 percent gravel and 5 percent cobbles; very strongly acid; abrupt wavy boundary.

R—14 to 25 inches; unweathered, moderately fractured biotite granitic gneiss.

#### Range in Characteristics

*Solum thickness:* 10 to 20 inches

*Depth to bedrock:* 10 to 20 inches to hard bedrock

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent; mostly gravel and cobbles

*Soil reaction:* Extremely acid to moderately acid throughout the profile

#### A horizon:

Color—hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4; where value is 3 or less, horizon is less than 7 inches thick

Texture (fine-earth fraction)—sandy loam

#### Bw horizon:

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

#### C horizon (if it occurs):

Color—horizon is multicolored or has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 or 4

Texture—sandy loam, fine sandy loam, or loam saprolite

#### R layer:

Type of bedrock—unweathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock

### Clifton Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Parent material:* Residuum affected by soil creep in the upper part, weathered from mafic, high-grade metamorphic or igneous rock

*Landscape:* Intermountain hills and low and intermediate mountains

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 8 to 50 percent

*Taxonomic class:* Clayey, mixed, mesic Typic Hapludults

#### Typical Pedon

Clifton clay loam, 8 to 15 percent slopes, eroded; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 3.3 miles northwest on North Carolina Highway 197, about 0.4 mile north on Secondary Road 1312 to a gravel driveway, 0.1 mile south on the driveway, 20 feet east in pasture; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 02 minutes 12 seconds N. and long. 82 degrees 15 minutes 57 seconds W.

Ap—0 to 10 inches; yellowish red (5YR 4/6) clay loam, yellowish red (5YR 5/8) dry; weak fine subangular blocky structure; friable; many very fine and fine, common medium, and few coarse roots; many very fine to medium and few coarse tubular pores; few fine flakes of mica; slightly acid; abrupt smooth boundary.

Bt1—10 to 23 inches; red (2.5YR 4/6) clay loam; strong medium subangular blocky structure; firm; common very fine and fine and few medium and coarse roots; common very fine and fine and few medium and coarse tubular pores; few discontinuous distinct yellowish red (5YR 4/6) clay films on faces of peds; common fine, medium, and coarse black (5YR 2/1) iron and manganese concretions; common fine flakes of mica; moderately acid; clear wavy boundary.

Bt2—23 to 34 inches; red (2.5YR 4/6) clay loam;

moderate medium subangular blocky structure; friable; few very fine to coarse roots; few very fine to coarse tubular pores; common discontinuous distinct yellowish red (5YR 4/6) clay films on faces of peds; many fine and medium black (5YR 2/1) iron and manganese concretions; many fine flakes of mica; strongly acid; clear wavy boundary.

C—34 to 79; yellowish red (5YR 5/8) fine sandy loam saprolite; massive; friable; few very fine to coarse roots; few very fine to coarse tubular pores; many fine, medium, and coarse black (5YR 2/1) iron and manganese concretions; many fine flakes of mica; strongly acid.

### Range in Characteristics

*Solum thickness:* 30 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent in the A horizon and less than 15 percent in the B and C horizons; mostly gravel and cobbles

*Soil reaction:* Very strongly acid to slightly acid throughout the profile

*Ap or A horizon:*

Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 6; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—clay loam

*Bt horizon:*

Color—hue of 10R to 5YR, value of 4 or 5, and chroma of 6 or 8

Texture (fine-earth fraction)—sandy clay loam, clay loam, or clay

*BC horizon (if it occurs):*

Color—hue of 10R to 5YR, value of 4 to 6, and chroma of 6 or 8

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*C horizon:*

Color—horizon is multicolored or has hue of 10R to 5YR, value of 4 to 6, and chroma of 6 to 8

Mottles—shades of red, brown, yellow, gray, or white

Texture—fine sandy loam or loam saprolite

### Cowee Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Intermountain hills and low and intermediate mountains

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 8 to 95 percent

*Taxonomic class:* Fine-loamy, mixed, mesic Typic Hapludults

### Typical Pedon

Cowee loam in an area of Evard-Cowee complex, 30 to 50 percent slopes, stony; from Bakersville, 8.5 miles north on North Carolina Highway 226, about 1.5 miles east on Secondary Road 1338, in a south-facing road cut; Bakersville USGS topographic quadrangle; lat. 36 degrees 03 minutes 11 seconds N. and long. 82 degrees 11 minutes 44 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A—0 to 2 inches; reddish brown (5YR 4/4) loam; moderate medium granular structure; friable; common very fine and fine and few medium and coarse roots; few very fine to medium tubular pores; few fine flakes of mica; moderately acid; clear wavy boundary.

Bt1—2 to 14 inches; red (2.5YR 4/6) loam; moderate medium subangular blocky structure; friable; common very fine and fine and few medium and coarse roots; few very fine, fine, and medium tubular pores; few faint red (2.5YR 4/6) clay films on faces of peds; few fine black (2.5YR 2.5/0) iron and manganese concretions; few fine flakes of mica; 10 percent gravel; moderately acid; gradual wavy boundary.

Bt2—14 to 26 inches; yellowish red (5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few very fine to coarse roots; few very fine to medium tubular pores; common faint yellowish red (5YR 4/8) clay films on faces of peds; common fine and medium black (2.5YR 2.5/0) iron and manganese concretions; few fine flakes of mica; 10 percent gravel; moderately acid; gradual wavy boundary.

Bt3—26 to 36 inches; yellowish red (5YR 4/6) gravelly clay loam; moderate medium subangular blocky structure; friable; few very fine and fine roots; few very fine and fine tubular pores; few distinct red (2.5YR 4/8) clay films on faces of peds and on faces of some rock fragments; many fine and medium black (N 2.5/0) iron and manganese

concretions; few fine flakes of mica; 20 percent gravel; moderately acid; abrupt wavy boundary. Cr—36 to 62 inches; weathered, moderately fractured amphibolite that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

#### Range in Characteristics

*Solum thickness:* 15 to 39 inches

*Depth to bedrock:* 20 to 40 inches to soft bedrock and more than 40 inches to hard bedrock

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent; ranging from gravel to stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

#### *A or Ap horizon:*

Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 to 8; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—loam

#### *Bt horizon:*

Color—hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam

#### *BC horizon (if it occurs):*

Color—hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or sandy clay loam

#### *C horizon (if it occurs):*

Color—horizon is multicolored or has hue of 2.5YR or 7.5YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam saprolite

#### *Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

### **Craggey Series**

*Depth class:* Shallow

*Drainage class:* Somewhat excessively drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in

the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock on Jane Bald and metasandstone on Unaka Mountain

*Landscape:* High mountains on Unaka Mountain and Jane Bald

*Landform:* Ridges

*Landform position:* Summits

*Slope range:* 8 to 15 percent

*Taxonomic class:* Loamy, mixed, frigid Lithic Haplumbrepts

#### Typical Pedon

Craggey gravelly loam in an area of Burton-Craggey complex, windswept, 8 to 15 percent slopes, extremely bouldery; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 15 miles north on North Carolina Highway 197 to Indian Grave Gap at the Tennessee-North Carolina State line, 4.3 miles east on U.S. Forest Service Road 230 to a hairpin curve near the Appalachian Trail, 0.6 mile up the trail to ridgetop of Unaka Mountain, 25 feet south of the trail in woodland; Unicoi USGS topographic quadrangle; lat. 36 degrees 07 minutes 45 seconds N. and long. 82 degrees 18 minutes 18 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A1—0 to 3 inches; black (10YR 2/1) gravelly loam, very dark grayish brown (10YR 3/2) dry; moderate medium subangular blocky structure; friable; many coarse, common medium, and few fine roots; common medium and few fine tubular pores; 10 percent gravel, 5 percent cobbles, and 1 percent stones; extremely acid; abrupt smooth boundary.

A2—3 to 11 inches; very dark grayish brown (10YR 3/2) gravelly loam, dark yellowish brown (10YR 4/4) dry; weak fine subangular blocky structure; very friable; common fine to coarse roots; common medium and few fine tubular pores; 10 percent gravel, 5 percent cobbles, and 1 percent stones; very strongly acid; abrupt smooth boundary.

Bw—11 to 17 inches; dark yellowish brown (10YR 4/6) gravelly loam; moderate fine subangular blocky structure; friable; common medium and coarse and few fine roots; few fine and medium tubular pores; 10 percent gravel, 10 percent cobbles, and 1 percent stones; very strongly acid; abrupt smooth boundary.

R—17 to 28 inches; unweathered, slightly fractured metasandstone.

#### Range in Characteristics

*Solum thickness:* 10 to 20 inches

*Depth to bedrock:* 10 to 20 inches to hard bedrock

*Content of mica flakes:* None to common

*Content and size of rock fragments:* 5 to less than 35 percent; mostly gravel, cobbles, and stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A horizon:*

Color—hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3

Thickness—10 to 19 inches

Texture (fine-earth fraction)—loam

*Bw horizon:*

Color—hue of 7.5YR or 10YR and value and chroma of 3 to 6

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*R layer:*

Type of bedrock—unweathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock or metasandstone

### **Cullasaja Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Low and intermediate mountains dominantly in the central and northern parts of the county

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Slope range:* 8 to 30 percent

*Taxonomic class:* Loamy-skeletal, mixed, mesic Typic Haplumbrepts

#### **Typical Pedon**

Cullasaja cobbly fine sandy loam, 8 to 30 percent slopes, very bouldery; from Bakersville, 9.9 miles north on North Carolina Highway 261, about 0.2 mile south on Secondary Road 1346, about 150 feet east in woodland, along a southwest-facing road cut of an old road; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 05 minutes 25 seconds N. and long. 82 degrees 05 minutes 59 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A—0 to 18 inches; very dark brown (10YR 2/2) cobbly fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable;

many very fine to medium and few coarse roots; few very fine to medium tubular pores; few fine flakes of mica; 5 percent gravel, 15 percent cobbles, and 1 percent stones; very strongly acid; clear wavy boundary.

Bw—18 to 60 inches; dark yellowish brown (10YR 4/8) very cobbly fine sandy loam; weak fine subangular blocky structure; very friable; few very fine to medium and common coarse roots; common very fine and fine and few medium tubular pores; few fine flakes of mica; 15 percent gravel, 25 percent cobbles, and 20 percent stones; moderately acid.

#### **Range in Characteristics**

*Solum thickness:* 30 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* 15 to less than 60 percent in the A horizon and the upper part of the B horizon and 35 to 80 percent in the lower part of the B horizon and in the C horizon; ranging from gravel to boulders

*Soil reaction:* Very strongly acid to slightly acid in the A horizon, except in limed areas, and very strongly acid to moderately acid in the B and C horizons

*A horizon:*

Color—hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3

Thickness—10 to 20 inches

Texture (fine-earth fraction)—fine sandy loam

*Bw horizon:*

Color—hue of 5YR to 10YR, value of 3 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or sandy clay loam

*BC horizon (if it occurs):*

Color—hue of 5YR to 10YR, value of 3 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loamy sand, loamy fine sand, coarse sandy loam, or sandy loam

*C horizon (if it occurs):*

Color—horizon is multicolored or has hue of 5YR to 10YR, value of 3 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, or sandy loam saprolite

### **Dellwood Series**

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Depth to seasonal high water table:* 2.0 to 4.0 feet from December through May  
*Permeability:* Moderately rapid in the A horizon and rapid or very rapid in the C horizon  
*Parent material:* Recent alluvium that is sandy in the upper part and sandy-skeletal in the lower part  
*Landscape:* Valleys of mountains and intermountain hills  
*Landform:* Flood plains dominantly at the upper end of mountain valleys  
*Landform position:* Planar to slightly convex bottomland slopes  
*Slope range:* 0 to 3 percent  
*Taxonomic class:* Sandy-skeletal, mixed, mesic Fluventic Haplumbrepts

### Typical Pedon

Dellwood sandy loam in an area of Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded (fig. 16); from Bakersville, 6.2 miles north on North Carolina Highway 261, about 0.05 mile south on Secondary Road 1223, about 600 feet west on a farm road, in a field, 50 feet from the edge of a gravel pit; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 03 minutes 07 seconds N. and long. 82 degrees 07 minutes 15 seconds W.

- Ap—0 to 12 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 4/3) dry; weak fine granular structure; very friable; many very fine and fine and common medium roots; common very fine to medium tubular pores; 10 percent gravel and 3 percent cobbles; strongly acid; clear smooth boundary.
- C1—12 to 26 inches; dark yellowish brown (10YR 4/6) very gravelly coarse sand; single grain; loose; few very fine and fine roots; few fine flakes of mica; 40 percent gravel and 5 percent cobbles; strongly acid; clear smooth boundary.
- C2—26 to 43 inches; multicolored extremely gravelly coarse sand in shades of brown, yellow, and gray; single grain; loose; few very fine roots; few fine flakes of mica; 60 percent gravel, 10 percent cobbles, and 1 percent stones; moderately acid; clear smooth boundary.
- C3—43 to 71 inches; multicolored extremely gravelly coarse sand in shades of brown, yellow, and gray; single grain; loose; few fine distinct dark gray (10YR 4/1) and light brownish gray (10YR 6/2) irregularly shaped iron depletions with clear boundaries throughout; 75 percent gravel, 10 percent cobbles, and 5 percent stones; slightly acid.

### Range in Characteristics

*Solum thickness:* 8 to 20 inches  
*Depth to contrasting material:* 8 to 20 inches to deposits of cobbles and gravel stratified with sandy or loamy material  
*Depth to bedrock:* More than 60 inches  
*Content of mica flakes:* Few or common in the A horizon and few to many in the C horizon  
*Content and size of rock fragments:* Less than 35 percent in the A horizon and more than 35 percent in the C horizon; mostly gravel and cobbles but including stones  
*Soil reaction:* Very strongly acid to neutral throughout the profile

#### Ap or A horizon:

Color—hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3  
 Thickness—10 to 20 inches  
 Texture—sandy loam

#### AC horizon (if it occurs):

Color—hue of 7.5YR or 10YR, value of 3, and chroma of 2 to 4  
 Texture (fine-earth fraction)—coarse sand, sand, loamy coarse sand, or loamy sand

#### Bw horizon (if it occurs):

Color—hue of 7.5YR or 10YR and value and chroma of 4 to 6  
 Texture (fine-earth fraction)—sandy loam or fine sandy loam

#### C horizon:

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 8  
 Texture (fine-earth fraction)—coarse sand, sand, loamy coarse sand, or loamy sand  
 Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

### Dillsboro Series

*Depth class:* Very deep  
*Drainage class:* Well drained  
*Depth to seasonal high water table:* More than 6.0 feet  
*Permeability:* Moderate  
*Parent material:* Old alluvium and colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock  
*Landscape:* Intermountain hills and low mountains

*Landform:* Coves, colluvial fans, high stream terraces, and benches and low stream terraces along the North Toe River and Cane Creek

*Landform position:* Head slopes, footslopes, and toeslopes

*Slope range:* 2 to 30 percent

*Taxonomic class:* Clayey, mixed, mesic Humic Hapludults

### Typical Pedon

Dillsboro clay loam, 2 to 8 percent slopes; from Bakersville, 12.3 miles north on North Carolina Highway 226 to Buladean, 0.3 mile east on Secondary Road 1334, about 300 feet north in a field; Bakersville USGS topographic quadrangle; lat. 36 degrees 06 minutes 35 seconds N. and long. 82 degrees 11 minutes 20 seconds W.

Ap1—0 to 7 inches; dark yellowish brown (10YR 3/4) clay loam, yellowish brown (10YR 5/4) dry; moderate fine granular structure; friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; 1 percent gravel; strongly acid; abrupt smooth boundary.

Ap2—7 to 13 inches; dark yellowish brown (10YR 3/4) clay loam, yellowish brown (10YR 5/6) dry; moderate fine and medium subangular blocky structure; friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; 1 percent gravel; strongly acid; clear smooth boundary.

BA—13 to 19 inches; dark yellowish brown (10YR 4/6) clay loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common very fine and fine tubular pores; few black (10YR 2/1) very fine and fine iron and manganese concretions; few fine flakes of mica; 1 percent gravel; strongly acid; clear wavy boundary.

Bt1—19 to 26 inches; strong brown (7.5YR 5/8) clay loam; moderate medium angular blocky structure; firm; common very fine and fine roots; common very fine and fine tubular pores; few discontinuous faint strong brown (7.5YR 4/6) clay films on faces of peds; few very fine to medium black (10YR 2/1) iron and manganese concretions; few fine flakes of mica; 1 percent gravel; very strongly acid; clear wavy boundary.

Bt2—26 to 49 inches; yellowish red (5YR 5/8) clay; strong medium angular blocky structure; firm; common very fine and fine roots; common very fine and fine tubular pores; common continuous

faint yellowish red (5YR 4/6) clay films on faces of peds; common very fine to medium black (10YR 2/1) iron and manganese concretions; few fine flakes of mica; 1 percent gravel; very strongly acid; clear wavy boundary.

Bt3—49 to 64 inches; yellowish red (5YR 5/8) clay; moderate medium subangular blocky structure; friable; few very fine and fine roots; common very fine and fine tubular pores; few discontinuous faint yellowish red (5YR 4/6) clay films on faces of peds; common very fine to medium black (10YR 2/1) iron and manganese concretions; few fine flakes of mica; 1 percent gravel; very strongly acid; clear wavy boundary.

Bt4—64 to 72 inches; yellowish red (5YR 5/8) clay loam; moderate fine subangular blocky structure; friable; few very fine and fine roots; few very fine and fine tubular pores; few discontinuous faint yellowish red (5YR 4/6) clay films on faces of peds; common very fine to medium black (10YR 2/1) iron and manganese concretions; few fine flakes of mica; 2 percent gravel, 5 percent cobbles, and 1 percent stones; very strongly acid; clear wavy boundary.

C—72 to 87 inches; 40 percent yellowish red (5YR 5/8), 40 percent light brownish gray (10YR 6/2), and 20 percent red (2.5YR 4/8) cobbly sandy clay loam; massive; friable; few fine flakes of mica; 10 percent gravel, 7 percent cobbles, and 2 percent stones; very strongly acid.

### Range in Characteristics

*Solum thickness:* More than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent above a depth of 40 inches and 5 to 60 percent below a depth of 40 inches; ranging from gravel to boulders

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*Ap or A horizon:*

Color—hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 4

Thickness—7 to 15 inches

Texture (fine-earth fraction)—clay loam

*BA horizon:*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy clay loam or clay loam

*Bt horizon:*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—clay loam or clay

*BC or 2BC horizon (if it occurs):*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*C or 2C horizon:*

Color—horizon is multicolored or has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—loamy sand, sandy loam, loam, or sandy clay loam

The Dillsboro soils in Mitchell County are considered taxadjuncts to the series because the percentage of clay in the soils does not decrease from its maximum amount by 20 percent within a depth of 60 inches. These soils are clayey, mixed, mesic Typic Paleudults.

**Edneytown Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Low and intermediate mountains

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 15 to 50 percent

*Taxonomic class:* Fine-loamy, mixed, mesic Typic Hapludults

**Typical Pedon**

Edneytown sandy loam in an area of Pigeonroost-Edneytown complex, 30 to 50 percent slopes, stony; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 12.1 miles north on North Carolina Highway 197, about 2.4 miles northeast on Secondary Road 1321, about 1.2 miles east on a private road to a fork in the road next to a cemetery, 0.15 mile north in a south-facing road cut; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 56 seconds N. and long. 82 degrees 17 minutes 03 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) sandy loam, brown (10YR 4/3) dry; moderate medium granular structure; friable; few coarse and many fine and medium roots; many very fine and fine tubular pores; 5 percent gravel and 1 percent cobbles; very strongly acid; abrupt smooth boundary.

Bt—4 to 37 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine and common medium and coarse roots; few fine and medium and common very fine tubular pores; few distinct dark yellowish brown (10YR 4/6) clay films on faces of peds; few fine flakes of mica; 5 percent gravel; very strongly acid; gradual wavy boundary.

C—37 to 62 inches; multicolored sandy loam saprolite in shades of red, brown, and yellow; massive; very friable; few very fine to coarse roots; few very fine or fine tubular pores; few fine flakes of mica; strongly acid.

**Range in Characteristics**

*Solum thickness:* 20 to 40 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* None to common

*Content and size of rock fragments:* Less than 35 percent in the A and E horizons and less than 15 percent in the B and C horizons; ranging from gravel to stones

*Soil reaction:* Extremely acid to moderately acid in the A horizon, except in limed areas, and very strongly acid or strongly acid in the B and C horizons

*A or Ap horizon:*

Color—hue of 10YR, value of 3 to 6, and chroma of 1 to 4; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—sandy loam

*E horizon (if it occurs):*

Color—hue of 10YR, value of 4 to 7, and chroma of 3 to 6

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*Bt horizon:*

Color—hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 8

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*BC horizon (if it occurs):*

Color—hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 6 to 8

Texture (fine-earth fraction)—sandy loam or sandy clay loam

*C horizon:*

Color—hue of 7.5YR or 10YR, value of 5 to 8, and chroma of 3 to 8

Mottles—shades of red, brown, yellow, or white

Texture (fine-earth fraction)—loamy sand, sandy loam, fine sandy loam, or loam

## **Evard Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Intermountain hills and low and intermediate mountains

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 8 to 95 percent

*Taxonomic class:* Fine-loamy, oxidic, mesic Typic Hapludults

### **Typical Pedon**

Evard loam in an area of Evard-Cowee complex, 30 to 50 percent slopes, stony; from Bakersville, 8.5 miles north on North Carolina Highway 226, about 1.5 miles east on Secondary Road 1338, in a south-facing road cut; Bakersville USGS topographic quadrangle; lat. 36 degrees 03 minutes 11 seconds N. and long. 82 degrees 11 minutes 45 seconds W.

O<sub>i</sub>—1 inch to 0; slightly decomposed leaf litter.

A—0 to 3 inches; reddish brown (5YR 4/3) loam, yellowish brown (10YR 5/4) dry; moderate medium granular structure; friable; many very fine, common fine and medium, and few coarse roots; common very fine to medium tubular pores; few fine flakes of mica; 5 percent gravel; moderately acid; clear wavy boundary.

B<sub>t</sub>—3 to 28 inches; red (2.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; common very fine and few fine to coarse roots; few fine and medium tubular pores; common faint red (2.5YR 4/8) clay films on faces of peds; few fine black (2.5YR 2.5/0) iron and manganese concretions; few fine flakes of mica; 10 percent gravel; moderately acid; gradual wavy boundary.

BC—28 to 55 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; few very fine to medium roots; few very fine to medium tubular pores; few distinct red (2.5YR 4/8) clay films on faces of peds; common fine and medium black (2.5YR 2.5/0) iron and manganese concretions; few fine flakes of mica; 10 percent gravel; moderately acid; abrupt wavy boundary.

C—55 to 62 inches; multicolored loam saprolite; massive; very friable; few very fine to coarse roots; few very fine and fine tubular pores; few distinct red (2.5YR 4/8) clay films in cracks; many fine, medium, and coarse black (2.5YR 2.5/0) iron and manganese concretions; few fine flakes of mica; moderately acid.

### **Range in Characteristics**

*Solum thickness:* 20 to more than 40 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* None to common

*Content and size of rock fragments:* Less than 35 percent in the A and C horizons and less than 15 percent in the B horizon; ranging from gravel to stones

*Soil reaction:* Very strongly acid to moderately acid throughout the profile

*A or A<sub>p</sub> horizon:*

Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—loam

*B<sub>t</sub> horizon:*

Color—hue of 2.5YR to 10YR and value and chroma of 4 to 8

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*BC horizon:*

Color—horizon has hue of 2.5YR or 7.5YR, value of 4 to 6, and chroma of 6 or 8 and may be mottled in shades of these colors

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam

*C horizon:*

Color—horizon is multicolored or has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 6 or 8 and may be mixed or mottled in shades of these colors

Texture (fine-earth fraction)—loamy sand, loamy fine sand, sandy loam, fine sandy loam, very fine sandy loam, or loam saprolite

## **Fannin Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock with a high mica content

*Landscape:* Intermountain hills and low and intermediate mountains in the central and southeastern parts of the county

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 8 to 50 percent

*Taxonomic class:* Fine-loamy, micaceous, mesic Typic Hapludults

### **Typical Pedon**

Fannin sandy clay loam, 15 to 30 percent slopes, eroded; from Bakersville, 12.0 miles south on North Carolina Highway 226 to Spruce Pine, 0.5 mile east on U.S. Highway 19E, 4.2 miles south on Secondary Road 1121, about 0.4 mile east on Secondary Road 1126, about 200 feet south on an unmarked, gravel road, in a southwest-facing road cut; Spruce Pine USGS topographic quadrangle; lat. 35 degrees 53 minutes 03 seconds N. and long. 82 degrees 00 minutes 14 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 2 inches; brown (7.5YR 4/4) sandy clay loam, strong brown (7.5YR 5/6) dry; weak medium granular structure; very friable; many very fine and fine and common medium roots; few coarse and common very fine and fine vesicular pores; many fine flakes of mica; 5 percent gravel; very strongly acid; abrupt smooth boundary.

Bt1—2 to 9 inches; yellowish red (5YR 5/6) sandy clay loam; common medium distinct brown (7.5YR 4/4) mottles; moderate medium subangular blocky structure; friable; many very fine and fine, common medium, and few coarse roots; common very fine and fine and few coarse tubular pores; few faint yellowish red (5YR 4/6) clay films between sand grains and very few faint yellowish red (5YR 4/6) clay films on faces of pedis; many fine flakes of mica; 5 percent gravel; very strongly acid; clear smooth boundary.

Bt2—9 to 22 inches; red (2.5YR 4/8) sandy clay loam; moderate medium subangular blocky structure; friable; common very fine and fine and few medium roots; common very fine and fine

vesicular and few fine tubular pores; very few faint yellowish red (5YR 4/6) clay films on faces of pedis; many fine flakes of mica; 1 percent gravel; moderately acid; clear smooth boundary.

BC—22 to 31 inches; yellowish red (5YR 5/8) sandy clay loam; weak medium subangular blocky structure; very friable; few coarse and common fine and medium roots; few very fine tubular pores; very few faint yellowish red (5YR 4/6) clay films in root channels and pores; many fine flakes of mica; 5 percent gravel; moderately acid; clear smooth boundary.

C—31 to 79 inches; multicolored fine sandy loam saprolite; massive; few medium and coarse roots; few very fine tubular pores; 5 percent gravel; strongly acid.

### **Range in Characteristics**

*Solum thickness:* 20 to 45 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Common or many in the A horizon and the upper part of the B horizon and many in the lower part of the B horizon and in the C horizon

*Content and size of rock fragments:* Less than 35 percent in the A and C horizons and 0 to 25 percent in the B horizon; mostly gravel and cobbles

*Soil reaction:* Extremely acid to slightly acid throughout the profile

*A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—sandy clay loam

*Bt horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8

Mottles—shades of red, brown, or yellow

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*BC horizon:*

Color—hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8

Mottles—shades of red, brown, or yellow

Texture (fine-earth fraction)—loam, fine sandy loam, sandy loam, or sandy clay loam

*C horizon:*

Color—horizon is multicolored or has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8 and may be mixed or mottled in shades of these colors

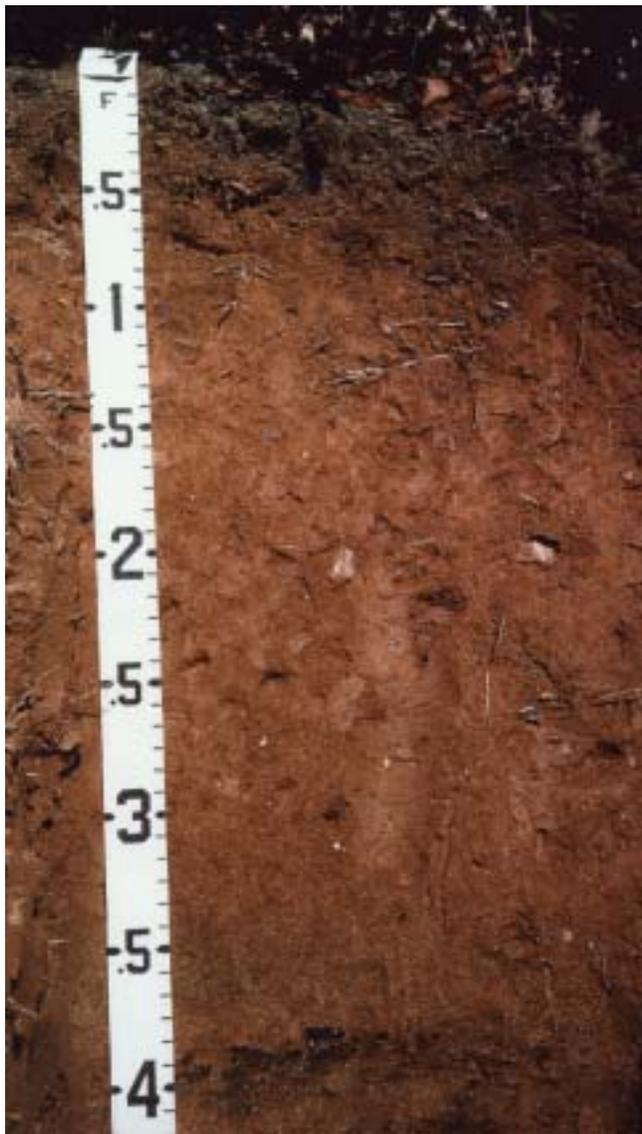


Figure 15.—Typical profile of Chandler gravelly sandy loam. Chandler soils are very deep and have a high mica content in the subsoil. They occur on intermountain hills and on low or intermediate mountains, predominantly in the southern half of Mitchell County.



Figure 16.—Typical profile of Dellwood sandy loam. Dellwood soils formed from material deposited by streams and consist mainly of sand, gravel, and cobbles. They occur predominantly at the upper end of large flood plains throughout Mitchell County.

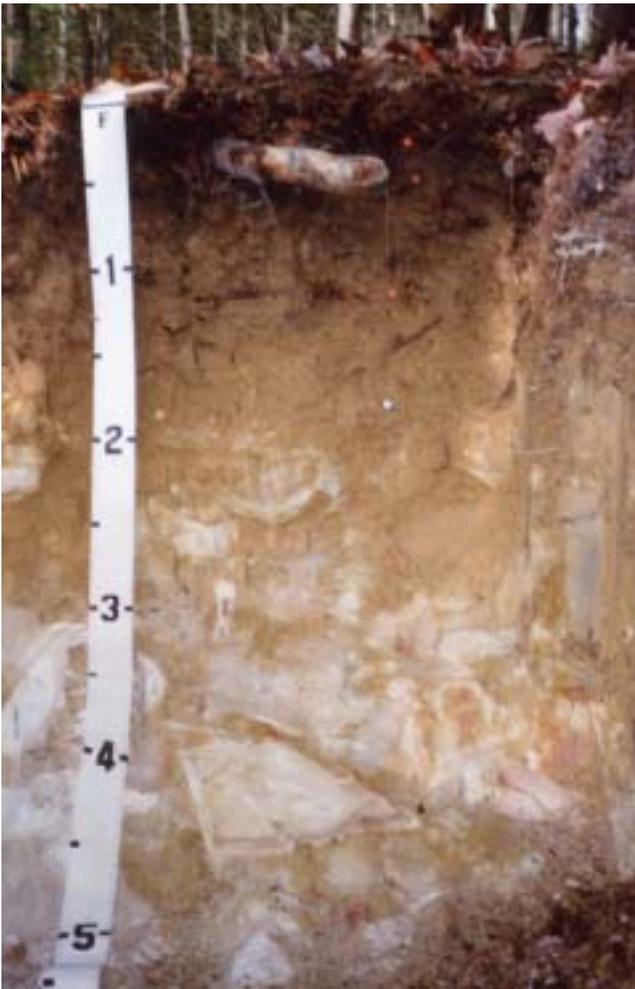


Figure 17.—Typical profile of Harmiller sandy loam. Harmiller soils are moderately deep to soft bedrock. They occur on low or intermediate mountains in the far northwestern part of Mitchell County.



Figure 18.—Typical profile of Hunt Dale silty clay loam. Hunt Dale soils occur on north- to east-facing slopes on intermountain hills and low or intermediate slopes, predominantly in the northern half of Mitchell County.



Figure 19.—Typical profile of Pigeonroost loam. Pigeonroost soils are moderately deep to soft bedrock. They occur on low or intermediate mountains predominantly in the northern half of Mitchell County.



Figure 20.—Typical profile of Watauga sandy loam. Watauga soils are very deep and have a high mica content in the subsoil. They occur on intermountain hills and on low or intermediate mountains in the central and southern parts of Mitchell County.

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam saprolite

### **Harmiller Series**

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 15 to 50 percent

*Taxonomic class:* Fine-loamy, siliceous, mesic Typic Hapludults

#### **Typical Pedon**

Harmiller sandy loam in an area of Harmiller-Shinbone complex, 15 to 30 percent slopes, stony (fig. 17); from Bakersville, 5.5 miles north on North Carolina Highway 226, about 14.7 miles north on North Carolina Highway 197, about 0.8 mile south on U.S. Forest Service Road 214 to a wildlife field, 0.1 mile south in the field; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 08 seconds N. and long. 82 degrees 22 minutes 44 seconds W.

Ap—0 to 4 inches; brown (10YR 4/3) sandy loam, yellowish brown (10YR 5/4) dry; weak fine granular structure; very friable; many very fine, common fine, and few medium roots; many very fine, common fine, and few medium tubular pores; 10 percent gravel and 2 percent cobbles; very strongly acid; abrupt smooth boundary.

Bt—4 to 22 inches; dark yellowish brown (10YR 4/6) loam; moderate medium subangular blocky structure; friable; common very fine and fine and few medium roots; few very fine, common fine, and few medium tubular pores; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; 5 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

C—22 to 31 inches; multicolored gravelly loamy sand saprolite; massive; very friable; few very fine and fine roots; few very fine and fine tubular pores; few streaks of dark yellowish brown (10YR 4/6) loam; 15 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

Cr—31 to 61 inches; weathered, moderately fractured,

low-grade metasandstone that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

#### **Range in Characteristics**

*Solum thickness:* 15 to 40 inches

*Depth to bedrock:* 20 to 40 inches to soft bedrock and more than 60 inches to hard bedrock

*Content of mica flakes:* None or few

*Content and size of rock fragments:* Less than 35 percent in the A and B horizons and less than 60 percent in the C horizon; mostly gravel, channers, and flagstones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Ap or A horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 8; where value is 3 or less, horizon is less than 6 inches thick

Texture—sandy loam

*Bt horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*BC horizon (if it occurs):*

Color—hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 4 to 8

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

*C horizon:*

Color—horizon is multicolored or has hue of 5YR to 2.5Y and value and chroma of 3 to 8 and may be mixed or mottled in shades of these colors

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam saprolite

*Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, low-grade metasedimentary rock that can be dug with difficulty with hand tools

### **Hunt Dale Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Intermountain hills and low and intermediate mountains in the north-central, northern, and northwestern parts of the county

*Landform:* North- to east-facing ridges, hillslopes, and mountain slopes and those shaded by the higher mountains

*Landform position:* Summits and side slopes

*Slope range:* 15 to 95 percent

*Taxonomic class:* Fine-loamy, mixed, mesic Umbric Dystrochrepts

### Typical Pedon

Hunt Dale silty clay loam, 50 to 95 percent slopes, very stony (fig. 18); from Buladean, 0.6 mile on Secondary Road 1330, about 0.75 mile north on Secondary Road 1331 to an unmarked, gravel road, 0.3 mile on the road, in a east-facing road cut; Iron Mountain Gap USGS topographic quadrangle; lat. 36 degrees 07 minutes 47 seconds N. and long. 82 degrees 11 minutes 12 seconds W.

Oi—3 inches to 0; slightly decomposed leaf litter

A1—0 to 1 inch; very dark brown (10YR 2/2) silty clay loam, dark yellowish brown (10YR 3/4) dry; weak fine granular structure; very friable; many very fine and fine, common medium, and few coarse roots; many very fine, common fine and medium, and few coarse tubular pores; very strongly acid; abrupt smooth boundary.

A2—1 to 9 inches; very dark grayish brown (10YR 3/2) silty clay loam, yellowish brown (10YR 5/4) dry; weak medium granular structure; very friable; common very fine to medium and few coarse roots; common very fine to medium and few coarse tubular pores; very strongly acid; abrupt smooth boundary.

Bw1—9 to 20 inches; brown (7.5YR 4/4) clay loam; moderate medium subangular blocky structure; friable; slightly sticky; slightly plastic; few very fine to coarse roots; common very fine and fine and few medium tubular pores; very strongly acid; gradual wavy boundary.

Bw2—20 to 36 inches; strong brown (7.5YR 5/6) silt loam; moderate medium subangular blocky structure; friable; slightly sticky; slightly plastic; few fine to coarse roots; few very fine and fine tubular pores; very strongly acid; gradual wavy boundary.

BC—36 to 58 inches; brownish yellow (10YR 6/8) silt loam; weak medium subangular blocky structure; friable; slightly sticky; slightly plastic; few very fine

to medium roots; few very fine and fine tubular pores; very strongly acid; gradual wavy boundary. C—58 to 80 inches; multicolored fine sandy loam saprolite; massive; very friable; few fine roots; few very fine and fine tubular pores; strongly acid.

### Range in Characteristics

*Solum thickness:* 30 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* None to common

*Content and size of rock fragments:* Less than 35 percent in the A horizon and less than 15 percent in the B and C horizons; ranging from gravel to stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 2 to 4

Thickness—7 to 10 inches

Texture (fine-earth fraction)—silty clay loam

*Bw horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—silt loam, silty clay loam, clay loam, or loam

*BC horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—silt loam, silty clay loam, clay loam, sandy clay loam, loam, sandy loam, or fine sandy loam saprolite

*C horizon:*

Color—horizon is multicolored or has hue of 5YR to 2.5Y and value and chroma of 3 to 8 and may be mixed or mottled in shades of these colors

Texture (fine-earth fraction)—silt loam, loam, sandy loam, or fine sandy loam saprolite

### Keener Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Colluvium derived from low-grade metasedimentary rock

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Slope range:* 15 to 30 percent

*Taxonomic class:* Fine-loamy, siliceous, mesic Typic Hapludults

### Typical Pedon

Keener loam in an area of Keener-Lostcove complex, 15 to 30 percent slopes, very stony; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 14 miles north on North Carolina Highway 197 to the gated entrance to a U.S. Forest Service wildlife field, 800 feet east to a power line right-of-way, 50 feet north in a field; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 23 seconds N. and long. 82 degrees 20 minutes 47 seconds W.

Ap—0 to 5 inches; brown (10YR 4/3) loam, yellowish brown (10YR 5/4) dry; moderate medium granular structure; friable; many very fine and few fine to coarse roots; few very fine and common fine to coarse tubular pores; extremely acid; clear smooth boundary.

Bt1—5 to 25 inches; dark yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine, medium, and coarse roots; common fine and medium and few coarse tubular pores; few faint yellowish brown (10YR 5/4) clay films on faces of peds; 5 percent gravel and 1 percent cobbles; very strongly acid; clear wavy boundary.

Bt2—25 to 55 inches; strong brown (7.5YR 4/8) clay loam; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine and medium tubular pores; common distinct yellowish brown (10YR 5/6) clay films on faces of peds; 5 percent gravel and 1 percent cobbles; extremely acid; clear wavy boundary.

BC—55 to 62 inches; 60 percent brownish yellow (10YR 6/8) and 40 percent strong brown (7.5YR 5/8) sandy clay loam; weak medium subangular blocky structure; friable; few fine and medium roots; few very fine and fine tubular pores; few faint yellowish brown (10YR 5/8) clay films on faces of peds; 5 percent gravel and 5 percent cobbles; extremely acid.

### Range in Characteristics

*Solum thickness:* 40 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* None or few

*Content and size of rock fragments:* Less than 35 percent in the A horizon, less than 30 percent in the Bt horizon, and 10 to 50 percent in the BC and

2C horizons; mostly gravel, channers, cobbles, and flagstones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Ap or A horizon:*

Color—hue of 10YR, value of 3 or 4, and chroma of 2 to 4; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—loam

*Bt horizon:*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*BC horizon:*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8

Texture (fine-earth fraction)—sandy loam, sandy clay loam, or clay loam

*C horizon (if it occurs):*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 or 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

### Lostcove Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* 5.0 to more than 6.0 feet from December through May

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Parent material:* Colluvium derived from low-grade metasedimentary rock

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Slope range:* 15 to 30 percent

*Taxonomic class:* Loamy-skeletal, siliceous, mesic Typic Hapludults

### Typical Pedon

Lostcove cobbly loam in an area of Keener-Lostcove complex, 15 to 30 percent slopes, very stony; from Bakersville, 5.5 miles north on North Carolina Highway

226, about 14.5 miles north on North Carolina Highway 197 to the gated entrance to a U.S. Forest Service wildlife field, 800 feet east to a power line right-of-way, 100 feet east in woodland; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 09 seconds N. and long. 82 degrees 21 minutes 07 seconds W.

O<sub>i</sub>—1 inch to 0; slightly decomposed leaf litter.

A—0 to 3 inches; dark grayish brown (10YR 4/2) cobbly loam, yellowish brown (10YR 5/4) dry; moderate fine subangular blocky structure; friable; many very fine and fine, common medium, and few coarse roots; common very fine to medium tubular pores; 10 percent gravel and 5 percent cobbles; moderately acid; abrupt smooth boundary.

Bt<sub>1</sub>—3 to 6 inches; yellowish brown (10YR 5/6) cobbly loam; moderate medium subangular blocky structure; friable; common very fine to medium and few coarse roots; common very fine and fine tubular pores; few faint clay films on faces of peds; 10 percent gravel and 5 percent cobbles; strongly acid; clear wavy boundary.

Bt<sub>2</sub>—6 to 43 inches; yellowish brown (10YR 5/6) very cobbly sandy clay loam; moderate fine subangular blocky structure; friable; common fine and medium and few coarse roots; few very fine to medium tubular pores; few faint clay films on faces of peds; 20 percent gravel, 20 percent cobbles, and 15 percent stones; very strongly acid; clear wavy boundary.

C—43 to 62 inches; multicolored very cobbly sandy loam; massive; very friable; few fine and medium roots; few very fine and fine tubular pores; few distinct dark yellowish brown (10YR 4/4) streaks of loamy material; 25 percent gravel, 25 percent cobbles, and 5 percent stones; very strongly acid.

#### Range in Characteristics

*Solum thickness:* 30 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* None or few

*Content and size of rock fragments:* 15 to 60 percent in the A horizon and the upper part of the B horizon and 35 to 80 percent in the middle and lower parts of the B horizon and in the C horizon; ranging from gravel to boulders, typically increasing in size as depth increases

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A or Ap horizon:*

Color—hue of 5YR to 10YR, value of 2 to 6, and

chroma of 1 to 4; where value is 3 or less, horizon is less than 6 inches thick  
Texture (fine-earth fraction)—loam

*BA horizon (if it occurs):*

Color—hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 3 to 6  
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*Bt horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8  
Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam

*C horizon:*

Color—horizon is multicolored or has hue of 5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8 and may be mixed or mottled in shades of these colors  
Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

#### Micaville Series

*Depth class:* Deep

*Drainage class:* Somewhat excessively drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the southern part of the county

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 15 to 95 percent

*Taxonomic class:* Coarse-loamy, micaceous, mesic  
Typic Dystrochrepts

#### Typical Pedon

Micaville channery coarse sandy loam in an area of Chandler-Micaville complex, 30 to 50 percent slopes, stony; from Bakersville, 12.0 miles south on North Carolina Highway 226 to Spruce Pine, 1.4 miles east on U.S. Highway 19E, 1.2 miles north on Secondary Road 1143, about 0.9 mile northeast on an unmarked, gravel road, in a west-facing road cut; Spruce Pine

USGS topographic quadrangle; lat. 35 degrees 56 minutes 47 seconds N. and long. 82 degrees 03 minutes 25 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 3 inches; black (10YR 2/1) channery coarse sandy loam, dark brown (10YR 3/3) dry; weak fine granular structure; friable; many fine to coarse roots; many fine and medium and few coarse tubular pores; many fine flakes of mica; 10 percent gravel and 15 percent channers; extremely acid; abrupt smooth boundary.

Bw1—3 to 7 inches; yellowish brown (10YR 5/6) channery coarse sandy loam; moderate coarse subangular blocky structure; friable; common fine to coarse roots; common fine and few medium and coarse tubular pores; many fine flakes of mica; 15 percent gravel and 15 percent channers; very strongly acid; clear wavy boundary.

Bw2—7 to 28 inches; yellowish brown (10YR 5/6) coarse sandy loam; moderate coarse subangular blocky structure; friable; common fine to coarse roots; common very fine and fine tubular pores; few medium and many fine flakes of mica; 10 percent gravel; very strongly acid; clear wavy boundary.

Bw3—28 to 37 inches; yellowish brown (10YR 5/8) coarse sandy loam; moderate coarse subangular blocky structure; very friable; few fine to coarse roots; few very fine and fine tubular and vesicular pores; many fine flakes of mica; 5 percent gravel; strongly acid; clear wavy boundary.

BC—37 to 51 inches; yellowish brown (10YR 5/8) gravelly sandy loam; weak coarse subangular blocky structure; very friable; few fine to coarse roots; few very fine tubular and vesicular pores; common medium and many fine flakes of mica; 20 percent gravel; strongly acid; abrupt wavy boundary.

Cr—51 to 61 inches; weathered, moderately fractured mica schist that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

#### Range in Characteristics

*Solum thickness:* 20 to 50 inches

*Depth to bedrock:* 40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock

*Content of mica flakes:* Few to many in the A horizon and many in the B and C horizons

*Content and size of rock fragments:* Less than 35 percent; mostly gravel but including cobbles and stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 4; where value is 3 or less, horizon is less than 7 inches thick

Texture (fine-earth fraction)—coarse sandy loam

*Bw horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

*BC horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

*C horizon (if it occurs):*

Color—horizon is multicolored or has hue of 5YR to 10YR, value of 3 to 8, and chroma of 2 to 8 and may be mixed or mottled in shades of these colors

Texture (fine-earth fraction)—loamy sand, coarse sandy loam, sandy loam, fine sandy loam, or loam saprolite

*Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic, high-grade metamorphic or igneous rock with a high mica content; it can be dug with difficulty with hand tools

### Pigeonroost Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Low and intermediate mountains

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 15 to 50 percent

*Taxonomic class:* Fine-loamy, mixed, mesic Typic Hapludults

#### Typical Pedon

Pigeonroost loam in an area of Pigeonroost-Edneytown complex, 30 to 50 percent slopes, stony (fig. 19); from Bakersville, 5.5 miles north on North Carolina Highway 226, about 12.1 miles north on

North Carolina Highway 197, about 2.4 miles northeast on Secondary Road 1321 to a private road, 1.2 miles east on the private road to a fork in the road, 0.1 mile north, in a south-facing road cut; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 54 seconds N. and long. 82 degrees 17 minutes 08 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 3 inches; dark yellowish brown (10YR 4/4) loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; common very fine and fine and few medium and coarse roots; common fine and medium interstitial pores; 5 percent gravel; very strongly acid; abrupt smooth boundary.

Bt1—3 to 12 inches; brownish yellow (10YR 6/6) loam; moderate medium subangular blocky structure; friable; few medium and coarse and many very fine and fine roots; few fine and medium and few medium and coarse tubular pores; common faint clay films on faces of peds; 5 percent gravel; very strongly acid; gradual wavy boundary.

Bt2—12 to 26 inches; brownish yellow (10YR 6/8) loam; moderate medium subangular blocky structure; friable; common very fine and fine and common medium and coarse roots; common very fine and fine and few medium and coarse tubular pores; few faint clay films on faces of peds; 5 percent gravel; very strongly acid; gradual wavy boundary.

BC—26 to 37 inches; yellowish brown (10YR 5/8) sandy loam; weak coarse subangular blocky structure; friable; few very fine to coarse roots; common very fine and fine and few medium and coarse tubular pores; few pockets of multicolored sandy loam saprolite; 5 percent gravel; very strongly acid; abrupt smooth boundary.

Cr—37 to 79 inches; weathered, moderately fractured granodioritic gneiss that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

#### Range in Characteristics

*Solum thickness:* 15 to 40 inches

*Depth to bedrock:* 20 to 40 inches to soft bedrock and more than 40 inches to hard bedrock

*Content of mica flakes:* None to common

*Content and size of rock fragments:* Less than 35 percent in the A horizon and less than 15 percent in the B and C horizons; mostly gravel

*Soil reaction:* Extremely acid to moderately acid throughout the profile

#### *A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—loam

#### *Bt horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loam, sandy clay loam, clay loam, or silty clay loam

#### *BC horizon:*

Color—horizon has hue of 7.5YR or 10YR, value of 4 to 8, and chroma of 3 to 8 or is mixed or mottled in shades of red, brown, or yellow

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam

#### *C horizon (if it occurs):*

Color—horizon has hue of 5YR to 10YR and value and chroma of 3 to 8 or is mixed or mottled in shades of these colors

Texture—coarse sandy loam, sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam saprolite

#### *Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

### **Plott Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Low and intermediate mountains dominantly in the east-central, northern, and northwestern parts of the county

*Landform:* Ridges, north- to east-facing mountain slopes, and those shaded by the higher mountains

*Landform position:* Summits and side slopes

*Slope range:* 15 to 95 percent

*Taxonomic class:* Fine-loamy, mixed, mesic Typic Haplumbrepts

#### **Typical Pedon**

Plott loam, 30 to 50 percent slopes, stony; from Bakersville, 9.9 miles north on North Carolina Highway

261, about 0.1 mile southwest on Secondary Road 1346 to a private road, 0.7 mile northwest on the private road, in a road cut; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 05 minutes 24 seconds N. and long. 82 degrees 06 minutes 22 seconds W.

**A**—0 to 13 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; moderate medium granular structure; friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; strongly acid; clear wavy boundary.

**AB**—13 to 16 inches; very dark grayish brown (10YR 3/2) loam, dark yellowish brown (10YR 4/4) dry; common medium distinct strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; very friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; 1 percent gravel; strongly acid; clear wavy boundary.

**Bw**—16 to 37 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; friable; common very fine to coarse roots; common very fine and fine tubular pores; few fine flakes of mica; 5 percent gravel; strongly acid; gradual wavy boundary.

**BC**—37 to 43 inches; brown (7.5YR 4/4) sandy loam; weak fine subangular blocky structure; very friable; few very fine and fine roots; few very fine and fine tubular pores; common distinct streaks of multicolored saprolite; few fine flakes of mica; 5 percent gravel; strongly acid; clear wavy boundary.

**C**—43 to 62 inches; multicolored loamy sand saprolite; massive; very friable; few very fine roots; few very fine tubular pores; common fine flakes of mica; strongly acid.

#### Range in Characteristics

*Solum thickness:* 30 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* None to common

*Content and size of rock fragments:* Less than 35 percent above a depth of 40 inches and less than 60 percent below a depth of 40 inches; ranging from gravel to stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

#### *A or Ap horizon:*

Color—hue of 5YR to 10YR, value of 2 or 3, and chroma of 1 to 3

Thickness—10 to 20 inches

Texture (fine-earth fraction)—loam

#### *AB horizon:*

Color—hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4

Mottles (if they occur)—shades of red, brown, or yellow

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

#### *Bw horizon:*

Color—horizon has hue of 7.5YR to 10YR, value of 3 to 5, and chroma of 4 to 8 and may be mottled in shades of these colors

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

#### *BC horizon:*

Color—horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8 and may be mottled in shades of these colors

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

#### *C horizon:*

Color—horizon is multicolored or has hue of 5YR to 2.5Y and value and chroma of 3 to 8 and may be mixed or mottled in shades of these colors

Texture (fine-earth fraction)—sand, loamy sand, loamy fine sand, sandy loam, or fine sandy loam saprolite

### Reddies Series

*Depth class:* Very deep

*Drainage class:* Moderately well drained

*Depth to seasonal high water table:* 2.0 to 3.5 feet from December through May

*Permeability:* Moderately rapid in the A and B horizons and rapid or very rapid in the C horizon

*Parent material:* Recent alluvium that is sandy in the upper part and sandy or sandy-skeletal in the lower part

*Landscape:* Valleys of mountains and intermountain hills

*Landform:* Flood plains dominantly at the upper end of mountain valleys

*Landform position:* Planar to slightly convex bottomland slopes

*Slope range:* 0 to 3 percent

*Taxonomic class:* Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluventic Haplumbrepts

#### Typical Pedon

Reddies fine sandy loam in an area of Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally

flooded; from Bakersville, 6.2 miles north on North Carolina Highway 261, about 0.05 mile south on Secondary Road 1223, about 600 feet west on a farm road, in a field; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 03 minutes 43 seconds N. and long. 82 degrees 07 minutes 09 seconds W.

Ap—0 to 12 inches; dark brown (10YR 3/3) fine sandy loam, dark yellowish brown (10YR 4/4) dry; weak coarse granular structure; very friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; 3 percent gravel; very strongly acid; abrupt smooth boundary.

Bw1—12 to 24 inches; dark yellowish brown (10YR 3/4) fine sandy loam; weak coarse subangular blocky structure; very friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; 1 percent gravel; very strongly acid; clear smooth boundary.

Bw2—24 to 31 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak coarse subangular blocky structure; very friable; common very fine and few fine roots; common very fine and fine tubular pores; few fine flakes of mica; 2 percent gravel; moderately acid; abrupt wavy boundary.

C1—31 to 35 inches; 50 percent dark yellowish brown (10YR 3/4), 30 percent dark yellowish brown (10YR 4/4), and 20 percent yellowish brown (10YR 5/8) extremely gravelly loamy sand; single grain; loose; few very fine roots; few very fine tubular pores; few fine flakes of mica; 60 percent gravel and 15 percent cobbles; moderately acid; abrupt wavy boundary.

C2—35 to 43 inches; 40 percent strong brown (7.5YR 4/6), 35 percent red (2.5YR 4/6), and 25 percent dark reddish brown (2.5YR 2/4) extremely gravelly coarse sand; single grain; loose; 50 percent gravel and 15 percent cobbles; slightly acid; abrupt wavy boundary.

C3—43 to 79 inches; very dark brown (10YR 2/2) extremely gravelly coarse sand; single grain; loose; few fine distinct dark gray (10YR 4/1) and light brownish gray (10YR 6/2) irregularly shaped iron depletions with clear boundaries throughout; few fine flakes of mica; 50 percent gravel, 15 percent cobbles, and 5 percent stones; moderately acid.

#### Range in Characteristics

*Solum thickness:* 20 to 39 inches

*Depth to contrasting material:* 20 to 40 inches to deposits of cobbles and gravel stratified with sandy or loamy material

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common in the A and B horizons and few to many in the C horizon

*Content and size of rock fragments:* Less than 35 percent in the A and B horizons and 35 percent or more in the C horizon; mostly gravel and cobbles but including stones

*Soil reaction:* Very strongly acid to neutral throughout the profile

*Ap or A horizon:*

Color—hue of 7.5YR or 10YR and value and chroma of 2 or 3

Thickness—10 to 20 inches

Texture (fine-earth fraction)—fine sandy loam

*Bw horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*C horizon:*

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 2 to 6, and chroma of 4 to 6

Texture (fine-earth fraction)—sand, coarse sand, loamy sand, or loamy fine sand

Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

The Reddies soils in Mitchell County are considered taxadjuncts to the series because they have a regular decrease in organic matter content as depth increases. These soils are coarse-loamy over sandy or sandy-skeletal, mixed, mesic Typic Haplumbrepts.

#### Rosman Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* 3.5 to more than 6.0 feet from December through May

*Permeability:* Moderately rapid

*Parent material:* Recent alluvium

*Landscape:* Mountains

*Landform:* Flood plains dominantly along Cane Creek, the North Toe River, and the Nolichucky River

*Landform position:* Planar to slightly convex bottomland slopes

*Slope range:* 0 to 3 percent

*Taxonomic class:* Coarse-loamy, mixed, mesic Fluventic Haplumbrepts

### Typical Pedon

Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 5.5 miles north on North Carolina Highway 197, about 0.3 mile south on Secondary Road 1315 to Relief, 75 feet east in a field; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 02 minutes 12 seconds N. and long. 82 degrees 17 minutes 45 seconds W.

Ap—0 to 10 inches; black (10YR 2/1) fine sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; very friable; many very fine roots; few very fine tubular pores; common fine flakes of mica; 5 percent gravel; slightly acid; clear wavy boundary.

Bw—10 to 25 inches; dark yellowish brown (10YR 3/6) fine sandy loam; weak coarse subangular blocky structure; very friable; few very fine roots; few very fine tubular pores; common fine flakes of mica; 5 percent gravel; moderately acid; gradual wavy boundary.

C1—25 to 42 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; very friable; few very fine roots; few very fine tubular pores; common fine flakes of mica; 5 percent gravel; moderately acid; gradual wavy boundary.

C2—42 to 62 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; very friable; common medium faint gray (10YR 5/1) irregularly shaped iron depletions with clear boundaries throughout; common fine flakes of mica; 5 percent gravel; moderately acid.

### Range in Characteristics

*Solum thickness:* 35 to more than 60 inches

*Depth to contrasting material:* More than 40 inches to deposits of gravel and cobbles stratified with sandy or loamy material

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few to many

*Content and size of rock fragments:* Less than 15 percent above a depth of 40 inches and less than 50 percent below a depth of 40 inches; mostly gravel

*Soil reaction:* Strongly acid to neutral throughout the profile

*Ap, A, or Ab horizon:*

Color—hue of 7.5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3

Thickness—10 to 20 inches

Texture (fine-earth fraction)—fine sandy loam

*Bw horizon:*

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—loamy fine sand, sandy loam, fine sandy loam, very fine sandy loam, loam, or silt loam

*C horizon:*

Color—hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 2 to 8

Texture (fine-earth fraction)—coarse sand, sand, fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

Redoximorphic features (if they occur)—iron or clay depletions in shades of brown, yellow, olive or gray; iron accumulations in shades of red, brown, yellow, or olive

### Saunook Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Intermountain hills and low and intermediate mountains throughout the county

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Slope range:* 2 to 50 percent

*Taxonomic class:* Fine-loamy, mixed, mesic Humic Hapludults

### Typical Pedon

Saunook silt loam, 8 to 15 percent slopes, stony; from Bakersville, 12.4 miles north on North Carolina Highway 226, about 3 miles northeast on Secondary Road 1330, about 0.35 mile southeast on a private road, 200 feet south in a field; Iron Mountain Gap USGS topographic quadrangle; lat. 36 degrees 07 minutes 50 seconds N. and long. 82 degrees 09 minutes 08 seconds W.

Ap—0 to 10 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many very fine and fine and common medium and coarse roots; many very fine and fine tubular and common coarse vesicular and tubular pores; few

fine flakes of mica; 1 percent gravel; moderately acid; abrupt smooth boundary.

BA—10 to 15 inches; dark yellowish brown (10YR 4/4) loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; common very fine to medium tubular and few coarse vesicular and tubular pores; very few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine flakes of mica; 3 percent gravel, 2 percent cobbles, and 1 percent stones; strongly acid; clear wavy boundary.

Bt1—15 to 25 inches; dark yellowish brown (10YR 4/6) silt loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; common very fine to medium vesicular and tubular pores; few faint dark yellowish brown (10YR 4/6) clay films on faces of peds and surfaces of rock fragments; few fine flakes of mica; 5 percent gravel, 3 percent cobbles, and 2 percent stones; strongly acid; clear wavy boundary.

Bt2—25 to 38 inches; dark yellowish brown (10YR 4/6) silt loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; common very fine to medium vesicular and tubular pores; few faint dark yellowish brown (10YR 4/6) clay films on faces of peds and surfaces of rock fragments; few fine flakes of mica; 6 percent gravel, 2 percent cobbles, and 3 percent stones; moderately acid; clear wavy boundary.

Bt3—38 to 50 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak fine subangular blocky structure; friable; common very fine and fine roots; common very fine and fine vesicular and tubular pores; few faint dark yellowish brown (10YR 4/6) clay films on faces of peds and surfaces of rock fragments; few fine flakes of mica; 15 percent gravel, 2 percent cobbles, and 5 percent stones; moderately acid; gradual wavy boundary.

BC1—50 to 77 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam; weak fine subangular blocky structure; friable; common very fine and fine roots; common very fine and fine vesicular and tubular pores; few faint dark yellowish brown (10YR 4/6) clay films on surfaces of rock fragments and faces of peds; few fine flakes of mica; 27 percent gravel, 16 percent cobbles, and 8 percent stones; moderately acid; gradual wavy boundary.

BC2—77 to 99 inches; dark yellowish brown (10YR 4/4) very cobbly sandy loam; weak fine subangular blocky structure; friable; common very fine and fine roots; common very fine and fine

vesicular and tubular pores; very few faint dark yellowish brown (10YR 4/6) clay films on faces of peds and surfaces of rock fragments; few fine flakes of mica; 25 percent gravel, 15 percent cobbles, and 5 percent stones; moderately acid.

### Range in Characteristics

*Solum thickness:* 40 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common in the A and B horizons and few to many in the C horizon

*Content and size of rock fragments:* Less than 35 percent in the A, BE, and Bt horizons and less than 60 percent in the BC and C horizons; ranging from gravel to stones

*Soil reaction:* Very strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to slightly acid in the B horizon

*Ap or A horizon:*

Color—hue of 10YR, value of 2 or 3, and chroma of 2 to 4

Thickness—6 to 15 inches

Texture (fine-earth fraction)—silt loam

*BA horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt loam

*Bt horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loam, silt loam, clay loam, or sandy clay loam

*BC horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or sandy clay loam

*C horizon (if it occurs):*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

### **Shinbone Series**

*Depth class:* Deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in

the upper part, weathered from low-grade metasedimentary rock

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Landform:* Ridges and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 15 to 50 percent

*Taxonomic class:* Fine-loamy, siliceous, mesic Typic Hapludults

### Typical Pedon

Shinbone sandy loam in an area of Harmiller-Shinbone complex, 15 to 30 percent slopes, stony; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 14.7 miles north on North Carolina Highway 197, about 0.8 mile south on U.S. Forest Service Road 214 to a wildlife field, 0.1 mile south in the field; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 10 seconds N. and long. 82 degrees 22 minutes 44 seconds W.

A—0 to 4 inches; brown (10YR 4/3) sandy loam, yellowish brown (10YR 5/4) dry; weak fine granular structure; very friable; many very fine, common fine, and few medium and coarse roots; common very fine and fine and few medium and coarse pores; 10 percent gravel and 1 percent cobbles; very strongly acid; abrupt smooth boundary.

Bt—4 to 17 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; common very fine to coarse roots; common very fine to coarse tubular pores; few faint clay films on faces of peds; 5 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

BC—17 to 30 inches; brownish yellow (10YR 6/6) sandy loam; weak medium subangular blocky structure; friable; few very fine to medium roots; few very fine and fine tubular pores; 5 percent gravel and 5 percent cobbles; strongly acid; gradual wavy boundary.

C1—30 to 36 inches; brownish yellow (10YR 6/8) gravelly coarse sandy loam saprolite; massive; very friable; few very fine and fine roots; few very fine tubular pores; 10 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

C2—36 to 45 inches; multicolored gravelly coarse sandy loam saprolite; massive; very friable; few very fine and fine roots; few very fine tubular pores; 10 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

Cr—45 to 62 inches; weathered, moderately fractured, low-grade metasandstone that can be dug with

difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

### Range in Characteristics

*Solum thickness:* 20 to 40 inches

*Depth to bedrock:* 40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock

*Content of mica flakes:* None or few

*Content and size of rock fragments:* Less than 35 percent; mostly gravel and channers but ranging to stones in the C horizon

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 6; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—sandy loam

*BA horizon (if it occurs):*

Color—hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

*Bt horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*BC horizon:*

Color—hue of 7.5YR to 2.5Y and value and chroma of 4 to 8

Texture (fine-earth fraction)—loamy sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

*C horizon:*

Color—horizon has hue of 5YR to 2.5Y and value and chroma of 3 to 8 and may be mixed or mottled in shades of these colors

Texture—coarse sandy loam, sandy loam, fine sandy loam, or loam saprolite

*Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, low-grade metasedimentary rock that can be dug with difficulty with hand tools

### Soco Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 10 to 95 percent

*Taxonomic class:* Coarse-loamy, mixed, mesic Typic Dystrachrepts

### Typical Pedon

Soco fine sandy loam in an area of Soco-Stecoah complex, 30 to 50 percent slopes, very stony; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 14.7 miles north on North Carolina Highway 197, about 0.4 mile south on an unmarked U.S. Forest Service road, in a southwest-facing road cut; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 15 seconds N. and long. 82 degrees 21 minutes 31 seconds W.

A—0 to 4 inches; dark brown (10YR 3/3) fine sandy loam, dark yellowish brown (10YR 4/4) dry; weak fine granular structure; very friable; many very fine and fine and few medium roots; many very fine and fine tubular pores; few fine flakes of mica; 1 percent gravel; very strongly acid; clear wavy boundary.

Bw—4 to 26 inches; brownish yellow (10YR 6/6) fine sandy loam; moderate fine subangular blocky structure; friable; common very fine and fine and few medium and coarse roots; common fine and few medium tubular pores; few fine flakes of mica; 5 percent gravel and 1 percent cobbles; very strongly acid; gradual wavy boundary.

C—26 to 34 inches; multicolored cobbly fine sandy loam saprolite; massive; friable; few fine and medium roots; common very fine and fine and medium tubular pores; few fine flakes of mica; 5 percent gravel, 5 percent cobbles, and 5 percent stones; very strongly acid; clear wavy boundary.

Cr—34 to 62 inches; weathered, moderately fractured, low-grade metasandstone that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

### Range in Characteristics

*Solum thickness:* 15 to 39 inches

*Depth to bedrock:* 20 to 40 inches to soft bedrock and more than 40 inches to hard bedrock

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent; mostly gravel and channers but including cobbles, flagstones, and stones

*Soil reaction:* Extremely acid to strongly acid throughout the profile

*A horizon:*

Color—hue of 7.5YR to 2.5Y, value of 2 to 5, and chroma of 1 to 6; where value is 3 or less, horizon is less than 7 inches thick

Texture (fine-earth fraction)—fine sandy loam

*Bw horizon:*

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt loam

*BC horizon (if it occurs):*

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt loam

*C horizon:*

Color—horizon is multicolored or has hue of 5YR to 2Y, value of 4 to 6, and chroma of 4 to 8 and may be mixed or mottled in shades of these colors

Texture (fine-earth fraction)—loamy sand, loamy fine sand, sandy loam, fine sandy loam, loam, or silt loam saprolite

*Cr layer:*

Type of bedrock—weathered, slightly fractured to highly fractured, low-grade metasedimentary rock that can be dug with difficulty with hand tools

### Stecoah Series

*Depth class:* Deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 30 to 95 percent

*Taxonomic class:* Coarse-loamy, mixed, mesic Typic Dystrochrepts

### Typical Pedon

Stecoah fine sandy loam in an area of Soco-Stecoah complex, 30 to 50 percent slopes, very stony; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 14.7 miles north on North Carolina Highway 197, about 0.5 mile south on an unmarked U.S. Forest Service road, in a west-facing road cut; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 09 seconds N. and long. 82 degrees 21 minutes 27 seconds W.

- A—0 to 5 inches; dark yellowish brown (10YR 3/4) fine sandy loam, dark yellowish brown (10YR 4/4) dry; weak fine granular structure; very friable; many very fine and common fine and medium roots; common very fine and fine and few medium and coarse tubular pores; few fine flakes of mica; 5 percent gravel and 5 percent cobbles; very strongly acid; clear smooth boundary.
- Bw1—5 to 31 inches; yellowish brown (10YR 5/8) fine sandy loam; weak medium subangular blocky structure; very friable; common very fine to medium and few coarse roots; common very fine and fine and few medium pores; few fine flakes of mica; 10 percent gravel and 1 percent channers; very strongly acid; gradual wavy boundary.
- Bw2—31 to 44 inches; brownish yellow (10YR 6/6) channery fine sandy loam; weak medium subangular blocky structure; very friable; common very fine and fine and few medium roots; common very fine and few fine tubular pores; few fine flakes of mica; 10 percent gravel and 10 percent channers; very strongly acid; gradual wavy boundary.
- BC—44 to 50 inches; yellow (10YR 7/6) channery fine sandy loam; weak fine subangular blocky structure; very friable; few very fine and fine roots; few very fine tubular pores; few fine flakes of mica; 5 percent gravel and 10 percent channers; extremely acid; abrupt wavy boundary.
- Cr—50 to 62 inches; weathered, moderately fractured, low-grade metasedimentary rock that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

### Range in Characteristics

- Solum thickness:* 24 to 50 inches  
*Depth to bedrock:* 40 to 60 inches to soft bedrock and more than 60 inches to hard bedrock  
*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent; mostly gravel, channers, and flagstones but including cobbles and stones

*Soil reaction:* Extremely acid to strongly acid throughout the profile

#### A horizon:

Color—hue of 7.5YR to 2.5Y, value of 2 to 5, and chroma of 2 to 6; where value is 3 or less, horizon is less than 7 inches thick

Texture (fine-earth fraction)—fine sandy loam

#### Bw horizon:

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—fine sandy loam, loam, or silt loam

#### BC horizon:

Color—hue of 5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—fine sandy loam, loam, or silt loam

#### C horizon (if it occurs):

Color—horizon is multicolored or has hue of 5YR to 2Y, value of 4 to 6, and chroma of 4 to 8 and may be mixed or mottled in shades of these colors

Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, loam, or silt loam saprolite

#### Cr layer:

Type of bedrock—weathered, slightly fractured to highly fractured, low-grade metasedimentary rock that can be dug with difficulty with hand tools

## Sylco Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate

*Parent material:* Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock

*Landscape:* Low and intermediate mountains in the far northwestern part of the county

*Landform:* Ridges and south- to west-facing mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 10 to 30 percent and 50 to 95 percent

*Taxonomic class:* Loamy-skeletal, mixed, mesic Typic Dystrochrepts

### Typical Pedon

Sylco very channery loam in an area of Sylco-Soco complex, 10 to 30 percent slopes, stony; from Bakersville, 5.5 miles north on North Carolina Highway 226, about 15.0 miles north on North Carolina Highway 197 to Indian Grave Gap at the Tennessee-North Carolina State line, 700 feet west on U.S. Forest Service Road 230, about 20 feet north in woodland; Hunt Dale USGS topographic quadrangle; lat. 36 degrees 06 minutes 34 seconds N. and long. 82 degrees 21 minutes 42 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A1—0 to 2 inches; dark brown (10YR 3/3) very channery loam, dark yellowish brown (10YR 4/4) dry; moderate fine granular structure; friable; many very fine, common fine, and few medium and coarse roots; common very fine and fine and few medium tubular pores; 35 percent channers and 5 percent flagstones; very strongly acid; clear wavy boundary.

A2—2 to 5 inches; brown (10YR 4/3) very channery loam, yellowish brown (10YR 5/4) dry; moderate fine granular structure; friable; many very fine, common fine, and few medium and coarse roots; common very fine and fine and few medium tubular pores; 35 percent channers and 5 percent flagstones; very strongly acid; clear wavy boundary.

BA—5 to 11 inches; dark yellowish brown (10YR 4/4) very channery loam; weak fine subangular blocky structure; very friable; common very fine and few fine to coarse roots; common very fine and few fine and medium tubular pores; 35 percent channers and 5 percent flagstones; very strongly acid; clear wavy boundary.

Bw—11 to 22 inches; yellowish brown (10YR 5/6) very channery loam; moderate fine subangular blocky structure; friable; common very fine and few fine and medium roots; few very fine to medium tubular pores; 35 percent channers and 10 percent flagstones; very strongly acid; clear wavy boundary.

BC—22 to 39 inches; yellowish brown (10YR 5/8) very flaggy loam; weak fine subangular blocky structure; very friable; few very fine and fine roots; few very fine tubular pores; 25 percent channers and 30 percent flagstones; very strongly acid; abrupt wavy boundary.

R—39 to 50 inches; unweathered, slightly fractured, low-grade metasandstone.

### Range in Characteristics

*Solum thickness:* 20 to 40 inches

*Depth to bedrock:* 20 to 40 inches to hard bedrock

*Content of mica flakes:* None or few

*Content and size of rock fragments:* 10 to 50 percent in the A horizon, 15 to 45 percent in the B horizon, and 40 to 70 percent in the C horizon; mostly channers and flagstones

*Soil reaction:* Extremely acid to strongly acid throughout the profile

#### A1 horizon:

Color—hue of 10YR, value of 3 or 4, and chroma of 2 to 4; where value is 3 or less, horizon is less than 7 inches thick

Texture (fine-earth fraction)—loam

#### A2 horizon:

Color—hue of 10YR, value of 4 or 5, and chroma of 3 or 4

Texture (fine-earth fraction)—loam or silt loam

#### BA horizon:

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 8

Texture (fine-earth fraction)—loam or silt loam

#### Bw horizon:

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 8

Texture (fine-earth fraction)—loam or silt loam

#### BC horizon:

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 8

Texture (fine-earth fraction)—loam or silt loam

#### C horizon (if it occurs):

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 8

Texture (fine-earth fraction)—loam or silt loam  
saprolite

#### R layer:

Type of bedrock—unweathered, slightly fractured to highly fractured, low-grade metasedimentary rock

### Tanasee Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* High mountains from Little Rock Knob to Roan Mountain and south to Spears Top

*Landform:* Coves, drainageways, and colluvial fans

*Landform position:* Head slopes, side slopes, and footslopes

*Slope range:* 15 to 50 percent

*Taxonomic class:* Fine-loamy, mixed, frigid Typic Haplumbrepts

### Typical Pedon

Tanasee loam in an area of Tanasee-Balsam complex, 15 to 30 percent slopes, very bouldery; from Bakersville, 12.7 miles north on North Carolina Highway 261 to Carvers Gap at the North Carolina-Tennessee State line, 1.0 mile southwest on Secondary Road 1348, about 1.5 miles west on Balsam Road, in a southeast-facing road cut in woodland; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 05 minutes 16 seconds N. and long. 82 degrees 07 minutes 49 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A1—0 to 5 inches; black (10YR 2/1) loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many very fine and fine, common medium, and few coarse roots; many very fine, common fine and medium, and few coarse tubular pores; few fine flakes of mica; 2 percent gravel; very strongly acid; clear smooth boundary.

A2—5 to 13 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; weak medium granular structure; very friable; common very fine and fine and few medium and coarse roots; many very fine, common fine and medium, and few coarse tubular pores; few fine flakes of mica; 2 percent gravel; very strongly acid; clear wavy boundary.

AB—13 to 19 inches; very dark grayish brown (10YR 3/2) gravelly fine sandy loam, dark yellowish brown (10YR 4/4) dry; many medium distinct strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; friable; few very fine to coarse roots; common very fine and fine and few medium and coarse tubular pores; few fine flakes of mica; 15 percent gravel and 10 percent cobbles; very strongly acid; clear wavy boundary.

Bw1—19 to 34 inches; strong brown (7.5YR 4/6) gravelly sandy loam; weak fine subangular blocky structure; friable; few very fine to medium roots; common very fine and few fine and medium tubular pores; few fine flakes of mica; 20 percent gravel and 10 percent cobbles; very strongly acid; clear wavy boundary.

Bw2—34 to 50 inches; strong brown (7.5YR 4/6) gravelly sandy loam; weak medium subangular

blocky structure; friable; few very fine and fine roots; few very fine to medium tubular pores; few fine flakes of mica; 25 percent gravel and 5 percent cobbles; strongly acid; clear wavy boundary.

BC—50 to 70 inches; strong brown (7.5YR 4/6) gravelly coarse sandy loam; weak coarse subangular blocky structure; very friable; few very fine and fine roots; few very fine and fine tubular pores; few fine flakes of mica; 20 percent gravel and 10 percent cobbles; strongly acid; clear wavy boundary.

C1—70 to 82 inches; multicolored gravelly coarse sandy loam; massive; very friable; few fine flakes of mica; 10 percent gravel and 5 percent cobbles; very strongly acid; clear wavy boundary.

C2—82 to 92 inches; multicolored gravelly loamy coarse sand; massive; very friable; few fine flakes of mica; 10 percent gravel and 5 percent cobbles; very strongly acid.

### Range in Characteristics

*Solum thickness:* 24 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent above a depth of 40 inches and less than 60 percent below a depth of 40 inches; ranging from gravel to stones

*Soil reaction:* Extremely acid to strongly acid throughout the profile

#### A horizon:

Color—hue of 10YR, value of 2 or 3, and chroma of 1 to 3

Thickness—10 to 20 inches

Mottles—shades of red or brown

Texture (fine-earth fraction)—loam

#### AB horizon:

Color—hue of 7.5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

#### Bw horizon:

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

#### BC horizon:

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*C horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—coarse sand, sand, fine sand, loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, or fine sandy loam

## **Thunder Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Parent material:* Colluvium derived from felsic or mafic, high-grade metamorphic or igneous rock

*Landscape:* Intermountain hills and low and intermediate mountains throughout the county

*Landform:* Coves, colluvial fans, drainageways, and benches

*Landform position:* Head slopes, side slopes, footslopes, and toeslopes

*Slope range:* 2 to 50 percent

*Taxonomic class:* Loamy-skeletal, mixed, mesic Humic Hapludults

### **Typical Pedon**

Thunder cobbly loam in an area of Thunder-Saunook complex, 8 to 15 percent slopes, very bouldery; from Bakersville, 9.4 miles north on North Carolina Highway 226 to a private road next to Big Rock Church, 0.3 mile east on the road, 25 feet south in woodland; Bakersville USGS topographic quadrangle; lat. 36 degrees 02 minutes 30 seconds N. and long. 82 degrees 12 minutes 22 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A—0 to 8 inches; dark brown (10YR 3/3) cobbly loam, dark yellowish brown (10YR 4/4) dry; weak medium and coarse granular structure; friable; many very fine to coarse roots; many very fine and fine and common medium and coarse tubular pores; 10 percent gravel, 15 percent cobbles, 5 percent stones, and 1 percent boulders; slightly acid; clear wavy boundary.

Bt1—8 to 21 inches; strong brown (7.5YR 4/6) very cobbly loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; common very fine and fine and medium

tubular pores; few faint brown (7.5YR 4/4) clay films on faces of pedes and surfaces of rock fragments; few fine flakes of mica; 10 percent gravel, 25 percent cobbles, 10 percent stones, and 1 percent boulders; strongly acid; clear irregular boundary.

Bt2—21 to 52 inches; strong brown (7.5YR 5/8) very cobbly sandy clay loam; moderate medium subangular blocky structure; friable; common very fine and fine and few medium roots; common very fine and fine tubular pores; common faint brown (7.5YR 4/4) clay films on faces of pedes and surfaces of rock fragments; few fine flakes of mica; 15 percent gravel, 25 percent cobbles, 15 percent stones, and 5 percent boulders; strongly acid; clear wavy boundary.

C—52 to 80 inches; strong brown (7.5YR 5/8) extremely cobbly loamy sand; massive; friable; few very fine and fine roots; few fine tubular pores; common fine flakes of mica; 15 percent gravel, 25 percent cobbles, 25 percent stones, and 5 percent boulders; moderately acid.

### **Range in Characteristics**

*Solum thickness:* More than 50 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common in the A and B horizons and few to many in the C horizon

*Content and size of rock fragments:* 25 to 85 percent in the A horizon and more than 35 percent in the B and C horizons; ranging from gravel to boulders

*Soil reaction:* Very strongly acid to slightly acid throughout the profile

*A or Ap horizon:*

Color—hue of 10YR, value of 2 to 4, and chroma of 1 to 3

Thickness—6 to 12 inches

Texture (fine-earth fraction)—loam

*Bt horizon:*

Color—hue of 5YR to 10YR, value of 4 to 6, and chroma of 4 to 8

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

*BC horizon (if it occurs):*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 6 to 8

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, loam, sandy clay loam, or clay loam

*C horizon:*

Color—hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 6 to 8

Texture (fine-earth fraction)—loamy sand, coarse sandy loam, or sandy loam

### **Udorthents**

*Depth class:* Deep and very deep

*Drainage class:* Somewhat excessively drained to moderately well drained

*Depth to seasonal high water table:* Variable; occasionally 3 to 6 feet and commonly more than 6 feet from January through December

*Permeability:* Moderate to slow

*Parent material:* Fill areas—mixture of earthy material and natural soils; excavated areas—variable, depending on the type of underlying bedrock

*Landscape:* Intermountain hills and low and intermediate mountains

*Landform:* Summits, side slopes, coves, terraces, and flood plains where the natural soil has been excavated or covered by earthy fill material

*Slope:* 0 to 50 percent

*Taxonomic class:* Udorthents

#### **Typical Pedon**

Udorthents consist of cut and fill areas where soil and the underlying material have been removed and placed on an adjacent site. Areas include highway right-of-way corridors, building sites, and mica and feldspar mines. Vertical faces of exposed bedrock are common. The map unit also includes landfills, borrow pits, and recreational areas, such as ball fields. A typical pedon is not given due to the variable nature of the soil.

#### **Range in Characteristics**

*Depth to bedrock:* Excavated areas—bedrock commonly exposed at or near the soil surface; fill areas—40 to more than 60 inches

*Content and size of rock fragments:* Variable, commonly 15 to 50 percent; ranging from gravel to stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*Fill areas:*

Color—hue of 2.5YR to 10YR, value of 4 to 7, and chroma of 2 to 8

Texture (fine-earth fraction)—variable, commonly loamy

*Excavated areas:*

Color—hue of 2.5YR to 5Y, value of 4 to 7, and chroma of 2 to 8

Texture (fine-earth fraction)—variable, commonly loamy

### **Watauga Series**

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderate in the surface layer and subsoil and moderately rapid in the underlying material

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock with a high mica content

*Landscape:* Intermountain hills and low and intermediate mountains dominantly in the central and southern parts of the county

*Landform:* Ridges and south- to west-facing hillslopes and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 8 to 50 percent

*Taxonomic class:* Fine-loamy, micaceous, mesic Typic Hapludults

#### **Typical Pedon**

Watauga sandy loam, 15 to 30 percent slopes, stony (fig. 20); from Bakersville, 7.3 miles south on North Carolina Highway 226 to its intersection with an unmarked, paved road, 0.4 mile east on the road, in a south-facing road cut; Spruce Pine USGS topographic quadrangle; lat. 35 degrees 56 minutes 25 seconds N. and long. 82 degrees 05 minutes 51 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A1—0 to 2 inches; dark brown (10YR 3/3) sandy loam, dark yellowish brown (10YR 4/4) dry; moderate fine granular structure; very friable; common fine and medium and few coarse roots; common fine to coarse vesicular pores; common fine flakes of mica; 5 percent gravel; very strongly acid; abrupt smooth boundary.

A2—2 to 5 inches; brown (10YR 4/3) sandy loam, yellowish brown (10YR 5/4) dry; weak coarse subangular blocky structure parting to moderate medium granular; friable; common fine and medium and few coarse roots; common fine and medium vesicular and few fine to coarse tubular pores; common fine flakes of mica; 3 percent gravel; very strongly acid; abrupt smooth boundary.

E—5 to 10 inches; yellowish brown (10YR 5/4) coarse sandy loam; common fine faint light yellowish brown (10YR 6/4) mottles; weak medium subangular blocky structure; friable; common fine and medium and few coarse roots; common fine and medium tubular pores; many fine flakes of

- mica; 3 percent gravel; very strongly acid; abrupt smooth boundary.
- BE—10 to 20 inches; light yellowish brown (10YR 6/4) coarse sandy loam; common fine faint yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; friable; few fine and medium and common coarse roots; common fine and medium tubular pores; many fine flakes of mica; 7 percent gravel; very strongly acid; clear smooth boundary.
- Bt1—20 to 36 inches; yellowish brown (10YR 5/4) sandy clay loam; few medium distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; common fine and medium tubular pores; common distinct yellowish brown (10YR 5/6) clay films on faces of peds; many fine and medium flakes of mica; 5 percent gravel; very strongly acid; clear smooth boundary.
- Bt2—36 to 58 inches; strong brown (7.5YR 5/6) sandy clay loam; common medium distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; few fine and medium tubular pores; common faint strong brown (7.5YR 4/6) clay films on faces of peds; many fine and medium flakes of mica; 3 percent gravel; very strongly acid; clear smooth boundary.
- BC—58 to 70 inches; reddish yellow (7.5YR 6/8) coarse sandy loam; common medium distinct pinkish white (7.5YR 8/2) mottles; weak medium and coarse subangular blocky structure; friable; few fine and medium vesicular pores; common faint strong brown (7.5YR 5/8) clay films on faces of peds; many fine and medium flakes of mica; 4 percent gravel; strongly acid; clear smooth boundary.
- C1—70 to 87 inches; brownish yellow (10YR 6/6) coarse sandy loam saprolite; few medium distinct strong brown (7.5YR 5/6) and common fine and medium very pale brown (10YR 7/3) mottles; massive; friable; few fine and medium vesicular pores; few faint strong brown (7.5YR 5/8) clay films on faces of peds; many fine and medium flakes of mica; 3 percent gravel; strongly acid; clear smooth boundary.
- C2—87 to 99 inches; white (10YR 8/1) loamy coarse sand saprolite; common fine and medium distinct very pale brown (10YR 8/3) mottles; massive; friable; many fine and medium flakes of mica; 4 percent gravel; strongly acid.

#### Range in Characteristics

*Solum thickness:* 20 to 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Common to many in the A and E horizons and in the upper part of the B horizon and many in the lower part of the B horizon and in the C horizon

*Content and size of rock fragments:* Less than 35 percent in the A horizon and less than 15 percent in the B and C horizons; mostly gravel

*Soil reaction:* Extremely acid to moderately acid throughout the profile

#### *A or Ap horizon:*

Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4; where value is 3 or less, horizon is less than 6 inches thick

Texture (fine-earth fraction)—sandy loam

#### *E horizon:*

Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 to 5

Mottles—shades of red, brown, or yellow

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

#### *BE horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Mottles—shades of red, brown, or yellow

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, loam, sandy clay loam, or clay loam

#### *Bt horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Mottles—shades of red, brown, or yellow

Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

#### *BC horizon:*

Color—hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 4 to 8

Mottles—shades of red, brown, yellow, gray, or white

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

#### *C horizon:*

Color—horizon is multicolored or has hue of 5YR to 2.5Y, value of 4 to 8, and chroma of 1 to 8; colors with chroma of 2 or less are inherited from the parent material and are not caused by wetness

Mottles—shades of red, brown, yellow, gray, or white

Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, or fine sandy loam saprolite

## Wayah Series

*Depth class:* Very deep

*Drainage class:* Well drained

*Depth to seasonal high water table:* More than 6.0 feet

*Permeability:* Moderately rapid

*Parent material:* Residuum affected by soil creep in the upper part, weathered from felsic or mafic, high-grade metamorphic and igneous rock

*Landscape:* High mountains from Little Rock Knob to Roan Mountain and south to Spears Top

*Landform:* Ridges and mountain slopes

*Landform position:* Summits and side slopes

*Slope range:* 15 to 95 percent

*Taxonomic class:* Fine-loamy, mixed, frigid Typic Haplumbrepts

### Typical Pedon

Wayah clay loam in an area of Wayah-Burton complex, windswept, 15 to 30 percent slopes, stony; from Bakersville, 10.3 miles north on North Carolina Highway 261, about 0.4 mile west on Valley of Roan Road to ridgetop, 0.6 mile on extreme right-hand fork to switchback, 0.1 mile on the road to an east-facing road cut; Carver's Gap USGS topographic quadrangle; lat. 36 degrees 05 minutes 56 seconds N. and long. 82 degrees 06 minutes 22 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter

A1—0 to 4 inches; very dark brown (10YR 2/2) clay loam, dark brown (10YR 3/3) dry; weak fine granular structure; very friable; many very fine and fine and common medium roots; many very fine and fine tubular pores; few fine flakes of mica; 1 percent gravel; very strongly acid; clear smooth boundary.

A2—4 to 8 inches; black (10YR 2.1) loam, brown (10YR 4/3) dry; moderate medium subangular blocky structure; friable; common very fine and fine and few medium roots; common very fine and fine tubular pores; few fine flakes of mica; 1 percent gravel; extremely acid; clear wavy boundary.

A3—8 to 18 inches; black (10YR 2/1) loam, brown (10YR 4/3) dry; moderate medium subangular blocky structure; friable; common very fine and fine and few medium roots; common very fine and fine tubular pores; few fine flakes of mica; 1 percent gravel; strongly acid; clear wavy boundary.

BA—18 to 26 inches; brown (7.5YR 4/4) loam; common coarse faint dark brown (7.5YR 3/3) mottles; moderate medium subangular blocky structure; friable; few very fine to coarse roots;

common very fine and fine tubular pores; few fine flakes of mica; 3 percent gravel; strongly acid; gradual wavy boundary.

Bw1—26 to 33 inches; strong brown (7.5YR 5/6) gravelly fine sandy loam; moderate medium subangular blocky structure; friable; few very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; 19 percent gravel and 1 percent cobbles; strongly acid; clear wavy boundary.

Bw2—33 to 41 inches; strong brown (7.5YR 4/6) gravelly fine sandy loam; few fine faint strong brown (7.5YR 5/6) and few fine faint reddish yellow (7.5YR 6/8) mottles; moderate medium subangular blocky structure; friable; few very fine and fine roots; few very fine and fine tubular pores; common fine flakes of mica; 16 percent gravel and 1 percent cobbles; strongly acid; clear wavy boundary.

Bw3—41 to 51 inches; strong brown (7.5YR 5/6) fine sandy loam; common distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few very fine and fine roots; few very fine and fine tubular pores; common fine flakes of mica; 3 percent gravel and 1 percent cobbles; strongly acid; clear wavy boundary.

BC—51 to 63 inches; strong brown (7.5YR 5/8) fine sandy loam; common medium distinct yellowish red (5YR 5/8) mottles; weak coarse subangular blocky structure; friable; few very fine and fine roots; few very fine tubular pores; few very fine and fine very dark gray (7.5YR 3/0) iron and manganese concretions; common fine flakes of mica; 1 percent gravel; strongly acid; clear wavy boundary.

C—63 to 77 inches; 65 percent strong brown (7.5YR 5/8), 25 percent very pale brown (10YR 8/4), and 10 percent yellowish red (5YR 5/8) fine sandy loam saprolite; massive; friable; few very fine tubular pores; few fine black (5YR 2.5/1) iron and manganese accumulations and stains on faces of peds; few fine flakes of mica; strongly acid; abrupt smooth boundary.

Cr—77 to 86 inches; weathered, moderately fractured biotite hornblende gneiss that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart.

### Range in Characteristics

*Solum thickness:* 20 to more than 60 inches

*Depth to bedrock:* More than 60 inches

*Content of mica flakes:* Few or common throughout the profile

*Content and size of rock fragments:* Less than 35 percent; ranging from gravel to stones

*Soil reaction:* Extremely acid to moderately acid throughout the profile

*A horizon:*

Color—hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3

Thickness—10 to 20 inches

Texture (fine-earth fraction)—clay loam

*BA horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 3 or 4

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*Bw horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

*BC horizon:*

Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8

Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

*C horizon:*

Color—horizon is multicolored or has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8 and may be mixed or mottled in shades of these colors

Texture (fine-earth fraction)—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam saprolite

*Cr horizon:*

Type of bedrock—weathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools



# Formation of the Soils

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This section describes the factors of soil formation and relates them to the soils in the survey area.

## Factors of Soil Formation

A soil is a three-dimensional natural body consisting of mineral and organic material that can support life. The nature of any soil at a given site is a result of the interaction of five general factors: parent material, climate, plants and animals, relief, and time. Climate and plants and animals act on parent material that is modified by relief over time (4). Theoretically, if all the soil-forming factors were identical at different sites, the soils at these sites would be identical. Differences among soils are caused by variations in one or more of these factors.

### Parent Material

Parent material is the unconsolidated mass in which a soil forms. It is derived from the physical and chemical breakdown of rocks. The physical and chemical composition of parent material has an important effect on the kind of soil that forms. Parent material influences the amount of sand, silt, and clay in a soil, as well as acidity, color, erodibility, and other soil characteristics that affect use and management. The amount of clay in a soil affects such factors as workability, fertilizer and water retention, and the performance of septic tank filter fields.

There are three categories of parent material in Mitchell County: residuum, colluvium, and alluvium (fig. 21).

#### Residuum

Residuum occurs throughout the county on ridgetops and side slopes of intermountain hills and low, intermediate, and high mountains. Residual parent material is the result of bedrock weathering in place. Residual soils include Buladean, Cheoah, Clifton, Evard, and Wayah.

#### Colluvium

Colluvium occurs throughout the county in coves, on benches, on footslopes, on toeslopes, and in

sloping drainageways. It consists of material that has slid or fallen downslope under the influence of gravity. Colluvial soils are loamy, are very deep, and contain angular to subrounded rock fragments that increase in quantity as depth increases. Surface stones and boulders are common. Soils that formed in colluvium include Saunook, Dillsboro, Cullasaja, Thunder, Lostcove, Keener, Balsam, and Tanasee.

#### Alluvium

Alluvium is material deposited on flood plains along streams and the North Toe River. Alluvial soils have very little development because the soil-forming processes are interrupted by each flooding event. The texture of the alluvial material varies, depending on the speed of the floodwater, the duration of flooding, and the distance from the streambank. Alluvial soils are usually stratified with rounded rock fragments that increase in quantity as depth increases.

In general, soils closest to the headwaters show the least soil development and are shallower to strata with a high content of rock fragments. Dellwood and Reddies soils are examples. Flood plains farther downstream receive finer parent material that has undergone more mechanical weathering. The soils in these areas show slightly more development. Bandana and Rosman soils are examples. Adjacent to the largest streams and the North Toe River, where flooding is frequent and velocity is high, sandy Biltmore soils formed.

#### Climate

Climate, particularly precipitation and temperature, affects the chemical, biological, and physical relationships in the soil. Annual rainfall varies considerably across Mitchell County. It ranges from 46 inches in the Green Mountain-Tipton Hill area to more than 70 inches on Roan Mountain in the northern part of the county. Rainwater, a weak acid, chemically dissolves rocks, minerals, and organic matter and thus releases soil nutrients. Water transports organic matter, soil particles, and nutrients through the soil. Temperature influences the kind and growth of organisms and the speed of physical and chemical

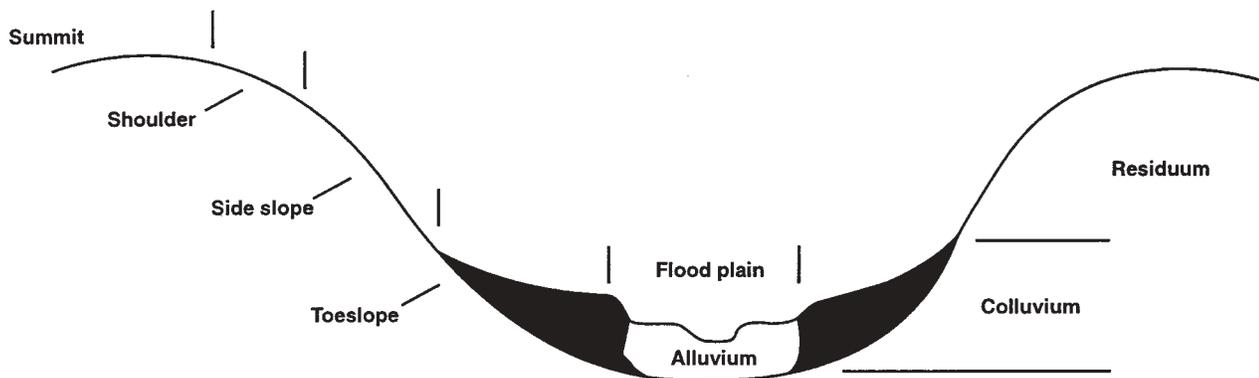


Figure 21.—Relationship between landform position and parent material.

reactions in the soil. The freeze-thaw cycle affects the formation of soils by assisting in the breakdown of rock into parent material.

Localized microclimates are the result of unique combinations of climate, aspect, landscape position, and elevation and are important in the soil-forming process. For example, the high amounts of rainfall and cool temperatures of high mountains produce brown, medium textured soils that have a high content of organic matter in the surface layer. The warmer temperatures and the lower amounts of rainfall of low mountains produce red soils that have less organic matter in the surface layer and more clay in the subsoil. Both areas of mountains host distinctly different plant and animal communities, which indicate that unique environmental factors are at work.

## Plant and Animal Life

Plants and animals influence the formation of soil and differentiation of soil horizons. The kind and number of organisms in and on the soil are determined to a large extent by climate and by parent material, relief, and the age of the soil. Bacteria, fungi, and other microscopic organisms aid in the weathering of rocks, the decomposition of organic matter, and the mixing of the surface layers. The larger plants and animals furnish organic matter and transfer elements from the subsoil to the surface soil. Soil properties affected by plants and animals include color, structure, reaction, and the content and distribution of organic matter.

Trees and plants take up nutrients from the deeper parts of the soil and add them to the surface as

leaves, twigs, and roots. This organic matter is chemically and physically altered by micro-organisms, earthworms, and higher forms of life. The nutrients are mineralized and leach into the root zone. Other plants take up these nutrients, continuing the cycle. This process is called biocycling. Where deep-rooted plants are removed, the accumulated nutrients are lost from the system.

Human activity has significantly influenced soil formation in Mitchell County. Native forests have been cleared for farming and other uses. Cultivation has accelerated erosion on sloping soils, wet soils have been drained, and manure, lime, chemical fertilizer, and pesticides have been applied across the landscape. Cultivation has affected soil structure and lowered the organic matter content. The development of land for urban uses or for mining has significantly influenced the soil in some areas.

## Relief

The relief, or topography, in Mitchell County is a result of mountain building, slope retreat, and the dissection of the land surface by major streams and tributaries. Slope retreat and dissection of the land surface are controlled by the hardness of bedrock and the amount of uplift in the area. Relief, in turn, influences soil formation by creating differences in internal drainage, surface runoff, geologic erosion, soil temperature, and plant cover. Mountains also influence weather patterns and thus local climate.

Relief determines soil drainage. Soils on ridgetops and side slopes are well drained while soils at the base of slopes and in coves can be affected by seeps and springs. On flood plains, soils next to the streams

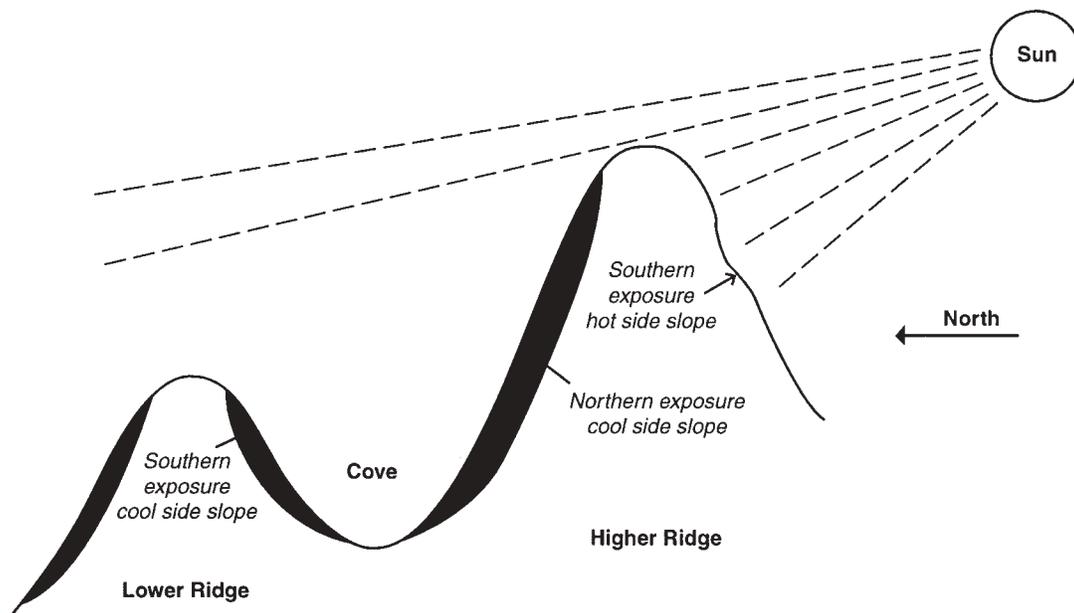


Figure 22.—Cool slopes include north- to east-facing slopes, those shaded by the higher mountains, and typically those in coves. These areas are more productive and are susceptible to late spring and early fall frosts.

are often well drained while soils farther away can have a high water table.

As slope increases, surface runoff and geologic erosion increase and the amount of water that percolates through the soil decreases. Thus soils on steep side slopes are not well developed. Soil creep also influences soil formation on mountainous terrain. Generally, the upper part of most soils on side slopes formed in material that is very slowly moving downslope. Time, steepness of slope, and slope length control the extent of soil creep. Soils that formed on ridgetops and shoulder slopes are much less affected by soil creep and may be the only completely residual soils. Generally, soil depth increases downslope. Maximum soil thickness occurs in concave areas, in coves, on footslopes, and on toeslopes.

Relief influences soil temperature, moisture, and organic matter content through aspect and elevation. For example, south- to west-facing slopes receive direct sunlight and warm up earlier in the spring. Soils on north- to east-facing slopes and those shaded by the higher mountains are cooler and retain moisture and thus have a higher organic matter content in the surface layer (fig. 22). Conditions are similar at elevations above 4,000 feet, where soils are cooler and receive more rainfall. Together these conditions

affect soil formation by regulating plant and animal activity and the weathering process.

## Time

The length of time that parent material has been exposed to the soil-forming processes accounts for some differences between soils. The formation of a well defined profile, however, also depends on other factors.

The soils of Mitchell County vary considerably in age. The oldest soils occur on warm, stable uplands. Clifton, Fannin, and Evard soils are examples. Older soils generally have had more time for clay to form, move, and accumulate. Their horizons or layers are more defined than those of younger soils.

Most soils in the county are relatively young and less developed. On uplands, these soils include Buladean, Chestnut, Plott, Soco, and Chandler. One reason these soils have not had time to develop further is steepness of slope. Geologic erosion and the percolation of water downslope instead of through the soil hinder soil formation. Soils at high elevations, such as Wayah, Burton, and Craggey, are young partially due to climatic factors. Limited periods of favorable temperatures hinder soil development.

In coves, Cullasaja, Lostcove, Balsam, and

Tanasee soils are examples of young soils. These soils are on more active landscapes where they receive material from geologic erosion. In addition, water moves through these soils as seeps and springs, carrying clay particles out of the soil. The development of Balsam and Tanasee soils is further slowed by the cold climate in which they occur.

The youngest soils in the county formed in alluvium on flood plains. This landscape is less stable, or more active, than other landscapes because flooding adds to and takes away soil material. Examples of soils formed in alluvium are Dellwood, Reddies, Biltmore, and Bandana.

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# Glossary

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**Access road.** A road constructed to facilitate the use and management of the land. Access roads are designed for limited traffic and typically consist of a cut slope, a roadbed, and a fill outslope.

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

**Amphibolite.** A metamorphic rock consisting mainly of amphibole and plagioclase with little or no quartz. As the content of quartz increases, the rock grades into hornblende plagioclase gneiss.

**Animal unit month (AUM).** The amount of forage required by one mature cow of approximately 1,000 pounds weight, with or without a calf, for 1 month.

**Aquic conditions.** Current soil wetness characterized by saturation, reduction, and redoximorphic features.

**Aquifer.** A water-bearing bed or stratum of permeable rock, sand, or gravel capable of fielding considerable quantities of water to wells or springs.

**Argillic horizon.** A subsoil horizon characterized by an accumulation of illuvial clay.

**Arkose.** A sandstone containing 25 percent or more of feldspar generally derived from the disintegration of felsic igneous rock.

**Aspect.** The direction in which a slope faces. Generally, cool aspects are north- to east-facing and warm aspects are south- to west-facing.

**Atterberg limits.** Atterberg limits are measured for soil materials passing the No. 40 sieve. They include the liquid limit (LL), which is the moisture content at which the soil passes from a plastic to a liquid state, and the plasticity index (PI), which is the water content corresponding to an arbitrary limit between the plastic and semisolid states of consistency of a soil.

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

inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low .....	0 to 3
Low .....	3 to 6
Moderate .....	6 to 9
High .....	9 to 12
Very high .....	more than 12

**Ball and burlap harvest.** A method of harvesting nursery plants in which burlap is wrapped around a ball of soil that is attached to the root system.

**Bare-root harvest.** A method of harvesting in which nursery plants are removed from the soil with their roots bare and are packed in moist shipping material.

**Basal area.** The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

**Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

**Basic rock.** An igneous rock composed dominantly of dark minerals. The minerals of this rock are comparatively low in silica and rich in bases, such as amphiboles, pyroxenes, biotite, and olivine.

**Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

**Bedrock escarpment.** An intermittent to continuous band of rock outcrop usually more than 50 feet in length and 5 feet wide. Commonly associated with moderately steep to very steep soils.

**Biotite.** A common rock-forming mineral consisting primarily of ferromagnesian silicate minerals. Color ranges from dark brown to green in thin section. Biotite is commonly referred to as "black mica" because of the natural black color.

**Borrow pit.** An open excavation from which the soil and underlying material have been removed, generally for use in road construction. Borrow pits

support few or no plants without major reclamation. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Bottomland.** The normal flood plain of a stream, subject to flooding.

**Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.

**Broad-based dips.** Short sections of access road having a reverse grade that intercept storm water. The dips are spaced about 200 feet apart and are designed to divert water away from stream crossings or steep grades.

**Cable logging.** A method of moving felled trees to a landing for loading and transport to a processing facility. Most cable logging systems consist of a truck-mounted drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees are generally reeled in while one end is lifted or the entire log is completely suspended. This system is used to log steep side slopes and reduce operational costs by minimizing road construction.

**Canopy.** The leafy crown of trees or shrubs. (See Crown.)

**Catena.** A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

**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.

**Catsteps.** Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

**Channery soil material.** Soil material that is, by volume, 15 to 35 percent thin, flat fragments of metasandstone, slate, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

**Chiseling.** Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

**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 depletions.** Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

**Clayey.** A general textural term that includes sandy clay, silty clay, and clay. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) containing 35 percent or more clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

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

**Claypan.** A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

**Clay spot.** An area where the surface layer is clayey (sandy clay, silty clay, or clay) occurring in a map unit in which the dominant soil or soils have a loamy, silty, or sandy surface layer. Excluded are areas where the textural classes are adjoining, such as an area of sandy clay occurring in a map unit in which the dominant soil or soils have a surface layer of clay loam. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size. (See Texture, soil.)

**Climax plant community.** The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

**Coarse fragments.** If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

**Coarse textured soil.** Sand or loamy sand.

**Coastal Plain.** The physiographic region of eastern North Carolina that consists of ocean-deposited sediments of sand, silt, and clay. These sediments are in level to rolling areas and vary in thickness.

**Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

**Cobbly soil material.** Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material

has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

**Colluvial fan.** A fan-shaped area of soils deposited by mass-wasting (direct gravitational action) and local unconcentrated runoff on and at the base of steeper side slopes.

**Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

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

**Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

**Concretions.** Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

**Conservation cropping system.** Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

**Conservation tillage.** A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the ear.

**Consistence, soil.** Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to

compression. Terms describing consistence are defined in the "Soil Survey Manual."

**Contour stripcropping.** Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

**Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

**Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

**Cove.** A gently sloping to very steep, concave colluvial area that is commonly located at the head of drains and along drainageways in mountainous areas. Coves are long and narrow along drainageways extending up into the mountains and become wide and bowl-shaped where streams flow out of the mountains and into the valleys.

**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.

**Cropping system.** Growing crops according to a planned system of rotation and management practices.

**Crop residue management.** Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

**Cross-slope farming.** Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

**Crown.** The upper part of a tree or shrub, including the living branches and their foliage.

**Culmination of the mean annual increment (CMAI).** The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.

**Cut and fill slopes.** Areas of sloping surfaces where excavated soil (cut) is moved to a downhill (fill) position. Usually associated with roads and building sites.

**Cutbanks cave** (in tables). The walls of excavations tend to cave in or slough.

**Dbh (diameter at breast height).** The diameter of a tree at 4.5 feet above the ground level on the uphill side.

**Deferred grazing.** Postponing grazing or resting grazing land for a prescribed period.

**Delineation.** An individual area drawn on the map. Soil delineations represent landforms such as flood plains, terraces, coves, side slopes, and ridges. They contain the named components as well as similar and dissimilar inclusions. A collection of soil delineations with the same name is called a map unit.

**Depression (depressional area).** A portion of land surrounded on all sides by higher land. These areas generally do not have outlets for drainage.

**Depth class.** Refers to the depth to a root-restricting layer. Unless otherwise stated, this layer is understood to be consolidated bedrock. The depth classes in this survey are:

Very shallow .....	less than 10 inches
Shallow .....	10 to 20 inches
Moderately deep .....	20 to 40 inches
Deep .....	40 to 60 inches
Very deep .....	more than 60 inches

**Depth, soil.** Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

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

**Diorite.** A coarse-grained igneous rock with the composition of andesite (no quartz or orthoclase). It is composed of about 75 percent plagioclase feldspars with the balance being ferromagnesian silicates.

**Dissimilar inclusions (soil).** Soils that affect use or management differently than the named components of a map unit. They comprise less than 25 percent of each map unit and vary from delineation to delineation. Nonlimiting dissimilar inclusions have soil properties that do not affect use and management. A loamy soil in a delineation of clayey soils is an example. Limiting inclusions have soil properties that could interfere with use and management, and special considerations may be necessary to overcome them. A soil that is moderately deep to bedrock in a delineation of very deep soils is an example.

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

**Drainage class (natural).** Refers to the frequency and

duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained.*—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

*Somewhat excessively drained.*—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

*Well drained.*—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

*Moderately well drained.*—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum or periodically receive high rainfall, or both.

*Somewhat poorly drained.*—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

*Poorly drained.*—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly

pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.  
*Very poorly drained.*—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

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

**Drainageway.** A narrow, gently sloping to very steep, concave colluvial area along an intermittent or perennial stream.

**Droughty** (in tables). The soil holds little water for plants during dry periods.

**Eroded (soil phase).** Because of erosion, the soil has lost an average of 25 to 75 percent of the original A horizon or the uppermost 2 to 6 inches if the original A horizon was less than 8 inches thick.

**Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

*Erosion (geologic).* Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

*Erosion (accelerated).* Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

**Erosion classes.** Classes based on estimates of past erosion. The classes are as follows:

*Class 1 (slight).*—Soils that have lost some of the original A horizon but on the average less than 25 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most areas, the thickness of the surface layer is within the normal range of variability of the uneroded soil. Class 1 erosion typically is not designated in the name of the map unit or in the map symbol.

*Class 2 (moderate).*—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging

from uneroded spots to spots where all of the original A horizon has been removed.

*Class 3 (severe).*—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most cultivated areas of class 3 erosion, material that was below the original A horizon is exposed. The plow layer consists entirely or largely of this material.

*Class 4 (very severe).*—Soils that have lost all of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick) plus some or all of the deeper horizons throughout most of the area. The original soil can be identified only in spots. Some areas may be smooth, but most have an intricate pattern of gullies.

**Erosion hazard.** A term describing the potential for future erosion, inherent in the soil itself, in inadequately protected areas. The following definitions are based on estimated annual soil loss in metric tons per hectare (values determined by the Universal Soil Loss Equation assuming bare soil conditions and using rainfall and climate factors for North Carolina):

0 tons per hectare .....	none
Less than 2.5 tons per hectare .....	slight
2.5 to 10 tons per hectare .....	moderate
10 to 25 tons per hectare .....	severe
More than 25 tons per hectare .....	very severe

**Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Exposed material is hard or soft bedrock. Areas identified on the detailed soil maps by a special symbol typically are long, narrow bands that are less than 2 acres in size. Synonym: scarp.

**Evapotranspiration.** The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period.

**Fallow.** Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

**Fast intake** (in tables). The rapid movement of water into the soil.

**Fault.** A surface of rock rupture along which there has been differential movement.

**Felsic rock.** A general term for light-colored igneous

rock and some metamorphic crystalline rock that have an abundance of quartz, feldspars, feldspathoids, and muscovite mica.

**Fen (bog).** An area of very poorly drained, organic soils that are saturated throughout most of the year. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**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, till, and other growth factors are favorable.

**Fibric soil material (peat).** The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

**Field border.** A strip of perennial vegetation (trees, shrubs, or herbaceous plants) established on the edge of a field to control erosion, provide travel lanes for farm machinery, control competition from adjacent woodland, or provide food and cover for wildlife.

**Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.

**Fill slope.** A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

**Fine textured soil.** Sandy clay, silty clay, or clay.

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

**Flaggy soil material.** Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material is 35 to 60 percent flagstones, and extremely flaggy soil material is more than 60 percent flagstones.

**Flagstone.** A thin fragment of metasandstone, phyllite, slate, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

**Flooding.** The temporary covering of the soil surface by flowing water from any source, such as overflowing streams, runoff from adjacent or surrounding slopes, and inflow from high tides. The frequency of flooding generally is expressed as none, rare, occasional, or frequent. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual

weather conditions (the chance of flooding is nearly 0 percent to 5 percent in any year).

*Occasional* means that flooding occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year).

*Frequent* means that flooding occurs often under normal weather conditions (the chance of flooding is more than 50 percent in any year). The duration of flooding is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month).

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

**Footslope.** The inclined surface at the base of a hill.

**Forb.** Any herbaceous plant not a grass or a sedge.

**Forest type.** A stand of trees similar in composition and development because of given physical and biological factors which differentiate it from other stands.

**Fragile** (in tables). A soil that is easily damaged by use or disturbance.

**Gap.** A concave, lower area between ridge crests that generally has lesser slope.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Geomorphic surface.** A part of the surface of the land that represents an episode of landscape development and consists of one or more landforms. It is a mappable part of the land surface that is defined in terms of morphology (relief, slope, aspect, etc.); origin (erosional, constructional, etc.); age (absolute or relative); and stability of component landforms.

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

**Gneiss.** A coarse-grained metamorphic rock in which bands rich in granular minerals alternate with bands that are predominantly schistose minerals. It is commonly formed by the metamorphism of granite.

**Granodiorite.** A plutonic rock roughly intermediate in composition between granite and diorite.

**Grassed waterway.** A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

**Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

**Gravelly soil material.** Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

**Gravelly spot.** An area of soils where the content of rock fragments generally less than 3 inches in diameter is more than 15 percent, by volume, in the surface layer, occurring in a map unit in which the surface layer of the dominant soil or soils has less than 15 percent gravel. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Gravel pit.** An open excavation in which the soil and underlying material are used as a source of sand and gravel. The excavated material is not crushed for use. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Ground water.** Water filling all the unblocked pores of the material below the water table.

**Gully.** A very small channel with steep sides cut by running water and through which water ordinarily runs only after rainfall, icemelt, or snowmelt. 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. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

**Hard to pack** (in tables). The soil is difficult to compact using regular earthmoving equipment.

**Head slope.** A concave, horseshoe-shaped slope on a mountain landscape at the head of an intermittent drainageway.

**Hemic soil material (mucky peat).** Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

**High-grade metamorphic rocks.** Highly metamorphosed rocks, such as gneiss and mica schist.

**High mountains.** The part of the landscape that is above an elevation of about 4,600 feet. It is dominated by frigid soil temperatures.

**High-value crop.** Crops such as tobacco, vegetables, and ornamentals that require a high level of management, are labor intensive, and have a high potential profit per acre.

**High water table (seasonal).** The highest level of a

saturated zone in the soil (the apparent or perched water table) over a continuous period of more than 2 weeks in most years, but not a permanent water table.

**Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

*O horizon.*—An organic layer of fresh and decaying plant residue.

*A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

*E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

*B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

*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 overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

*Cr horizon.*—Soft, consolidated bedrock beneath the soil.

*R layer.*—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

**Hornblende.** A rock-forming ferromagnesian silicate mineral of the amphibole group.

**Humus.** The well decomposed, more or less stable part of the organic matter in mineral soils.

**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.

**Hydroseeding.** Applying seed, fertilizer, and mulch to steep areas by spraying a mixture of those ingredients and water under pressure from a truck.

**Igneous rock.** Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are amphibolite, basalt, and granite.

**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 capacity.** The maximum rate at which water can infiltrate into a soil under a given set of conditions.

**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.

**Intermediate mountains.** The part of the landscape that ranges from about 3,000 to 4,800 feet in elevation. It is dominated by mesic soil temperatures.

**Intermediate rock.** Igneous or metamorphic crystalline rock that is intermediate in composition between mafic and felsic rock.

**Intermittent stream.** A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

**Intermountain hills.** Low hills that are in valleys between mountain ranges. They are dominated by mesic soil temperatures.

**Iron depletions.** Low-chroma zones that have a low content of iron and manganese oxide because of chemical reduction and removal but also have a

clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

**Kaolinite.** An aluminosilicate clay mineral with a 1:1 layer structure; that is, a silicon tetrahedral sheet alternating with an aluminum octahedral sheet. Little or no expansion occurs when water mixes with the clay.

**Knoll.** A small, low, rounded hill rising above adjacent landforms.

**Landfill.** An area of accumulated wastes produced by human activities. These areas can be above or below the natural ground level. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Landform.** Part of a landscape, such as a ridge, mountain slope, hillslope, cove, colluvial fan, drainageway, bench, or flood plain.

**Landform position.** Part of a landform, such as a summit, shoulder slope, nose slope, side slope, toeslope, footslope, or bottomland slope.

**Landing.** An area where felled trees are brought for loading and transport to a processing facility.

**Landscape.** A relatively large portion of land. Examples are high, intermediate, and low mountains, intermountain hills, and valleys.

**Landslide.** The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

**Large stones** (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

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

**Linear extensibility.** The change in length of an unconfined clod as moisture content is decreased from a moist to a dry state ( $1/3$ - or  $1/10$ -bar water content to oven dryness), expressed as a percent. The volume change is reported as percent change for the whole soil. Linear extensibility is used to determine shrink-swell potential classes for soils.

**Line-out beds.** Elevated planting beds where woody ornamentals and Christmas tree seedlings are grown for 1 or 2 years until they are adequate size for planting and rapid establishment in the field.

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

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

**Loamy.** A general textural term that includes coarse sandy loam, sandy loam, fine sandy loam, very fine sandy loam, loam, silt loam, silt, clay loam,

sandy clay loam, and silty clay loam. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of loamy very fine sand or finer textured material that contains less than 35 percent clay, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

**Low mountains.** The part of the landscape that ranges from about 2,500 to 3,500 feet in elevation. It is dominated by mesic soil temperatures.

**Low stream terrace.** A terrace in an area that floods, commonly 3 to 10 feet higher in elevation than the adjacent flood plain.

**Low strength.** The soil is not strong enough to support loads. The soil has a low resistance to deforming, sliding, or failure.

**Mafic rock.** A dark rock composed predominantly of magnesium silicates. It can contain small amounts of quartz, feldspar, or muscovite mica.

**Masses.** Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

**Mean annual increment.** The average annual volume of a stand of trees from the year of origin to the age under consideration.

**Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.

**Meta-arkose.** An arkose that has undergone some degree of metamorphism.

**Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement.

**Metasedimentary rock.** Metamorphosed sedimentary rocks, such as phyllite and metasandstone.

**Micas.** A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

**Micorelief.** The concave to convex changes in the land surface occurring over a relatively short distance or within a small area, such as 1 acre.

**Mine or quarry** (map symbol). An open excavation from which the soil and underlying material have been removed, exposing bedrock; or the surface opening to underground mines. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

**Miscellaneous area.** An area that has little or no natural soil and supports little or no vegetation.

**Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.

**Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.

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

**Mottling, soil (mottles).** Irregular spots of different colors that vary in number and size. They result from impeded drainage and poor aeration or as a result of weathering of geologic material. Redoximorphic features are a type of mottle resulting from conditions of wetness. Lithochromic or lithomorphous mottles are mottles which retain colors of the original geologic materials. 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 three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

**Muscovite.** A nonferromagnesian rock-forming silicate mineral that has tetrahedra arranged in sheets. Commonly called “white mica” and sometimes called potassic mica.

**Native pasture.** Pasture that has seeded naturally in native grasses. It is on slopes too steep to manage with modern machinery.

**Neutral soil.** A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

**Nose slope.** The downward-sloping convex end of a main ridge or spur ridge.

**No-till planting.** A method of planting crops in which there is virtually no seedbed preparation. A thin slice of the soil is opened, and the seed is planted at the desired depth.

**Nutrient leaching.** The movement of soluble fertilizer (and soil-applied pesticides) by percolating water

to below plant roots and possibly into the water table.

**Nutrient, plant.** Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

**Organic matter.** Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low .....	less than 0.5 percent
Low .....	0.5 to 1.0 percent
Moderately low .....	1.0 to 2.0 percent
Moderate .....	2.0 to 4.0 percent
High .....	4.0 to 8.0 percent
Very high .....	more than 8.0 percent

**Overstory.** The portion of the trees in a forest stand forming the upper crown cover.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Pegmatite.** A small pluton of exceptionally coarse texture, commonly formed at the margin of a batholith characterized by graphic structure. Nearly 90 percent of all pegmatites are simple pegmatites consisting of quartz, orthoclase, and minor percentages of micas.

**Percolation.** The downward movement of water through the soil.

**Percs slowly** (in tables). The slow movement of water through the soil adversely affects the specified use.

**Perennial stream.** A stream, or reach of a stream, that flows continuously throughout the year.

**Permeability.** The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as "saturated hydraulic conductivity," which is defined in the "Soil Survey Manual." In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this

rate of flow continues to be expressed as "permeability." Terms describing permeability, measured in inches per hour, are as follows:

Extremely slow .....	0.0 to 0.01 inch
Very slow .....	0.01 to 0.06 inch
Slow .....	0.06 to 0.2 inch
Moderately slow .....	0.2 to 0.6 inch
Moderate .....	0.6 inch to 2.0 inches
Moderately rapid .....	2.0 to 6.0 inches
Rapid .....	6.0 to 20 inches
Very rapid .....	more than 20 inches

**Pesticides.** Chemical formulations used to control insects and other animals, diseases, and plant growth. Common pesticides include insecticides, animal repellents and baits, fungicides, defoliant, and herbicides. Their use and application is controlled by State and Federal regulations.

**Phase, soil.** A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

**pH value.** A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

**Phytophthora root rot.** A soil-borne disease caused by the fungus *Phytophthora cinnamomi*. The disease is spread by the movement of contaminated soil or water or infected plant material. Out of a thousand species of woody plants that are hosts to phytophthora root rot, Fraser fir is one of the most susceptible. Soil and landform conditions that restrict the movement of air and water in the soil favor growth of the disease. These conditions include a high clay content, saturation by a high water table, flooding and ponding, and water retention for extended periods by a high content of organic matter in the surface layer.

**Piedmont.** The physiographic region of central North Carolina characterized by rolling landscapes formed from the weathering of residual rock material.

**Piping** (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

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

**Plastic limit.** The moisture content at which a soil changes from semisolid to plastic.

**Ponding.** Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

**Poor filter** (in tables). Because of rapid or very rapid

permeability, the soil may not adequately filter effluent from a waste disposal system.

**Poorly graded.** Refers to a coarse-grained soil or 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.

**Potential native plant community.** See Climax plant community.

**Productivity, soil.** The capability of a soil for producing a specified plant or sequence of plants under specific management.

**Profile, soil.** A vertical section of the soil extending through all its horizons and into the parent material.

**Reaction, soil.** A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid .....	less than 3.5
Extremely acid .....	3.5 to 4.4
Very strongly acid .....	4.5 to 5.0
Strongly acid .....	5.1 to 5.5
Moderately acid .....	5.6 to 6.0
Slightly acid .....	6.1 to 6.5
Neutral .....	6.6 to 7.3
Slightly 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

**Redoximorphic concentrations.** Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. They indicate chemical reduction and oxidation resulting from saturation.

**Redoximorphic depletions.** Low-chroma zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. They indicate the chemical reduction of iron resulting from saturation.

**Redoximorphic features.** Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation. Descriptive terms for concentrations and depletions 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).

**Reduced matrix.** A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

**Reforestation.** The process in which tree seedlings are planted or become naturally established in an area that was once forested.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Ridge.** A long, narrow elevation of the land surface, usually having a sharp crest and steep sides.

**Ridge nose.** The downward-sloping convex terminal point of a main ridge or a spur ridge.

**Rime ice.** Windblown ice that accumulates on tree branches mainly on exposed ridges and upper side slopes and at the higher elevations. The weight of rime ice can cause branches to break.

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

**Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rock outcrop.** An area of exposed bedrock in a map unit that has less than 0.1 percent exposed bedrock. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Rooting depth (in tables).** Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

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

**Rubble land.** Areas where stones and boulders cover at least 15 percent, but commonly more than 50 percent, of the soil surface.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil

is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

**Runoff class** (surface). Refers to the rate at which water flows away from the soil over the surface without infiltrating. Six classes of rate of runoff are recognized:

*Ponded.*—Little of the precipitation and water that runs onto the soil escapes as runoff, and free water stands on the surface for significant periods. The amount of water that is removed from ponded areas by movement through the soil, by plants, or by evaporation is usually greater than the total rainfall. Ponding normally occurs on level and nearly level soils in depressions. The water depth may fluctuate greatly.

*Very slow.*—Surface water flows away slowly, and free water stands on the surface for long periods or immediately enters the soil. Most of the water passes through the soil, is used by plants, or evaporates. The soils are commonly level or nearly level or are very porous.

*Slow.*—Surface water flows away so slowly that free water stands on the surface for moderate periods or enters the soil rapidly. Most of the water passes through the soil, is used by plants, or evaporates. The soils are nearly level or very gently sloping, or they are steeper but absorb precipitation very rapidly.

*Medium.*—Surface water flows away so rapidly that free water stands on the surface for only short periods. Part of the precipitation enters the soil and is used by plants, is lost by evaporation, or moves into underground channels. The soils are nearly level to gently sloping and absorb precipitation at a moderate rate, or they are steeper but absorb water rapidly.

*Rapid.*—Surface water flows away so rapidly that the period of concentration is brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly moderately steep or steep and have moderate or slow rates of absorption.

*Very rapid.*—Surface water flows away so rapidly that the period of concentration is very brief and free water does not stand on the surface. Only a small part of the water enters the soil. The soils are mainly steep or very steep and absorb precipitation slowly.

**Saddle.** A localized concave dip in a main ridge where intermittent drainage commences on the adjacent side slope.

**Sand.** As a soil separate, individual rock or mineral fragments ranging 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-sized particles.

**Sandy.** A general textural term that includes coarse sand, sand, fine sand, very fine sand, loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand. According to family level criteria in the soil taxonomic system, a specific textural name referring to fine earth (particles less than 2 millimeters in size) of sand or loamy sand that contains less than 50 percent very fine sand, by weight, within the control section. The content of rock fragments is less than 35 percent, by volume.

**Sapric soil material (muck).** The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

**Saprolite.** Unconsolidated residual material underlying the soil and grading to hard bedrock below.

**Saturation.** Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

**Schist.** A metamorphic rock that is dominantly fibrous or platy minerals. It has schistose cleavage and is a product of regional metamorphism.

**Sedimentary rock.** Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

**Seep.** A small area on the landscape where water oozes through the soil and causes the surface to remain wet. The water does not flow on the surface.

**Seepage** (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

**Series, soil.** A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

**Severely eroded spot.** An area of soil that has lost an average of 75 percent or more of the original

surface layer because of accelerated erosion, occurring in a map unit in which the dominant soil or soils have lost less than 25 percent of the original surface layer. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

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

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

**Short, steep slope.** An area of soils that are at least two slope classes steeper than the named soils in the surrounding map unit. Areas identified on the detailed soil maps by a special symbol typically are long, narrow bands that are less than 2 acres in size. (See Slope.)

**Shoulder.** The landscape position, parallel to the summit, that is directly below the ridgetop and directly above the side slope.

**Shrink-swell** (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Shrink-swell potential.** The potential for volume change in a soil with a loss or gain in moisture. Shrink-swell potential classes are based on the linear extensibility of the soil. If the soil has a linear extensibility of less than 3 percent, the shrink-swell potential is low; 3 to 6 percent, the shrink-swell potential is moderate; 6 to 9 percent, the shrink-swell potential is high; and more than 9 percent, the shrink-swell potential is very high.

**Side slope.** The landscape position that is directly below the shoulder and directly above the toeslope. It makes up most of the mountainside or hillside.

**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.

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

**Similar inclusions (soil).** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements. They comprise less than 50 percent of each map unit and vary from delineation to delineation.

**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.

**Skeletal (soils).** Soils that contain more than 35 percent, by volume, coarse fragments (gravel, cobbles, stones, or boulders).

**Skid trails.** A system of bulldozer or tractor trails quickly built to allow for the skidding or pulling of felled trees to a landing for loading and transport to a processing facility.

**Skidding.** A method of moving felled trees to a nearby central area for transport to a processing facility. Most systems involve pulling the trees with wire cables attached to a bulldozer or a rubber-tired tractor.

**Slate.** A fine-grained metamorphic rock with well developed slaty cleavage. Formed by the low-grade regional metamorphism of shale.

**Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, slope classes are as follows:

Nearly level .....	0 to 3 percent
Gently sloping .....	2 to 8 percent
Strongly sloping .....	8 to 15 percent
Moderately steep .....	15 to 30 percent
Steep .....	30 to 50 percent
Very steep .....	50 to 95 percent

**Slope** (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Slow air drainage.** Cold, moist, heavy air moves slowly (drains) up and down valleys and coves and in drainageways. Where this air accumulates in low areas, frost pockets occur.

**Small stones** (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil compaction.** An alteration of soil structure that

ultimately can affect the biological and chemical properties of the soil. Compaction decreases the extent of voids and increases bulk density.

**Soil creep.** The slow mass movement of soil and soil materials downslope, primarily under the influence of gravity, facilitated by water saturation and by alternating periods of freezing and thawing.

**Soil map unit.** A kind of soil or miscellaneous area or a combination of two or more soils or one or more soils and one or more miscellaneous areas that can be shown at the scale of mapping for the defined purposes and objectives of the soil survey. Soil map units generally are designed to reflect significant differences in use and management among the soils of a survey area.

**Soil sample site** (map symbol). The location of a typifying pedon in the survey area.

**Soil separates.** Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand .....	2.0 to 1.0
Coarse sand .....	1.0 to 0.5
Medium sand .....	0.5 to 0.25
Fine sand .....	0.25 to 0.10
Very fine sand .....	0.10 to 0.05
Silt .....	0.05 to 0.002
Clay .....	less than 0.002

**Soil strength.** The load-supporting capacity of a soil at specific moisture and density conditions.

**Solum.** The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

**Specialty crop.** Crops, such as Fraser fir grown for use as Christmas trees, that require intensive management and a specific combination of soils and climate.

**Spring.** A small area on the landscape where water flows naturally through the soil onto the surface.

**Spur ridge.** A sharply convex portion of a mountain side slope extending from the main ridge to some point at a lower elevation.

**Stand density.** The degree to which an area is covered with living trees. It is usually expressed in units of basal areas per acre, number of trees per acre, or the percentage of ground covered by the tree canopy as viewed from above.

**Stones.** Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stony spot.** An area where 0.01 to 0.1 percent of the surface is covered by rock fragments larger than 10 inches in diameter. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Strippcropping.** Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

**Structure, soil.** The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Subsidence.** A pronounced reduction in volume in some drained soils because of the removal of water, shrinkage of organic material, and the oxidation of organic compounds. Generally associated with soils that have a high content of organic matter.

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Subsoiling.** Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

**Suitability ratings.** Ratings for the degree of suitability of soils for a given use within the survey area.

*Well suited.*—The soils are favorable for the use.

There are no soil limitations, although limiting, dissimilar soils or site features may occur in the map unit. Good soil performance and low maintenance can be expected. Vegetation or other attributes can easily be maintained, improved, or established.

*Suited.*—The soils are moderately favorable for the use. One or more soil properties make these soils less desirable than those rated well suited. Vegetation or other attributes can be maintained, improved, or established, but a more intensive

management effort is needed to maintain the resource base.

*Poorly suited.*—The soils have one or more soil properties unfavorable for the use. Overcoming the unfavorable property requires special design, extra maintenance, or costly alteration. Vegetation or other attributes are difficult to establish or maintain.

*Unsuited.*—The expected performance of the soils is unacceptable, and the intended use generally should not be undertaken.

**Surface layer.** The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “A or Ap horizon.”

**Surface Runoff Classes, Index of.** Relative estimates of surface runoff based on slope gradient and saturated hydraulic conductivity under certain conditions. Classes are negligible, very low, low, medium, high, and very high. The classes are described in the “Soil Survey Manual.”

**Surface soil.** The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

**Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

**Terrace.** An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is 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.

**Texture, soil.** The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam

classes may be further divided by specifying “coarse,” “fine,” or “very fine.” The textural classes are defined as follows:

*Sands (coarse sand, sand, fine sand, and very fine sand).*—Soil material in which the content of sand is 85 percent or more and the percentage of silt plus  $1\frac{1}{2}$  times the percentage of clay does not exceed 15.

*Loamy sands (loamy coarse sand, loamy sand, loamy fine sand, and loamy very fine sand).*—Soil material in which, at the upper limit, the content of sand is 85 to 90 percent and the percentage of silt plus  $1\frac{1}{2}$  times the percentage of clay is not less than 15; at the lower limit, the content of sand is 70 to 85 percent and the percentage of silt plus twice the percentage of clay does not exceed 30.

*Sandy loams (coarse sandy loam, sandy loam, fine sandy loam, and very fine sandy loam).*—Soil material in which the content of clay is 20 percent or less, the percentage of silt plus twice the percentage of clay exceeds 30, and the content of sand is 52 percent or more or soil material in which the content of clay is less than 7 percent, the content of silt is less than 50 percent, and the content of sand is 43 to 52 percent.

*Loam.*—Soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

*Silt loam.*—Soil material that contains 50 percent or more silt and 12 to 27 percent clay or 50 to 80 percent silt and less than 12 percent clay.

*Silt.*—Soil material that contains 80 percent or more silt and less than 12 percent clay.

*Sandy clay loam.*—Soil material that contains 20 to 35 percent clay, less than 28 percent silt, and 45 percent or more sand.

*Clay loam.*—Soil material that contains 27 to 40 percent clay and 20 to 45 percent sand.

*Silty clay loam.*—Soil material that contains 27 to 40 percent clay and less than 20 percent sand.

*Sandy clay.*—Soil material that contains 35 percent or more clay and 45 percent or more sand.

*Silty clay.*—Soil material that contains 40 percent or more clay and 40 percent or more silt.

*Clay.*—Soil material that contains 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Thin layer** (in tables). Otherwise suitable soil material that is too thin for the specified use.

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

**Toeslope.** The outermost inclined surface at the base of a hill; part of a footslope.

**Topography.** The relative positions and elevations of the natural or manmade features of an area that describe the configuration of its surface.

**Topsoil.** The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

**Underlying material.** Technically the C horizon; the part of the soil below the biologically altered A and B horizons.

**Understory.** The trees and other woody species growing under a more or less continuous cover of branches and foliage formed collectively by the upper portions of adjacent trees and other woody growth.

**Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

**Very stony spot.** An area where 0.1 to 3.0 percent of the surface is covered by rock fragments larger than 10 inches in diameter. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

**Water bars.** Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and to divert water off and away from the road surface. Water bars can be easily driven over if they are constructed properly.

**Water table (apparent).** A thick zone of free water in the soil. The apparent water table is indicated by the level at which water stands in an uncased

borehole after adequate time is allowed for adjustment in the surrounding soil.

**Water table (perched).** A saturated zone of water in the soil standing above an unsaturated zone.

**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.

**Well graded.** Refers to soil material consisting of coarse-grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

**Wetness.** A general term applied to soils that hold water at or near the surface long enough to be a common management problem.

**Wet spot.** An area of somewhat poorly drained to very poorly drained soils that are at least two drainage classes wetter than the named soils in the surrounding map unit. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size. (See Drainage class.)

**Windswept.** A phase of a soil map unit where hardwood trees have been stunted, twisted, and gnarled due to exposure to high winter winds and frequent ice storms.

**Windthrow.** The uprooting and tipping over of trees by the wind.

**Yield (forestland).** The volume of wood fiber from trees harvested in a certain unit of area. Yield is usually measured in board feet or cubic feet per acre.

# Tables

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Table 1.--Temperature and Precipitation  
(Recorded in the period 1953-76 at Gillespie Gap, North Carolina)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
<u>°</u> <u>F</u>	<u>°</u> <u>F</u>	<u>°</u> <u>F</u>	<u>°</u> <u>F</u>	<u>°</u> <u>F</u>	<u>Units</u>	<u>In</u>	<u>In</u>	<u>In</u>			
January---	44.8	23.6	34.2	67	-4	44	3.76	2.35	5.03	6	
February--	46.2	24.8	35.5	66	0	46	4.68	2.56	6.56	8	
March-----	53.1	30.1	41.6	74	10	127	5.42	3.72	6.98	8	
April-----	64.8	39.3	52.0	84	20	328	4.69	2.68	6.48	7	
May-----	72.0	48.1	60.0	86	28	561	4.60	2.90	6.15	8	
June-----	77.3	54.1	65.7	88	37	705	4.44	2.39	6.24	8	
July-----	80.1	58.3	69.2	90	36	857	4.85	3.34	6.23	8	
August-----	79.8	57.8	68.8	89	42	834	5.03	2.51	7.22	7	
September-	74.3	51.4	62.8	88	32	646	5.47	2.39	8.10	6	
October---	65.5	40.3	52.9	80	21	343	4.75	1.75	8.04	5	
November--	55.2	31.5	43.4	75	9	143	3.63	2.33	5.44	5	
December--	46.5	25.1	35.8	69	1	59	3.81	1.92	5.45	6	
Yearly:											
Average-	63.3	40.4	51.8	---	---	---	---	---	---	---	
Extreme-	94	-10	---	90	-5	---	---	---	---	---	
Total---	---	---	---	---	---	4,694	55.13	43.86	62.19	82	

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

Table 2.--Freeze Dates in Spring and Fall  
 (Recorded in the period 1953-76 at Gillespie Gap, North Carolina)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 18	May 5	May 25
2 years in 10 later than--	Apr. 13	Apr. 30	May 18
5 years in 10 later than--	Apr. 4	Apr. 19	May 5
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 14	Sept. 27	Sept. 22
2 years in 10 earlier than--	Oct. 19	Oct. 3	Sept. 27
5 years in 10 earlier than--	Oct. 29	Oct. 15	Oct. 5

Table 3.--Growing Season  
 (Recorded in the period 1953-76 at Gillespie Gap, North Carolina)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	<u>Days</u>	<u>Days</u>	<u>Days</u>
9 years in 10	172	151	125
8 years in 10	179	158	133
5 years in 10	191	173	148
2 years in 10	203	187	164
1 year in 10	210	194	172

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
AcF	Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, very bouldery-----	2,705	1.9
BaD	Balsam sandy loam, 15 to 30 percent slopes, extremely bouldery-----	596	0.4
BaE	Balsam sandy loam, 30 to 50 percent slopes, extremely bouldery-----	1,128	0.8
BdA	Bandana sandy loam, 0 to 3 percent slopes, occasionally flooded-----	1,591	1.1
BmA	Biltmore sand, 0 to 3 percent slopes, frequently flooded-----	279	0.2
BtD	Buladean-Chestnut complex, 15 to 30 percent slopes, stony-----	1,848	1.3
BtE	Buladean-Chestnut complex, 30 to 50 percent slopes, stony-----	1,974	1.4
BtF	Buladean-Chestnut complex, 50 to 95 percent slopes, stony-----	11,558	8.1
ByC	Burton-Craggey complex, windswept, 8 to 15 percent slopes, extremely bouldery-----	58	*
CaD	Cashiers sandy loam, 15 to 30 percent slopes, stony-----	345	0.2
CaE	Cashiers sandy loam, 30 to 50 percent slopes, stony-----	1,024	0.7
CaF	Cashiers sandy loam, 50 to 95 percent slopes, stony-----	1,706	1.2
CdB	Chandler loam, 2 to 8 percent slopes-----	82	*
CdC	Chandler loam, 8 to 15 percent slopes-----	233	0.2
CeD	Chandler-Micaville complex, 15 to 30 percent slopes, stony-----	718	0.5
CeE	Chandler-Micaville complex, 30 to 50 percent slopes, stony-----	3,271	2.3
CeF	Chandler-Micaville complex, 50 to 95 percent slopes, stony-----	2,442	1.7
CfD	Cheoah channery loam, windswept, 10 to 35 percent slopes, stony-----	102	*
ChE	Cheoah channery loam, 35 to 50 percent slopes, stony-----	203	0.1
ChF	Cheoah channery loam, 50 to 95 percent slopes, stony-----	442	0.3
CnC2	Clifton clay loam, 8 to 15 percent slopes, eroded-----	1,151	0.8
CnD2	Clifton clay loam, 15 to 30 percent slopes, eroded-----	1,882	1.3
CnE2	Clifton clay loam, 30 to 50 percent slopes, eroded-----	1,426	1.0
CsD	Cullasaja cobbly fine sandy loam, 8 to 30 percent slopes, very bouldery--	1,135	0.8
DeA	Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded---	999	0.7
DoB	Dillsboro clay loam, 2 to 8 percent slopes-----	417	0.3
DrC	Dillsboro clay loam, 8 to 15 percent slopes, stony-----	1,138	0.8
DrD	Dillsboro clay loam, 15 to 30 percent slopes, stony-----	461	0.3
DsC	Dillsboro clay loam, 8 to 15 percent slopes, rarely flooded-----	103	*
EcC	Evard-Cowee complex, 8 to 15 percent slopes-----	1,157	0.8
EcD	Evard-Cowee complex, 15 to 30 percent slopes-----	3,270	2.3
EdE	Evard-Cowee complex, 30 to 50 percent slopes, stony-----	4,634	3.3
EdF	Evard-Cowee complex, 50 to 95 percent slopes, stony-----	1,012	0.7
FeC2	Fannin sandy clay loam, 8 to 15 percent slopes, eroded-----	1,710	1.2
FeD2	Fannin sandy clay loam, 15 to 30 percent slopes, eroded-----	4,780	3.4
FeE2	Fannin sandy clay loam, 30 to 50 percent slopes, eroded-----	7,047	5.0
HaD	Harmiller-Shinbone complex, 15 to 30 percent slopes, stony-----	513	0.4
HaE	Harmiller-Shinbone complex, 30 to 50 percent slopes, stony-----	666	0.5
HnD	Huntdale silty clay loam, 15 to 30 percent slopes, stony-----	1,629	1.1
HuE	Huntdale silty clay loam, 30 to 50 percent slopes, very stony-----	4,687	3.3
HuF	Huntdale silty clay loam, 50 to 95 percent slopes, very stony-----	4,365	3.1
KcD	Keener-Lostcove complex, 15 to 30 percent slopes, very stony-----	551	0.4
PeD	Pigeonroost-Edneytown complex, 15 to 30 percent slopes, stony-----	1,263	0.9
PeE	Pigeonroost-Edneytown complex, 30 to 50 percent slopes, stony-----	1,828	1.3
PtD	Plott loam, 15 to 30 percent slopes, stony-----	611	0.4
PtE	Plott loam, 30 to 50 percent slopes, stony-----	1,579	1.1
PtF	Plott loam, 50 to 95 percent slopes, stony-----	6,467	4.6
RoA	Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded-----	539	0.4
SaB	Saunook silt loam, 2 to 8 percent slopes-----	1,447	1.0
ScC	Saunook silt loam, 8 to 15 percent slopes, stony-----	6,157	4.3
SdD	Saunook-Thunder complex, 15 to 30 percent slopes, stony-----	7,110	5.0
SdE	Saunook-Thunder complex, 30 to 50 percent slopes, stony-----	690	0.5
SrF	Sylco-Rock outcrop complex, 50 to 95 percent slopes-----	613	0.4
SsD	Sylco-Soco complex, 10 to 30 percent slopes, stony-----	193	0.1
StE	Soco-Stecoah complex, 30 to 50 percent slopes, very stony-----	752	0.5
StF	Soco-Stecoah complex, 50 to 95 percent slopes, very stony-----	1,534	1.1
TbD	Tanasee-Balsam complex, 15 to 30 percent slopes, very bouldery-----	187	0.1
TbE	Tanasee-Balsam complex, 30 to 50 percent slopes, very bouldery-----	1,772	1.2
TsB	Thunder-Saunook complex, 2 to 8 percent slopes, very bouldery-----	170	0.1

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
TsC	Thunder-Saunook complex, 8 to 15 percent slopes, very bouldery-----	2,173	1.5
TsD	Thunder-Saunook complex, 15 to 30 percent slopes, very bouldery-----	8,440	5.9
TsE	Thunder-Saunook complex, 30 to 50 percent slopes, very bouldery-----	4,920	3.5
Ud	Udorthents, loamy-----	1,404	1.0
Un	Udorthents, loamy, stony-----	962	0.7
Ur	Urban land-----	272	0.2
W	Water-----	679	0.5
WgC	Watauga sandy loam, 8 to 15 percent slopes, stony-----	2,183	1.5
WgD	Watauga sandy loam, 15 to 30 percent slopes, stony-----	4,160	2.9
WgE	Watauga sandy loam, 30 to 50 percent slopes, stony-----	3,232	2.3
WhD	Wayah-Burton complex, windswept, 15 to 30 percent slopes, stony-----	1,074	0.8
WyE	Wayah-Burton complex, windswept, 30 to 50 percent slopes, very stony-----	971	0.7
WyF	Wayah-Burton complex, windswept, 50 to 95 percent slopes, very stony-----	1,660	1.2
	Total-----	142,080	100.0

\* Less than 0.1 percent.

Table 5.—Orchards and Ornamental Crops

(See text for definitions of "well suited," "suited," "poorly suited," and "unsuited". Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Apples	Fraser fir <sup>1</sup>	Ball and burlap harvesting <sup>2</sup>	Line-out beds <sup>3</sup>	Vegetables <sup>4</sup>
AcF:					
Ashe-----	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock
Cleveland-----	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock
Rock outcrop.					
BaD, BaE-----	Unsuited: slope large stones climate	Unsuited: slope large stones climate	Unsuited: slope large stones climate	Unsuited: slope large stones climate	Unsuited: slope large stones climate
BdA-----	Unsuited: flooding wetness climate-frost	Unsuited: flooding wetness warm aspect	Poorly suited: flooding wetness too sandy	Suited: flooding wetness	Suited: flooding wetness
BmA-----	Unsuited: flooding droughty climate-frost	Unsuited: flooding droughty warm aspect	Unsuited: flooding too sandy	Unsuited: flooding droughty	Unsuited: flooding droughty
BtD:					
Buladean-----	Suited: slope	Poorly suited: slope warm aspect	Suited: slope low clay	Poorly suited: slope	Poorly suited: slope
Chestnut-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Suited: slope low clay depth to rock	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock
BtE:					
Buladean-----	Poorly suited: slope	Poorly suited: slope warm aspect	Poorly suited: slope low clay	Poorly suited: slope	Unsuited: slope
Chestnut-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope low clay depth to rock	Poorly suited: slope depth to rock	Unsuited: slope depth to rock
BtF:					
Buladean-----	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope
Chestnut-----	Unsuited: slope depth to rock	Unsuited: slope depth to rock warm aspect	Unsuited: slope low clay depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Soil name and map symbol	Apples	Fraser fir <sup>1</sup>	Ball and burlap harvesting <sup>2</sup>	Line-out beds <sup>3</sup>	Vegetables <sup>4</sup>
ByC: Burton-----	Unsuited: depth to rock large stones climate				
Craggey-----	Unsuited: depth to rock large stones climate				
CaD----- Cashiers	Suited: slope	Suited: slope	Suited: slope low clay	Poorly suited: slope	Poorly suited: slope
CaE----- Cashiers	Poorly suited: slope	Suited: slope	Poorly suited: slope low clay	Poorly suited: slope	Unsuited: slope
CaF----- Cashiers	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope
CdB----- Chandler	Suited: droughty	Poorly suited: droughty warm aspect	Poorly suited: low clay	Suited: droughty	Well suited: droughty
CdC----- Chandler	Suited: droughty	Poorly suited: droughty warm aspect	Poorly suited: low clay	Suited: droughty slope	Suited: droughty slope
CeD: Chandler-----	Suited: slope droughty	Poorly suited: slope droughty warm aspect	Poorly suited: slope low clay	Suited: slope droughty	Poorly suited: slope droughty
Micaville-----	Suited: slope droughty	Poorly suited: slope droughty warm aspect	Poorly suited: slope low clay	Suited: slope droughty	Poorly suited: slope droughty
CeE: Chandler-----	Poorly suited: slope droughty	Poorly suited: slope droughty warm aspect	Poorly suited: slope low clay	Poorly suited: slope droughty	Unsuited: slope droughty
Micaville-----	Poorly suited: slope droughty	Poorly suited: slope droughty warm aspect	Poorly suited: slope low clay	Poorly suited: slope droughty	Unsuited: slope droughty
CeF: Chandler-----	Unsuited: slope droughty	Unsuited: slope droughty warm aspect	Unsuited: slope low clay	Unsuited: slope droughty	Unsuited: slope droughty
Micaville-----	Unsuited: slope droughty	Unsuited: slope droughty warm aspect	Unsuited: slope low clay	Unsuited: slope droughty	Unsuited: slope droughty

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Soil name and map symbol	Apples	Fraser fir <sup>1</sup>	Ball and burlap harvesting <sup>2</sup>	Line-out beds <sup>3</sup>	Vegetables <sup>4</sup>
CfD----- Cheoah	Unsuited: slope climate	Unsuited: slope climate	Unsuited: slope climate	Unsuited: slope climate	Unsuited: slope climate
ChE----- Cheoah	Poorly suited: slope.	Poorly suited: slope	Poorly suited: slope	Poorly suited: slope	Unsuited: slope
ChF----- Cheoah	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope
CnC2----- Clifton	Well suited	Poorly suited: high clay phytophthora warm aspect	Poorly suited: high clay	Unsuited: surface clay phytophthora slope	Suited: high clay eroded slope
CnD2----- Clifton	Suited: slope	Poorly suited: high clay phytophthora warm aspect	Poorly suited: slope high clay	Unsuited: slope surface clay phytophthora	Poorly suited: slope high clay eroded
CnE2----- Clifton	Poorly suited: slope	Poorly suited: high clay phytophthora warm aspect	Poorly suited: slope high clay	Unsuited: slope surface clay phytophthora	Unsuited: slope high clay eroded
CsD----- Cullasaja	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones
DeA: Dellwood-----	Unsuited: flooding droughty climate-frost	Poorly suited: flooding droughty warm aspect	Poorly suited: flooding too sandy small stones	Suited: flooding droughty small stones	Suited: flooding droughty small stones
Reddies-----	Unsuited: flooding droughty climate-frost	Poorly suited: flooding droughty warm aspect	Poorly suited: flooding too sandy	Suited: flooding droughty	Suited: flooding droughty
DoB----- Dillsboro	Well suited: climate-frost	Poorly suited: high clay phytophthora	Poorly suited: high clay	Unsuited: surface clay phytophthora	Well suited: surface clay
DrC----- Dillsboro	Well suited: climate-frost	Poorly suited: high clay phytophthora	Poorly suited: high clay	Unsuited: surface clay phytophthora slope	Suited: surface clay slope
DrD----- Dillsboro	Suited: slope climate-frost	Poorly suited: slope high clay phytophthora	Poorly suited: slope high clay	Unsuited: slope surface clay phytophthora	Poorly suited: slope surface clay
DsC----- Dillsboro	Poorly suited: flooding climate-frost	Poorly suited: flooding high clay phytophthora	Poorly suited: high clay	Poorly suited: flooding surface clay phytophthora	Suited: flooding surface clay slope

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Soil name and map symbol	Apples	Fraser fir <sup>1</sup>	Ball and burlap harvesting <sup>2</sup>	Line-out beds <sup>3</sup>	Vegetables <sup>4</sup>
EcC: Evard-----	Well suited	Suited: warm aspect phytophthora	Well suited	Poorly suited: surface clay phytophthora slope	Suited: slope
Cowee-----	Poorly suited: depth to rock	Poorly suited: depth to rock warm aspect	Poorly suited: depth to rock	Poorly suited: surface clay depth to rock	Poorly suited: depth to rock slope
EcD: Evard-----	Suited: slope	Suited: slope warm aspect phytophthora	Suited: slope	Poorly suited: slope surface clay phytophthora	Poorly suited: slope
Cowee-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope depth to rock	Poorly suited: slope surface clay depth to rock	Poorly suited: slope depth to rock
EdE: Evard-----	Poorly suited: slope	Poorly suited: slope warm aspect phytophthora	Poorly suited: slope	Poorly suited: slope surface clay phytophthora	Unsuited: slope
Cowee-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope depth to rock	Poorly suited: slope surface clay depth to rock	Unsuited: slope depth to rock
EdF: Evard-----	Unsuited: slope	Unsuited: slope warm aspect	Unsuited: slope	Unsuited: slope surface clay	Unsuited: slope
Cowee-----	Unsuited: slope depth to rock	Unsuited: slope depth to rock warm aspect	Unsuited: slope depth to rock	Unsuited: slope surface clay depth to rock	Unsuited: slope depth to rock
FeC2----- Fannin	Well suited	Suited: warm aspect phytophthora	Well suited	Poorly suited: surface clay phytophthora slope	Suited: eroded slope
FeD2----- Fannin	Suited: slope	Suited: slope warm aspect	Suited: slope	Poorly suited: slope surface clay	Poorly suited: slope eroded
FeE2----- Fannin	Poorly suited: slope	Poorly suited: slope warm aspect	Poorly suited: slope	Poorly suited: slope surface clay	Unsuited: slope eroded
HaD: Harmiller-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Soil name and map symbol	Apples	Fraser fir <sup>1</sup>	Ball and burlap harvesting <sup>2</sup>	Line-out beds <sup>3</sup>	Vegetables <sup>4</sup>
HaD: Shinbone-----	Poorly suited: slope	Poorly suited: slope warm aspect	Suited: slope	Poorly suited: slope	Poorly suited: slope
HaE: Harmiller-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock	Unsuited: slope depth to rock
Shinbone-----	Poorly suited: slope	Poorly suited: slope warm aspect	Poorly suited: slope	Poorly suited: slope	Unsuited: slope
HnD----- Huntdale	Suited: slope	Suited: slope	Suited: slope	Poorly suited: slope surface clay	Poorly suited: slope
HuE----- Huntdale	Poorly suited: slope	Suited: slope	Poorly suited: slope	Poorly suited: slope surface clay	Unsuited: slope
HuF----- Huntdale	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope surface clay	Unsuited: slope
KcD: Keener-----	Suited: slope	Suited: slope large stones phytophthora	Suited: slope	Poorly suited: slope surface clay phytophthora	Poorly suited: slope large stones
Lostcove-----	Unsuited: slope large stones	Unsuited: slope large stones phytophthora	Unsuited: slope large stones	Unsuited: slope large stones phytophthora	Unsuited: slope large stones
PeD: Pigeonroost-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope depth to rock	Poorly suited: slope surface clay depth to rock	Poorly suited: slope depth to rock
Edneytown-----	Suited: slope	Suited: slope warm aspect	Suited: slope	Poorly suited: slope surface clay	Poorly suited: slope
PeE: Pigeonroost-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope depth to rock	Poorly suited: slope surface clay depth to rock	Unsuited: slope depth to rock
Edneytown-----	Poorly suited: slope	Poorly suited: slope warm aspect	Poorly suited: slope	Poorly suited: slope surface clay	Unsuited: slope

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Soil name and map symbol	Apples	Fraser fir <sup>1</sup>	Ball and burlap harvesting <sup>2</sup>	Line-out beds <sup>3</sup>	Vegetables <sup>4</sup>
PtD----- Plott	Suited: slope	Suited: slope	Suited: slope	Suited: slope	Poorly suited: slope
PtE----- Plott	Poorly suited: slope	Suited: slope	Poorly suited: slope	Poorly suited: slope	Unsuited: slope
PtF----- Plott	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope
RoA----- Rosman	Unsuited: flooding climate-frost	Poorly suited: flooding warm aspect	Poorly suited: flooding too sandy	Well suited: flooding	Well suited: flooding
SaB----- Saunook	Well suited: climate-frost	Suited: phytophthora	Well suited	Poorly suited: surface clay phytophthora	Well suited
ScC----- Saunook	Well suited: climate-frost	Suited: phytophthora	Well suited	Poorly suited: surface clay phytophthora slope	Suited: slope
SdD: Saunook-----	Suited: slope climate-frost	Suited: slope phytophthora	Suited: slope	Poorly suited: slope surface clay phytophthora	Poorly suited: slope
Thunder-----	Poorly suited: slope large stones climate-frost	Poorly suited: slope large stones phytophthora	Unsuited: slope large stones	Unsuited: slope large stones surface clay	Poorly suited: slope large stones
SdE: Saunook-----	Poorly suited: slope climate-frost	Suited: slope phytophthora	Poorly suited: slope	Poorly suited: slope surface clay phytophthora	Unsuited: slope
Thunder-----	Poorly suited: slope large stones climate-frost	Poorly suited: slope large stones phytophthora	Unsuited: slope large stones	Unsuited: slope large stones surface clay	Unsuited: slope large stones
SrF: Sylco-----	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock	Unsuited: slope depth to rock
Rock outcrop.					
SsD: Sylco-----	Unsuited: slope depth to rock small stones	Unsuited: slope depth to rock warm aspect small stones	Unsuited: slope depth to rock small stones low clay	Unsuited: slope depth to rock small stones	Unsuited: slope depth to rock small stones

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Soil name and map symbol	Apples	Fraser fir <sup>1</sup>	Ball and burlap harvesting <sup>2</sup>	Line-out beds <sup>3</sup>	Vegetables <sup>4</sup>
SsD:					
Soco-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope depth to rock low clay	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock
StE:					
Soco-----	Poorly suited: slope depth to rock	Poorly suited: slope depth to rock warm aspect	Poorly suited: slope depth to rock low clay	Poorly suited: slope depth to rock	Unsuited: slope depth to rock
Stecoah-----	Poorly suited: slope	Poorly suited: slope warm aspect	Poorly suited: slope low clay	Poorly suited: slope	Unsuited: slope
StF:					
Soco-----	Unsuited: slope depth to rock	Unsuited: slope depth to rock warm aspect	Unsuited: slope depth to rock low clay	Unsuited: slope depth to rock	Unsuited: slope depth to rock
Stecoah-----	Unsuited: slope	Unsuited: slope warm aspect	Unsuited: slope low clay	Unsuited: slope	Unsuited: slope
TbD:					
Tanasee-----	Unsuited: slope large stones climate elevation	Unsuited: slope large stones climate elevation	Unsuited: slope large stones climate elevation	Unsuited: slope large stones climate elevation	Unsuited: slope large stones climate elevation
Balsam-----	Unsuited: slope large stones climate elevation	Unsuited: slope large stones climate elevation	Unsuited: slope large stones climate elevation	Unsuited: slope large stones climate elevation	Unsuited: slope large stones climate elevation
TbE:					
Tanasee-----	Unsuited: slope large stones climate	Poorly suited: slope large stones climate	Poorly suited: slope large stones climate	Poorly suited: slope large stones climate	Unsuited: slope large stones climate
Balsam-----	Unsuited: slope large stones climate	Unsuited: slope large stones climate	Unsuited: slope large stones climate	Unsuited: slope large stones climate	Unsuited: slope large stones climate
TsB, TsC:					
Thunder-----	Unsuited: large stones climate-frost	Unsuited: large stones phytophthora	Unsuited: large stones	Unsuited: large stones surface clay phytophthora	Unsuited: large stones slope
Saunook-----	Suited: large stones climate-frost	Suited: phytophthora large stones	Suited: large stones	Poorly suited: surface clay phytophthora large stones	Suited: large stones slope

See footnotes at end of table.

Table 5.--Orchards and Ornamental Crops--Continued

Soil name and map symbol	Apples	Fraser fir <sup>1</sup>	Ball and burlap harvesting <sup>2</sup>	Line-out beds <sup>3</sup>	Vegetables <sup>4</sup>
<b>TsD:</b>					
Thunder-----	Unsuited: slope large stones climate-frost	Unsuited: slope large stones phytophthora	Unsuited: slope large stones	Unsuited: slope large stones surface clay	Unsuited: slope large stones
Saunook-----	Suited: slope large stones climate-frost	Suited: slope large stones phytophthora	Suited: slope large stones	Poorly suited: slope surface clay large stones	Poorly suited: slope large stones
<b>TsE:</b>					
Thunder-----	Unsuited: slope large stones climate-frost	Unsuited: slope large stones phytophthora	Unsuited: slope large stones	Unsuited: slope large stones surface clay	Unsuited: slope large stones
Saunook-----	Poorly suited: slope climate-frost	Poorly suited: slope phytophthora	Poorly suited: slope	Poorly suited: slope surface clay large stones	Unsuited: slope
<b>Ud, Un:</b> Udorthents					
<b>Ur.</b> Urban land					
<b>W.</b> Water					
<b>WgC</b> ----- Watauga	Well suited	Suited: warm aspect	Suited: low clay	Suited: slope	Suited: slope
<b>WgD</b> ----- Watauga	Suited: slope	Suited: slope warm aspect	Suited: slope low clay	Poorly suited: slope	Poorly suited: slope
<b>WgE</b> ----- Watauga	Poorly suited: slope	Poorly suited: slope warm aspect	Poorly suited: slope low clay	Poorly suited: slope	Unsuited: slope
<b>WhD, WyE, WyF:</b>					
Wayah-----	Unsuited: slope climate	Unsuited: slope climate	Unsuited: slope climate	Unsuited: slope climate	Unsuited: slope climate
Burton-----	Unsuited: slope depth to rock climate	Unsuited: slope depth to rock climate	Unsuited: slope depth to rock climate	Unsuited: slope depth to rock climate	Unsuited: slope depth to rock climate

<sup>1</sup> In general, areas on warm, south- to west-facing aspects, at elevations below 3,000 feet or above 4,600 feet are considered marginal to unsuited for commercial Fraser fir production due to climatic limitations.

<sup>2</sup> The limitations "low clay," "high clay," and "small stones" are based on clay content and the quantity of coarse fragments in the upper 20 inches of the soil. The limitation "large stones" is based on a high quantity of surface stones and boulders.

<sup>3</sup> In general, areas at elevations above 4,600 feet are considered marginal to unsuited for line-out beds, except for Fraser fir, due to climatic limitations. Limitations are based on the upper 10 inches of the soil.

<sup>4</sup> Vegetables commonly include tomatoes, squash, bell peppers, sweet corn, cucumbers, pole beans, bush beans, potatoes, cabbage, greens, strawberries, and melons.

Table 6.—Land Capability and Yields per Acre of Crops and Pasture

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Map symbol and soil name	Land capabil- ity	Alfalfa	Corn	Grass hay	Pasture	Tobacco
		hay	silage			
		<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>	<u>Lbs</u>
AcF:						
Ashe-----	7e	---	---	---	---	---
Cleveland-----	7e	---	---	---	---	---
Rock outcrop-----	8s	---	---	---	---	---
BaD:						
Balsam-----	7s	---	---	---	2.00	---
BaE:						
Balsam-----	7s	---	---	---	---	---
BdA:						
Bandana-----	3w	---	25.00	5.50	7.50	2,600.00
BmA:						
Biltmore-----	4w	---	---	2.00	4.00	---
BtD:						
Buladean-----	6e	---	---	4.00	6.50	---
Chestnut-----	6e	---	---	3.50	6.00	---
BtE:						
Buladean-----	7e	---	---	---	5.00	---
Chestnut-----	7e	---	---	---	5.00	---
BtF:						
Buladean-----	7e	---	---	---	---	---
Chestnut-----	7e	---	---	---	---	---
ByC:						
Burton-----	4e	---	---	---	6.00	---
Craggey-----	7s	---	---	---	---	---
CaD:						
Cashiers-----	6e	---	---	3.50	6.00	---
CaE:						
Cashiers-----	7e	---	---	---	5.00	---
CaF:						
Cashiers-----	7e	---	---	---	---	---
CdB:						
Chandler-----	3e	---	---	---	5.00	---
CdC:						
Chandler-----	4e	---	---	---	4.50	---

See footnote at end of table.

Table 6.--Land Capability and Yields per Acre of Crops and Pasture--Continued

Map symbol and soil name	Land capabil- ity	Alfalfa	Corn	Grass hay	Pasture	Tobacco
		hay	silage			
		<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>	<u>Lbs</u>
CeD:						
Chandler-----	6e	---	---	---	4.50	---
Micaville-----	6e	---	---	---	4.00	---
CeE:						
Chandler-----	7e	---	---	---	3.50	---
Micaville-----	7e	---	---	---	3.00	---
CeF:						
Chandler-----	7e	---	---	---	---	---
Micaville-----	7e	---	---	---	---	---
CfD:						
Cheoah-----	6e	---	---	---	5.50	---
ChE:						
Cheoah-----	7e	---	---	---	4.50	---
ChF:						
Cheoah-----	7e	---	---	---	---	---
CnC2:						
Clifton-----	4e	4.50	19.00	4.50	7.00	3,000.00
CnD2:						
Clifton-----	6e	4.00	---	4.00	6.50	2,800.00
CnE2:						
Clifton-----	7e	---	---	---	5.00	---
CsD:						
Cullasaja-----	7s	---	---	---	5.00	---
DeA:						
Dellwood-----	3s	---	---	3.50	7.00	2,000.00
Reddies-----	2w	---	---	4.00	8.00	2,600.00
DoB:						
Dillsboro-----	3e	6.00	25.00	6.50	9.00	3,200.00
DrC:						
Dillsboro-----	4e	5.50	25.00	6.50	9.00	3,000.00
DrD:						
Dillsboro-----	6e	5.00	---	6.00	9.00	2,800.00
DsC:						
Dillsboro-----	4e	5.50	25.00	6.50	9.00	3,000.00
EcC:						
Evard-----	4e	4.00	20.00	4.50	6.50	2,600.00
Cowee-----	4e	3.50	17.00	4.00	6.00	2,000.00

See footnote at end of table.

Table 6.—Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capabil- ity	Alfalfa	Corn	Grass hay	Pasture	Tobacco
		hay	silage			
		<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>	<u>Lbs</u>
<b>EcD:</b>						
Evard-----	6e	4.00	---	4.50	6.50	2,600.00
Cowee-----	6e	3.50	---	4.00	6.00	2,000.00
<b>EdE:</b>						
Evard-----	7e	---	---	---	6.00	---
Cowee-----	7e	---	---	---	5.50	---
<b>EdF:</b>						
Evard-----	7e	---	---	---	---	---
Cowee-----	7e	---	---	---	---	---
<b>FeC2:</b>						
Fannin-----	6e	3.50	15.00	4.50	6.50	2,000.00
<b>FeD2:</b>						
Fannin-----	7e	3.00	---	4.00	5.00	---
<b>FeE2:</b>						
Fannin-----	7e	---	---	---	5.00	---
<b>HaD:</b>						
Harmiller-----	6e	---	---	3.50	6.00	---
Shinbone-----	6e	---	---	4.00	6.00	---
<b>HaE:</b>						
Harmiller-----	7e	---	---	---	6.00	---
Shinbone-----	7e	---	---	---	6.00	---
<b>HnD:</b>						
Huntdale-----	6e	---	---	5.00	8.00	---
<b>HuE:</b>						
Huntdale-----	7e	---	---	---	7.50	---
<b>HuF:</b>						
Huntdale-----	7e	---	---	---	---	---
<b>KcD:</b>						
Keener-----	6e	---	---	4.00	6.50	---
Lostcove-----	7s	---	---	---	6.00	---
<b>PeD:</b>						
Pigeonroost-----	6e	3.50	---	4.00	6.00	---
Edneytown-----	6e	4.00	---	4.50	6.50	---
<b>PeE:</b>						
Pigeonroost-----	7e	---	---	---	5.50	---
Edneytown-----	7e	---	---	---	6.00	---
<b>PtD:</b>						
Plott-----	6e	---	---	5.00	8.00	---

See footnote at end of table.

Table 6.—Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capabil- ity	Alfalfa	Corn	Grass hay	Pasture	Tobacco
		hay	silage			
		<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>	<u>Lbs</u>
PtE: Plott-----	7e	---	---	---	7.50	---
PtF: Plott-----	7e	---	---	---	---	---
RoA: Rosman-----	2w	---	25.00	6.50	9.00	3,000.00
SaB: Saunook-----	2e	5.50	20.00	6.50	9.50	3,000.00
ScC: Saunook-----	4e	5.50	20.00	6.50	9.00	3,000.00
SdD: Saunook-----	6e	5.00	---	6.00	9.00	2,800.00
Thunder-----	6s	---	---	5.50	8.50	2,600.00
SdE: Saunook-----	7e	---	---	---	8.00	---
Thunder-----	7s	---	---	---	7.50	---
SrF: Sylco-----	7s	---	---	---	---	---
Rock outcrop-----	8s	---	---	---	---	---
SsD: Sylco-----	7s	---	---	---	---	---
Soco-----	6e	---	---	---	4.00	---
StE, StF: Soco-----	7e	---	---	---	4.00	---
Stecoah-----	7e	---	---	---	5.00	---
TbD: Tanasee-----	6e	---	---	---	6.50	---
Balsam-----	7s	---	---	---	3.50	---
TbE: Tanasee-----	7e	---	---	---	6.00	---
Balsam-----	7s	---	---	---	3.50	---
TsB: Thunder-----	6s	---	---	5.50	8.50	2,600.00
Saunook-----	2e	---	25.00	6.00	9.00	3,200.00
TsC: Thunder-----	6s	---	---	5.50	8.00	2,600.00
Saunook-----	4e	---	15.00	6.00	9.00	3,000.00

See footnote at end of table.

Table 6.—Land Capability and Yields per Acre of Crops and Pasture—Continued

Map symbol and soil name	Land capabil- ity	Alfalfa	Corn	Grass hay	Pasture	Tobacco
		hay	silage			
		<u>Tons</u>	<u>Tons</u>	<u>Tons</u>	<u>AUM*</u>	<u>Lbs</u>
TsD:						
Thunder-----	6s	---	---	5.00	8.00	2,600.00
Saunook-----	6e	---	---	5.50	9.00	2,800.00
TsE:						
Thunder-----	7s	---	---	---	7.50	---
Saunook-----	7e	---	---	---	8.00	---
Ud, Un:						
Udorthents-----	7s	---	---	---	4.50	---
Ur:						
Urban land-----	8s	---	---	---	---	---
W.						
Water						
WgC:						
Watauga-----	4e	---	---	4.00	6.00	2,000.00
WgD:						
Watauga-----	6e	---	---	3.50	5.00	---
WgE:						
Watauga-----	7e	---	---	---	4.00	---
WhD:						
Wayah-----	6e	---	---	---	5.00	---
Burton-----	6e	---	---	---	5.00	---
WyE:						
Wayah-----	7e	---	---	---	4.00	---
Burton-----	7e	---	---	---	4.00	---
WyF:						
Wayah-----	7e	---	---	---	---	---
Burton-----	7e	---	---	---	---	---

\* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one sheep, or five goats) for 30 days.

Table 7.-Acreage by Capability Class and Subclass

Capability class	Capability subclass	Acreage
Unclassified	---	679
2	e	1,136
2	w	654
3	e	382
3	w	1,273
3	s	450
4	e	9,952
4	w	209
6	e	22,194
6	s	7,524
7	e	61,548
7	s	6,165
8	s	1,091

Table 8.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
BdA	Bandana sandy loam, 0 to 3 percent slopes, occasionally flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
CdB	Chandler loam, 2 to 8 percent slopes
DoB	Dillsboro clay loam, 2 to 8 percent slopes
RoA	Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded
SaB	Saunook silt loam, 2 to 8 percent slopes

Table 9.--Farmland of Statewide Importance

Map symbol	Soil name
CdC	Chandler loam, 8 to 15 percent slopes
CnC2	Clifton clay loam, 8 to 15 percent slopes, eroded
DeA	Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded
DsC	Dillsboro clay loam, 8 to 15 percent slopes, rarely flooded
EcC	Evard-Cowee complex, 8 to 15 percent slopes
FeC2	Fannin sandy clay loam, 8 to 15 percent slopes, eroded

Table 10.—Map Units That Have Inclusions of Hydric Soils or Wet Spots

Map unit symbol	Map unit name	Hydric inclusion	Normal inclusion location
BdA	Bandana sandy loam, 0 to 3 percent slopes, occasionally flooded	Poorly drained soils	Depressions, old channels, and backwater areas away from the channel
BmA	Biltmore sand, 0 to 3 percent slopes, frequently flooded	Poorly drained soils	Depressions, old channels, and backwater areas
DeA	Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded	Poorly drained soils	Depressions, old channels, and backwater areas away from the channel
DoB	Dillsboro clay loam, 2 to 8 percent slopes	Poorly drained soils	Drainageways and depressions
RoA	Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded	Poorly drained soils	Depressions, old channels, and backwater areas
SaB	Saunook silt loam, 2 to 8 percent slopes	Poorly drained soils	Areas along drainageways and in depressions and seep areas on toeslopes
TsB	Thunder-Saunook complex, 2 to 8 percent slopes, very bouldery	Poorly drained soils	Areas along drainageways and in depressions and seep areas on toeslopes

Table 11.--Forestland Management and Productivity

(Refer to the "Detailed Soil Map Units" and "Use and Management" sections of this survey for information on soil properties and management concerns. Forestland managers should seek assistance from a professional forester)

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
ACF: Ashe-----	4R	Severe	Severe	Moderate	Moderate	Moderate	chestnut oak----- eastern white pine-- hickory----- Virginia pine----- pitch pine----- scarlet oak----- shortleaf pine-----	--- --- --- --- --- --- ---	--- --- --- --- --- --- ---	See footnote 5.
Cleveland-----	2R	Severe	Severe	Moderate	Severe	Slight	chestnut oak----- eastern white pine-- scarlet oak----- white oak----- black oak----- pitch pine-----	--- --- --- --- --- ---	--- --- --- --- --- ---	See footnote 5.
Rock outcrop.										
BaD: Balsam-----	10R	Moderate	Moderate	Slight	Slight	Moderate	red spruce----- northern red oak---- sugar maple----- yellow birch----- Fraser fir-----	64 --- --- --- ---	150 --- --- --- ---	See footnote 5.
BaE: Balsam-----	10R	Severe	Severe	Slight	Slight	Moderate	red spruce----- northern red oak---- sugar maple----- yellow birch----- Fraser fir-----	64 --- --- --- ---	150 --- --- --- ---	See footnote 5.
BdA: Bandana-----	8W	Slight	Moderate	Slight	Slight	Moderate	yellow-poplar <sup>6</sup> ----- American sycamore--- red maple----- river birch----- eastern hemlock----	103 --- --- --- ---	112 --- --- --- ---	yellow-poplar

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
BmA: Biltmore-----	8S	Slight	Moderate	Severe	Slight	Moderate	yellow-poplar <sup>7</sup> ----- American sycamore--- river birch-----	106 --- ---	117 --- ---	yellow-poplar, American sycamore, black walnut
BtD: Buladean-----	13R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- chestnut oak----- white oak----- scarlet oak----- black oak----- yellow-poplar----- red maple----- hickory----- black locust-----	97 --- --- --- --- 97 --- --- ---	180 --- --- --- --- 102 --- --- ---	eastern white pine, yellow-poplar, chestnut oak, white oak
Chestnut-----	10R	Moderate	Moderate	Moderate	Moderate	Moderate	eastern white pine-- yellow-poplar----- scarlet oak----- white oak----- black oak----- chestnut oak-----	78 --- --- --- --- ---	139 --- --- --- --- ---	eastern white pine, yellow-poplar
BtE, BtF: Buladean-----	13R	Severe	Severe	Moderate	Slight	Moderate	eastern white pine-- chestnut oak----- white oak----- scarlet oak----- black oak----- yellow-poplar----- red maple----- hickory----- black locust-----	97 --- --- --- --- --- --- --- ---	180 --- --- --- --- --- --- --- ---	eastern white pine, yellow-poplar, chestnut oak, white oak
Chestnut-----	10R	Severe	Severe	Moderate	Moderate	Moderate	eastern white pine-- yellow-poplar----- scarlet oak----- white oak----- black oak----- chestnut oak-----	78 --- --- --- --- ---	139 --- --- --- --- ---	eastern white pine, yellow-poplar
ByC: Burton-----	2R	Slight	Slight	Severe	Moderate	Slight	northern red oak---- red spruce----- Fraser fir-----	--- --- ---	--- --- ---	See footnote 5.

See footnotes at end of table.

Table 11.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
ByC: Craggey-----	2D	Slight	Slight	Severe	Severe	Slight	northern red oak---- red spruce----- Fraser fir-----	--- --- ---	--- --- ---	See footnote 5.
CaD: Cashiers-----	7R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- eastern white pine-- eastern hemlock----- yellow buckeye----- American beech----- white ash-----	93 84 91 --- --- --- ---	95 66 168 --- --- ---	yellow-poplar, eastern white pine, northern red oak
CaE, CaF: Cashiers-----	7R	Severe	Severe	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- eastern white pine-- eastern hemlock----- yellow buckeye----- American beech----- white ash-----	93 84 91 --- --- --- ---	95 66 168 --- --- ---	yellow-poplar, eastern white pine, northern red oak
CdB, CdC: Chandler-----	11A	Slight	Slight	Slight	Slight	Moderate	eastern white pine-- chestnut oak----- Virginia pine----- hickory----- pitch pine----- scarlet oak----- white oak----- yellow-poplar----- shortleaf pine-----	88 76 --- --- --- --- --- --- ---	162 58 --- --- --- --- --- ---	eastern white pine, chestnut oak, white oak, shortleaf pine
CeD: Chandler-----	11R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- chestnut oak----- Virginia pine----- hickory----- pitch pine----- scarlet oak----- white oak----- shortleaf pine-----	88 76 --- --- --- --- --- ---	162 58 --- --- --- --- --- ---	eastern white pine, chestnut oak, white oak, shortleaf pine

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
CeD: Micaville-----	10R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- chestnut oak----- scarlet oak----- white oak----- hickory----- black oak-----	88 76 --- --- --- ---	157 57 --- --- --- ---	eastern white pine, chestnut oak, white oak
CeE, CeF: Chandler-----	11R	Severe	Severe	Slight	Slight	Moderate	eastern white pine-- chestnut oak----- Virginia pine----- hickory----- northern red oak---- pitch pine----- scarlet oak----- white oak----- shortleaf pine-----	88 76 --- --- --- --- --- --- ---	162 58 --- --- --- --- --- --- ---	eastern white pine, chestnut oak, white oak, shortleaf pine
Micaville-----	10R	Severe	Severe	Moderate	Slight	Moderate	eastern white pine-- chestnut oak----- scarlet oak----- white oak----- hickory----- black oak-----	88 76 --- --- --- ---	157 57 --- --- --- ---	eastern white pine, chestnut oak, white oak
CfD: Cheoah-----	2R	Moderate	Moderate	Severe	Slight	Slight	yellow-poplar----- American beech----- black cherry----- black oak----- eastern hemlock----- northern red oak---- yellow buckeye-----	--- --- --- --- --- --- ---	--- --- --- --- --- --- ---	See footnote 5.
ChE, ChF: Cheoah-----	8R	Severe	Severe	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- American beech----- black cherry----- eastern hemlock----- black oak----- yellow buckeye-----	103 84 80 74 --- --- ---	112 66 --- --- --- --- ---	northern red oak, yellow-poplar, black cherry

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
CnC2: Clifton-----	12A	Slight	Slight	Moderate	Slight	Moderate	eastern white pine-- Virginia pine----- pitch pine----- yellow-poplar----- scarlet oak-----	93 --- --- 93 ---	172 --- --- 95 ---	eastern white pine, white oak, yellow- poplar, chestnut oak
CnD2: Clifton-----	12R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- Virginia pine----- pitch pine----- yellow-poplar----- scarlet oak-----	93 --- --- 93 ---	172 --- --- 95 ---	eastern white pine, white oak, yellow- poplar, chestnut oak
CnE2: Clifton-----	12R	Severe	Severe	Moderate	Slight	Moderate	eastern white pine-- Virginia pine----- pitch pine----- yellow-poplar----- scarlet oak-----	93 --- --- 93 ---	172 --- --- 95 ---	eastern white pine, white oak, yellow- poplar, chestnut oak
CsD: Cullasaja-----	8R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar----- black cherry----- northern red oak---- yellow birch-----	109 --- 92 ---	122 --- 74 ---	yellow-poplar, northern red oak, black cherry
DeA: Dellwood-----	8F	Slight	Slight	Moderate	Slight	Moderate	yellow-poplar----- eastern white pine-- river birch----- American sycamore--- eastern hemlock----	100 91 --- --- ---	107 168 --- --- ---	yellow-poplar, eastern white pine
Reddies-----	8A	Slight	Slight	Slight	Slight	Moderate	yellow-poplar----- American sycamore--- eastern white pine-- river birch-----	105 --- --- ---	115 --- --- ---	yellow-poplar, eastern white pine
DoB, DrC: Dillsboro-----	8C	Slight	Slight	Moderate	Slight	Moderate	yellow-poplar <sup>7</sup> ----- eastern white pine-- white oak----- scarlet oak----- northern red oak----	103 --- --- --- ---	112 --- --- --- ---	yellow-poplar, eastern white pine

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
DrD: Dillsboro-----	8R	Moderate	Moderate	Moderate	Slight	Moderate	yellow-poplar <sup>7</sup> ----- eastern white pine-- white oak----- scarlet oak----- northern red oak----	103 --- --- --- ---	112 --- --- ---	yellow-poplar, eastern white pine
DsC: Dillsboro-----	8C	Slight	Slight	Moderate	Slight	Moderate	yellow-poplar----- eastern white pine--	--- ---	--- ---	yellow-poplar, eastern white pine
EcC: Evard-----	12A	Slight	Slight	Slight	Slight	Moderate	eastern white pine-- pitch pine----- Virginia pine----- white oak----- hickory----- scarlet oak-----	91 --- --- --- --- ---	168 --- --- --- ---	eastern white pine, white oak, chestnut oak
Cowee-----	10D	Slight	Slight	Slight	Moderate	Moderate	eastern white pine-- pitch pine----- chestnut oak----- Virginia pine----- white oak----- scarlet oak-----	78 --- --- --- --- ---	139 --- --- --- ---	eastern white pine
EcD: Evard-----	12R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- pitch pine----- Virginia pine----- white oak----- hickory----- scarlet oak-----	91 --- --- --- --- ---	168 --- --- --- ---	eastern white pine, white oak, chestnut oak
Cowee-----	10R	Moderate	Moderate	Moderate	Moderate	Moderate	eastern white pine-- pitch pine----- chestnut oak----- Virginia pine----- white oak----- scarlet oak-----	78 --- --- --- --- ---	139 --- --- --- ---	eastern white pine

See footnotes at end of table.

Table 11.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
EdE, EdF: Evard-----	12R	Severe	Severe	Moderate	Slight	Moderate	eastern white pine-- pitch pine----- Virginia pine----- white oak----- hickory----- scarlet oak-----	91 --- --- --- --- ---	168 --- --- --- --- ---	eastern white pine, white oak, chestnut oak
Cowee-----	10R	Severe	Severe	Moderate	Moderate	Moderate	eastern white pine-- yellow-poplar----- pitch pine----- chestnut oak----- Virginia pine----- white oak----- scarlet oak-----	78 --- --- --- --- --- ---	139 --- --- --- --- --- ---	eastern white pine
FeC2: Fannin-----	12A	Slight	Slight	Slight	Slight	Moderate	eastern white pine-- yellow-poplar----- pitch pine----- Virginia pine----- scarlet oak----- chestnut oak-----	94 96 --- --- --- ---	174 100 --- --- --- ---	eastern white pine, yellow-poplar, white oak, chestnut oak
FeD2: Fannin-----	12R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- yellow-poplar----- pitch pine----- Virginia pine----- scarlet oak----- chestnut oak-----	94 96 --- --- --- ---	174 100 --- --- --- ---	eastern white pine, yellow-poplar, white oak, chestnut oak
FeE2: Fannin-----	12R	Severe	Severe	Moderate	Slight	Moderate	eastern white pine-- yellow-poplar----- pitch pine----- Virginia pine----- scarlet oak----- chestnut oak-----	94 96 --- --- --- ---	174 100 --- --- --- ---	eastern white pine, yellow-poplar, white oak, chestnut oak

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordi-nation symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Plant competi-tion	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
HaD:										
Harmiller-----	10R	Moderate	Moderate	Moderate	Moderate	Moderate	eastern white pine-- chestnut oak----- scarlet oak----- white oak----- black oak----- hickory----- pitch pine----- Virginia pine-----	80 --- --- --- --- --- --- ---	144 --- --- --- --- --- --- ---	eastern white pine
Shinbone-----	11R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- white oak----- chestnut oak----- scarlet oak----- black oak----- hickory----- pitch pine----- shortleaf pine----- Virginia pine-----	86 --- --- --- --- --- --- --- ---	157 --- --- --- --- --- --- --- ---	eastern white pine
HaE:										
Harmiller-----	10R	Severe	Severe	Moderate	Moderate	Moderate	eastern white pine-- chestnut oak----- scarlet oak----- white oak----- black oak----- hickory----- pitch pine----- Virginia pine-----	80 --- --- --- --- --- --- ---	144 --- --- --- --- --- --- ---	eastern white pine
Shinbone-----	11R	Severe	Severe	Moderate	Slight	Moderate	eastern white pine-- white oak----- chestnut oak----- scarlet oak----- black oak----- hickory----- pitch pine----- shortleaf pine----- Virginia pine-----	86 --- --- --- --- --- --- --- ---	157 --- --- --- --- --- --- --- ---	eastern white pine

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
HuD: Huntdale-----	8R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- white oak----- eastern white pine-- cucumbertree----- sweet birch----- black cherry-----	106 --- --- --- --- ---	117 --- --- --- --- ---	yellow-poplar, northern red oak, white oak, black cherry
HuE, HuF: Huntdale-----	8R	Severe	Severe	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- white oak----- eastern white pine-- cucumbertree----- sweet birch----- black cherry-----	106 --- --- --- --- ---	117 --- --- --- --- ---	yellow-poplar, northern red oak, white oak, black cherry
KcD: Keener-----	8R	Moderate	Moderate	Moderate	Slight	Moderate	yellow-poplar----- northern red oak---- Virginia pine----- eastern white pine chestnut oak----- eastern hemlock---- pitch pine-----	92 --- --- 89 --- --- ---	93 --- --- 164 --- --- ---	yellow-poplar, eastern white pine
Lostcove-----	7R	Moderate	Moderate	Moderate	Slight	Moderate	yellow-poplar----- eastern white pine-- northern red oak---- white oak----- eastern hemlock---- red maple----- chestnut oak-----	98 97 --- --- --- --- ---	104 180 --- --- --- --- ---	yellow-poplar, eastern white pine, northern red oak, white oak
PeD: Pigeonroost-----	12R	Moderate	Moderate	Moderate	Moderate	Moderate	eastern white pine-- northern red oak---- yellow-poplar----- white oak----- chestnut oak----- scarlet oak----- black oak----- red maple----- hickory-----	78 --- --- --- --- --- --- --- ---	139 --- --- --- --- --- --- --- ---	eastern white pine, yellow-poplar, white oak, chestnut oak

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
PeD: Edneytown-----	12R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- pitch pine----- Virginia pine----- yellow-poplar----- white oak----- southern red oak---- hickory-----	91 --- --- 95 --- --- ---	168 --- --- 98 --- --- ---	eastern white pine, yellow-poplar, white oak, chestnut oak
PeE: Pigeonroost-----	12R	Severe	Severe	Moderate	Moderate	Moderate	eastern white pine-- northern red oak---- yellow-poplar----- white oak----- chestnut oak----- scarlet oak----- black oak----- red maple----- hickory-----	78 --- --- --- --- --- --- --- ---	139 --- --- --- --- --- --- --- ---	eastern white pine, yellow-poplar, white oak, chestnut oak
Edneytown-----	12R	Severe	Severe	Moderate	Slight	Moderate	eastern white pine-- pitch pine----- Virginia pine----- yellow-poplar----- white oak----- southern red oak---- hickory-----	91 --- --- 95 --- --- ---	168 --- --- 98 --- --- ---	eastern white pine, yellow-poplar, white oak, chestnut oak
PtD: Plott-----	9R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar <sup>6</sup> ----- northern red oak <sup>6</sup> --- black cherry----- American beech----- sugar maple----- eastern hemlock----- black oak----- yellow birch----- black locust----- white ash <sup>6</sup> -----	97 85 87 --- --- --- --- --- --- 94	102 67 --- --- --- --- --- --- ---	northern red oak, yellow-poplar, black cherry

See footnotes at end of table.

Table 11.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
PtE, PtF: Plott-----	9R	Severe	Severe	Slight	Slight	Moderate	yellow-poplar <sup>6</sup> ----- northern red oak <sup>6</sup> ---- black cherry----- American beech----- sugar maple----- eastern hemlock----- black oak----- yellow birch----- black locust----- white ash <sup>6</sup> -----	97 85 87 --- --- --- --- --- --- 94	102 67 --- --- --- --- --- --- ---	northern red oak, yellow-poplar, black cherry
RoA: Rosman-----	9A	Slight	Slight	Slight	Slight	Moderate	yellow-poplar----- American sycamore--- black walnut----- red maple----- river birch----- American beech----- black locust----- eastern white pine--	110 --- --- --- --- --- --- 100	124 --- --- --- --- --- --- 186	yellow-poplar, black walnut, eastern white pine, black cherry
SaB, ScC: Saunook-----	8A	Slight	Slight	Slight	Slight	Moderate	yellow-poplar----- eastern white pine-- northern red oak--- white oak----- eastern hemlock----- black cherry----- white ash-----	107 104 --- --- --- --- ---	119 194 --- --- --- --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
SdD: Saunook-----	8R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar----- eastern white pine-- northern red oak--- white oak----- eastern hemlock----- black cherry----- white ash-----	107 104 --- --- --- --- ---	119 194 --- --- --- --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
Thunder-----	8R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar----- northern red oak--- sugar maple----- white ash----- black cherry-----	105 92 --- --- ---	115 74 --- --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
SdE: Saunook-----	8R	Severe	Severe	Slight	Slight	Moderate	yellow-poplar----- eastern white pine-- northern red oak---- white oak----- eastern hemlock----- black cherry----- white ash-----	107 104 --- --- --- ---	119 194 --- --- --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
Thunder-----	8R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- sugar maple----- white ash----- black cherry-----	105 92 --- --- ---	115 74 --- --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
SrF: Sylco-----	9R	Severe <sup>7</sup>	Severe	Severe	Moderate	Moderate	eastern white pine-- pitch pine----- Virginia pine----- chestnut oak----- black oak----- scarlet oak-----	--- --- --- --- --- ---	--- --- --- --- --- ---	See footnote 5.
Rock outcrop.										
SsD: Sylco-----	9X	Moderate	Severe	Moderate	Moderate	Moderate	eastern white pine-- pitch pine----- Virginia pine----- chestnut oak----- black oak----- scarlet oak-----	74 --- --- --- --- ---	130 --- --- --- --- ---	eastern white pine
Soco-----	11R	Moderate	Moderate	Moderate	Moderate	Moderate	eastern white pine-- pitch pine----- Virginia pine----- chestnut oak----- scarlet oak----- white oak----- black oak-----	85 --- --- --- --- --- ---	155 --- --- --- --- --- ---	eastern white pine

See footnotes at end of table.

Table 11.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
StE, StF: Soco-----	11R	Severe <sup>7</sup>	Severe	Moderate	Moderate	Moderate	eastern white pine-- pitch pine----- Virginia pine----- chestnut oak----- scarlet oak----- white oak----- black oak-----	85 --- --- --- --- --- ---	155 --- --- --- --- --- ---	eastern white pine
Stecoah-----	12R	Severe <sup>7</sup>	Severe	Moderate	Slight	Moderate	eastern white pine-- scarlet oak----- white oak----- chestnut oak----- Virginia pine----- hickory----- black oak-----	93 --- --- --- --- --- ---	172 --- --- --- --- --- ---	eastern white pine
TbD: Tanasee-----	10R	Moderate	Moderate	Slight	Slight	Moderate	red spruce----- Fraser fir----- northern red oak---- black cherry----- black oak----- American beech----- yellow birch----- sugar maple----- eastern hemlock----- yellow buckeye----- white ash-----	64 --- --- --- --- --- --- --- --- --- --- ---	150 --- --- --- --- --- --- --- --- --- --- ---	Fraser fir, red spruce, northern red oak
Balsam-----	10R	Moderate	Moderate	Slight	Slight	Moderate	red spruce----- northern red oak---- Fraser fir----- sugar maple----- yellow birch-----	64 --- --- --- ---	143 --- --- --- ---	Fraser fir, red spruce, northern red oak

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
TbE: Tanasee-----	10R	Severe	Severe	Slight	Slight	Moderate	red spruce----- Fraser fir----- northern red oak---- black cherry----- black oak----- American beech----- yellow birch----- sugar maple----- eastern hemlock----- yellow buckeye----- white ash-----	64 --- --- --- --- --- --- --- --- --- ---	150 --- --- --- --- --- --- --- --- --- ---	Fraser fir, red spruce, northern red oak
Balsam-----	10R	Severe	Severe	Slight	Slight	Moderate	red spruce----- northern red oak---- Fraser fir----- sugar maple----- yellow birch-----	64 --- --- --- ---	150 --- --- --- ---	Fraser fir, red spruce, northern red oak
TsB, TsC: Thunder-----	8X	Slight	Moderate	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- white ash----- black cherry-----	105 92 --- ---	115 74 --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
Saunook-----	8A	Slight	Slight	Slight	Slight	Moderate	yellow-poplar----- eastern white pine-- northern red oak---- white oak----- eastern hemlock----- black cherry----- white ash-----	107 104 --- --- --- --- ---	119 194 --- --- --- --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
TsD: Thunder-----	8R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- white ash----- black cherry-----	100 92 --- ---	114 74 --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
TsD: Saunook-----	8R	Moderate	Moderate	Slight	Slight	Moderate	yellow-poplar----- eastern white pine-- northern red oak---- white oak----- eastern hemlock----- black cherry----- white ash-----	107 104 --- --- --- ---	119 194 --- --- --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
TsE: Thunder-----	8R	Severe	Severe	Slight	Slight	Moderate	yellow-poplar----- northern red oak---- white ash----- black cherry-----	100 92 --- ---	114 74 --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
Saunook-----	8R	Severe	Severe	Slight	Slight	Moderate	yellow-poplar----- eastern white pine-- northern red oak---- white oak----- eastern hemlock----- black cherry----- white ash-----	107 104 --- --- --- ---	119 194 --- --- --- ---	yellow-poplar, eastern white pine, northern red oak, black cherry, white ash
Ud, Un. Udorthents										
Ur. Urban land										
W. Water										
WgC: Watauga-----	11A	Slight	Slight	Slight	Slight	Moderate	eastern white pine-- yellow-poplar----- white oak----- hickory----- northern red oak---- Virginia pine-----	87 94 --- --- --- ---	159 174 --- --- --- ---	yellow-poplar, eastern white pine, white oak, chestnut oak
WgD: Watauga-----	11R	Moderate	Moderate	Moderate	Slight	Moderate	eastern white pine-- yellow-poplar----- white oak----- hickory----- northern red oak---- Virginia pine-----	87 94 --- --- --- ---	159 174 --- --- --- ---	yellow-poplar, eastern white pine, white oak, chestnut oak

See footnotes at end of table.

Table 11.--Forestland Management and Productivity--Continued

Map symbol and soil name	Ordination symbol <sup>1</sup>	Management concerns					Potential productivity			Trees to manage <sup>4</sup>
		Erosion hazard	Equipment limitation	Seedling mortality	Wind-throw hazard	Plant competition	Common trees	Site index <sup>2</sup>	Volume of wood fiber <sup>3</sup> cu ft/ac	
WgE: Watauga-----	11R	Severe	Severe	Moderate	Slight	Moderate	eastern white pine-- yellow-poplar----- white oak----- hickory----- northern red oak---- Virginia pine-----	87 94 --- --- --- ---	159 174 --- --- --- ---	yellow-poplar, eastern white pine, white oak, chestnut oak
WhD: Wayah-----	2R	Moderate	Moderate	Severe	Slight	Slight	red spruce----- northern red oak---- Fraser fir-----	--- --- ---	--- --- ---	See footnote 5.
Burton-----	2R	Moderate	Moderate	Severe	Moderate	Slight	red spruce----- northern red oak---- Fraser fir-----	--- --- ---	--- --- ---	See footnote 5.
WyE, WyF: Wayah-----	2R	Severe	Severe	Severe	Slight	Slight	red spruce----- northern red oak---- Fraser fir-----	--- --- ---	--- --- ---	See footnote 5.
Burton-----	2R	Severe	Severe	Severe	Moderate	Slight	red spruce----- northern red oak---- Fraser fir-----	--- --- ---	--- --- ---	See footnote 5.

<sup>1</sup> The number in the ordination symbol denotes the potential productivity in cubic meeters per hectare per year for a group or range of site indices for the indicator species (the first tree listed under "Common trees"). One cubic hectare per year equals 14.3 cubic feet per acre per year.

<sup>2</sup> Site indices were assigned using available plot data and comparison curves. If plot data was insufficient, site index was assigned based on data from soils with similar properties. If there were no data and no soils with similar properties, the soil was assigned a probable ordination symbol without any site index. Site index may vary considerably among sites with the same soil because of the influence of past management, climate, relief, landform position, aspect, drainage, parent material, and elevation.

<sup>3</sup> Potential productivity is measured as yield (volume of wood fiber) in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked, natural stands. Cubic feet can be converted to board feet by multiplying by about 5.

<sup>4</sup> If hardwoods are desired on a forest site, rely on natural reproduction (seeds and sprouts) of acceptable species. Special site preparation techniques may be required. The planting of hardwoods on a site should be based on the recommendation of a professional forester.

<sup>5</sup> This map unit is in noncommercial forestland. See the map unit description for composition and management concerns.

<sup>6</sup> Data exists but there are not enough plots to meet the standards of sampling and analysis.

<sup>7</sup> The soil is subject to mass movement (landslides). Roads should not be built where this is a problem.

Table 12.—Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AcF: Ashe-----	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope depth to rock
Cleveland-----  Rock outcrop.	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope small stones depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
BaD, BaE: Balsam-----	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
BdA: Bandana-----	Severe: flooding wetness	Moderate: flooding wetness	Severe: flooding wetness	Moderate: flooding wetness	Severe: flooding wetness
BmA: Biltmore-----	Severe: flooding too sandy	Severe: flooding too sandy	Severe: flooding too sandy	Severe: flooding too sandy	Severe: flooding too sandy droughty
BtD: Buladean-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope droughty
Chestnut-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope depth to rock
BtE, BtF: Buladean-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope depth to rock
Chestnut-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope depth to rock
ByC: Burton-----	Moderate: large stones slope	Moderate: large stones	Severe: large stones slope	Moderate: large stones	Moderate: large stones slope
Craggy-----	Severe: depth to rock large stones	Severe: depth to rock large stones	Severe: slope large stones depth to rock	Severe: fragile large stones	Severe: large stones depth to rock

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CaD: Cashiers-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
CaE, CaF: Cashiers-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
CdB: Chandler-----	Slight	Slight	Moderate: slope small stones	Slight	Moderate: droughty
CdC: Chandler-----	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope droughty
CeD, CeE, CeF: Chandler-----	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: slope droughty
Micaville-----	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: slope droughty
CfD: Cheoah-----	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: slope
ChE, ChF: Cheoah-----	Severe: slope small stones	Severe: slope	Severe: slope small stones	Severe: slope	Severe: slope
CnC2: Clifton-----	Moderate: slope too clayey	Moderate: slope	Severe: slope	Slight: too clayey	Moderate: slope too clayey
CnD2, CnE2: Clifton-----	Severe: slope too clayey	Severe: slope	Severe: slope	Moderate: slope too clayey	Severe: slope too clayey
CsD: Cullasaja-----	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
DeA: Dellwood-----	Severe: flooding	Moderate: flooding	Severe: flooding small stones	Slight: flooding	Severe: flooding droughty
Reddies-----	Severe: flooding	Moderate: flooding	Moderate: flooding	Slight: flooding	Severe: flooding droughty

Table 12.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DoB: Dillsboro-----	Slight	Slight	Moderate: slope	Slight	Moderate: too clayey
DrC: Dillsboro-----	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope too clayey
DrD: Dillsboro-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope too clayey
DsC: Dillsboro-----	Severe: flooding	Moderate: slope	Severe: slope	Slight	Moderate: slope too clayey
EcC: Evard-----	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Cowee-----	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope depth to rock
EcD: Evard-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Cowee-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope depth to rock
EdE, EdF: Evard-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Cowee-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope depth to rock
FeC2: Fannin-----	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
FeD2: Fannin-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
FeE2: Fannin-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HaD: Harmiller-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope depth to rock
Shinbone-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
HaE: Harmiller-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope depth to rock
Shinbone-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HnD: Huntdale-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
HuE, HuF: Huntdale-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
KcD: Keener-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: large stones slope
Lostcove-----	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
PeD: Pigeonroost-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope depth to rock
Edneytown-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
PeE: Pigeonroost-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope depth to rock
Edneytown-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
PtD: Plott-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
PtE, PtF: Plott-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
RoA: Rosman-----	Severe: flooding	Moderate: flooding	Moderate: flooding	Moderate: flooding	Moderate: flooding
SaB: Saunook-----	Slight	Slight	Slight	Slight	Slight
ScC: Saunook-----	Moderate slope	Moderate slope	Moderate: slope	Slight	Moderate slope

Table 12.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
SdD: Saunook-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Thunder-----	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope
SdE: Saunook-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Thunder-----	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope
SrF: Sylco-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones
Rock outcrop.					
SsD: Sylco-----	Severe: slope small stones	Severe: slope small stones	Severe: slope small stones	Severe: small stones	Severe: slope small stones
Soco-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope depth to rock
StE, StF: Soco-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope depth to rock
Stecoah-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope depth to rock
TbD: Tanasee-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Balsam-----	Severe: large stones slope	Severe: slope large stones	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
TbE: Tanasee-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Balsam-----	Severe: large stones slope	Severe: slope large stones	Severe: large stones slope	Severe: slope	Severe: large stones slope
TsB: Thunder-----	Severe: large stones	Severe: large stones	Severe: large stones slope	Severe: large stones	Severe: large stones

Table 12.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TsB: Saunook-----	Slight	Slight	Moderate: slope small stones	Slight	Severe: large stones
TsC: Thunder-----	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope	Severe: large stones	Severe: large stones slope
Saunook-----	Moderate: slope	Moderate: slope	Severe: slope	Slight	Severe: large stones
TsD, TsE: Thunder-----	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope
Saunook-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: large stones slope
Ud, Un: Udorthents-----	Limitation: variable	Limitation: variable	Limitation: variable	Limitation: variable	Limitation: variable
Ur. Urban land					
W. Water					
WgC: Watauga-----	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
WgD: Watauga-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
WgE: Watauga-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
WhD: Wayah-----	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Burton-----	Severe: slope	Severe: slope	Severe: slope small stones	Moderate: slope	Severe: large stones slope depth to rock
WyE, WyF: Wayah-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Burton-----	Severe: slope	Severe: slope	Severe: slope small stones	Severe: slope	Severe: large stones slope depth to rock

Table 13.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
AcF:						
Ashe-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
Cleveland----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
Rock outcrop.						
BaD, BaE:						
Balsam-----	Severe: slope cutbanks cave large stones	Severe: slope large stones	Severe: slope cutbanks cave large stones	Severe: slope large stones	Severe: slope cutbanks cave large stones	Severe: large stones slope
BdA:						
Bandana-----	Severe: wetness cutbanks cave	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness
EmA:						
Biltmore-----	Severe: flooding cutbanks cave	Severe: flooding	Severe: flooding cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding too sandy droughty
BtD, BtE, BtF:						
Buladean-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope droughty
Chestnut-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
ByC:						
Burton-----	Severe: depth to rock	Moderate: slope depth to rock	Severe: depth to rock	Severe: slope depth to rock	Moderate: slope depth to rock	Moderate: large stones slope

Table 13.--Building Site Development--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
ByC: Craggy-----	Severe: depth to rock	Severe: depth to rock	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: large stones depth to rock
CaD, CaE, CaF: Cashiers-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope
CdB: Chandler-----	Slight	Slight	Slight	Moderate: slope	Severe: low strength	Moderate: droughty
CdC: Chandler-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: slope droughty
CeD, CeE, CeF: Chandler-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope droughty
Micaville-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: low strength slope depth to rock	Severe: slope droughty
CfD, ChE, ChF: Cheoah-----	Severe: slope depth to rock	Severe: slope				
CnC2: Clifton-----	Moderate: slope too clayey	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: slope too clayey
CnD2, CnE2: Clifton-----	Severe: slope too clayey	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope too clayey

Table 13.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
CsD: Cullasaja-----	Severe: large stones slope cutbanks cave	Severe: large stones slope	Severe: large stones slope cutbanks cave	Severe: large stones slope	Severe: large stones slope cutbanks cave	Severe: large stones slope
DeA: Dellwood-----	Severe: wetness cutbanks cave	Severe: flooding	Severe: flooding wetness	Severe: flooding	Severe: flooding	Severe: flooding droughty
Reddies-----	Severe: wetness cutbanks cave	Severe: flooding	Severe: flooding wetness	Severe: flooding	Severe: flooding	Severe: flooding droughty
DoB: Dillsboro-----	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Moderate: too clayey
DrC: Dillsboro-----	Moderate: slope too clayey	Moderate: shrink-swell slope	Moderate: shrink-swell slope	Severe: slope	Severe: low strength	Moderate: slope too clayey
DrD: Dillsboro-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope too clayey
DsC: Dillsboro-----	Moderate: slope too clayey	Severe: flooding	Severe: flooding	Severe: flooding slope	Severe: low strength	Moderate: slope too clayey
EcC: Evard-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope
Cowee-----	Severe: slope depth to rock	Moderate: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope depth to rock	Moderate: slope depth to rock

Table 13.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
EcD, EdE, EdF: Evard-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Cowee-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
FeC2: Fannin-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength slope	Moderate: slope
FeD2, FeE2: Fannin-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope
HaD, HaE: Harmiller-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
Shinbone-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
HnD, HuE, HuF: Huntsdale-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
KcD: Keener-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: large stones slope
Lostcove-----	Severe: large stones slope cutbanks cave	Severe: large stones slope	Severe: large stones slope cutbanks cave	Severe: large stones slope	Severe: large stones slope cutbanks cave	Severe: large stones slope
PeD, PeE: Pigeonroost---	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
Edneytown-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 13.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
PtD, PtE, PtF: Plott-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
RoA: Rosman-----	Severe: cutbanks cave	Severe: flooding	Severe: flooding	Severe: flooding	Severe: flooding	Moderate: flooding
SaB: Saunook-----	Slight	Slight	Slight	Moderate: slope	Severe: low strength	Slight
ScC: Saunook-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate slope
SdD, SdE: Saunook-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope
Thunder-----	Severe: large stones slope cutbanks cave	Severe: large stones slope	Severe: large stones slope cutbanks cave	Severe: large stones slope	Severe: large stones slope cutbanks cave	Severe: large stones slope
SrF: Sylco-----	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope small stones
Rock outcrop.						
SsD, StE, StF: Sylco-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope small stones
Soco-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock

Table 13.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TbD, TbE: Tanasee-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Balsam-----	Severe: slope cutbanks cave	Severe: slope	Severe: slope cutbanks cave	Severe: slope	Severe: slope cutbanks cave	Severe: large stones slope
TsB: Thunder-----	Severe: large stones cutbanks cave	Severe: large stones	Severe: large stones cutbanks cave	Severe: large stones	Severe: large stones cutbanks cave	Severe: large stones
Saunook-----	Slight	Slight	Moderate large stones	Moderate: slope	Severe: low strength	Severe: large stones
TsC: Thunder-----	Severe: large stones cutbanks cave	Severe: large stones	Severe: large stones cutbanks cave	Severe: large stones slope	Severe: large stones cutbanks cave	Severe: large stones slope
Saunook-----	Moderate: slope	Moderate: slope	Moderate: slope large stones	Severe: slope	Severe: low strength	Severe: large stones
TsD, TsE: Thunder-----	Severe: large stones slope cutbanks cave	Severe: large stones slope	Severe: large stones slope cutbanks cave	Severe: large stones slope	Severe: large stones slope cutbanks cave	Severe: large stones slope
Saunook-----	Severe: slope	Severe: slope	Severe: slope large stones	Severe: slope	Severe: low strength slope	Severe: large stones slope
Ud, Un: Udorthents----	Limitation: variable	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Limitation: variable
Ur. Urban land						
W. Water						

Table 13.—Building Site Development—Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WgC: Watauga-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Severe: low strength	Moderate: slope
WgD, WgE: Watauga-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope
WhD, WyE, WhF: Wayah-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Burton-----	Severe: slope depth to rock	Severe: large stones slope depth to rock				

Table 14.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
AcF: Ashe-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
Cleveland-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
Rock outcrop.					
BaD, BaE: Balsam-----	Severe: slope large stones poor filter	Severe: large stones seepage slope	Severe: large stones seepage slope	Severe: seepage slope large stones	Poor: slope large stones
BdA: Bandana-----	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: thin layer wetness
BmA: Biltmore-----	Severe: flooding wetness poor filter	Severe: flooding seepage	Severe: flooding seepage wetness	Severe: flooding seepage	Poor: seepage too sandy
BtD, BtE, BtF: Buladean-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
Chestnut-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
ByC: Burton-----	Severe: depth to rock	Severe: seepage slope depth to rock	Severe: seepage depth to rock	Severe: seepage depth to rock	Poor: depth to rock
Craggy-----	Severe: depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
CaD, CaE, CaF: Cashiers-----	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: hard to pack slope

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CdB: Chandler-----	Slight	Severe: seepage	Severe: seepage	Severe: seepage	Poor: hard to pack
CdC: Chandler-----	Moderate: slope	Severe: seepage slope	Severe: seepage	Severe: seepage	Poor: hard to pack
CeD, CeE, CeF: Chandler-----	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: hard to pack slope
Micaville-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope small stones depth to rock
CfD, ChE, ChF: Cheoah-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
CnC2: Clifton-----	Moderate: percs slowly slope	Severe: seepage slope	Severe: seepage too clayey	Moderate: slope	Poor: hard to pack too clayey
CnD2, CnE2: Clifton-----	Severe: percs slowly slope	Severe: seepage slope	Severe: seepage slope too clayey	Severe: slope	Poor: hard to pack slope too clayey
CsD: Cullasaja-----	Severe: large stones slope poor filter	Severe: large stones seepage slope	Severe: large stones seepage slope	Severe: large stones seepage slope	Poor: large stones seepage slope
DeA: Dellwood-----	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage small stones too sandy
Reddies-----	Severe: flooding wetness poor filter	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage small stones too sandy
DoB: Dillsboro-----	Moderate: percs slowly	Moderate: seepage slope	Severe: too clayey	Slight	Poor: hard to pack too clayey
DrC: Dillsboro-----	Moderate: percs slowly slope	Severe: slope	Severe: too clayey	Moderate: slope	Poor: hard to pack too clayey

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
DrD: Dillsboro-----	Severe: slope percs slowly	Severe: slope	Severe: slope too clayey	Severe: slope	Poor: hard to pack slope too clayey
DsC: Dillsboro-----	Moderate: flooding percs slowly slope	Severe: flooding slope	Severe: flooding too clayey	Moderate: flooding slope	Poor: hard to pack too clayey
EcC: Evard-----	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope	Fair: slope
Cowee-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: depth to rock	Severe: depth to rock	Poor: depth to rock
EcD, EdE, EdF: Evard-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
Cowee-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
FeC2: Fannin-----	Moderate: percs slowly slope	Severe: slope	Moderate: slope	Moderate: slope	Poor: hard to pack slope
FeD2, FeE2: Fannin-----	Severe: percs slowly slope	Severe: slope	Severe: slope	Severe: slope	Poor: hard to pack slope
HaD, HaE: Harmiller-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope small stones depth to rock
Shinbone-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope small stones depth to rock
HnD, HuE, HuF: Huntdale-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Poor: slope
KcD: Keener-----	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: slope	Poor: slope
Lostcove-----	Severe: large stones slope	Severe: large stones seepage slope	Severe: large stones seepage slope	Severe: large stones seepage slope	Poor: large stones slope

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
PeD, PeE: Pigeonroost-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope depth to rock
Edneytown-----	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: slope
PtD, PtE, PtF: Plott-----	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: slope
RoA: Rosman-----	Severe: flooding wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Severe: flooding seepage wetness	Poor: seepage too sandy
SaB: Saunook-----	Moderate: percs slowly	Severe: seepage	Severe: seepage	Severe: seepage	Fair small stones
ScC: Saunook-----	Moderate: percs slowly slope	Severe: seepage slope	Severe: seepage	Severe: seepage	Fair small stones
SdD, SdE: Saunook-----	Severe: percs slowly slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: slope small stones
Thunder-----	Severe: large stones slope	Severe: large stones seepage slope	Severe: large stones seepage slope	Severe: seepage slope large stones	Poor: large stones slope
SrF: Sylco-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope small stones depth to rock
Rock outcrop.					
SsD: Sylco-----	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Poor: slope small stones depth to rock
Soco-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
StE, StF: Soco-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
Stecoah-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock
TbD, TbE: Tanasee-----	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: large stones seepage slope
Balsam-----	Severe: slope large stones poor filter	Severe: large stones seepage slope	Severe: large stones seepage slope	Severe: seepage slope large stones	Poor: slope large stones
TsB: Thunder-----	Severe: large stones	Severe: large stones seepage	Severe: large stones seepage	Severe: seepage large stones	Poor: large stones
Saunook-----	Moderate: percs slowly	Severe: seepage	Severe: seepage	Severe: seepage	Poor large stones
TsC: Thunder-----	Severe: large stones slope	Severe: large stones seepage slope	Severe: large stones seepage	Severe: seepage large stones	Poor: large stones
Saunook-----	Moderate: percs slowly slope	Severe: seepage slope	Severe: seepage	Severe: seepage	Poor large stones
TsD, TsE: Thunder-----	Severe: large stones slope	Severe: large stones seepage slope	Severe: large stones seepage slope	Severe: seepage slope large stones	Poor: large stones slope
Saunook-----	Severe: percs slowly slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: slope large stones
Ud, Un: Udorthents-----	Limitation: variable	Limitation: variable	Limitation: variable	Limitation: variable	Limitation: variable
Ur. Urban land					

Table 14.—Sanitary Facilities—Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
W. Water					
WgC: Watauga-----	Moderate: percs slowly slope	Severe: slope seepage	Moderate: seepage slope	Moderate: slope seepage	Poor: hard to pack slope
WgD, WgE: Watauga-----	Severe: slope	Severe: slope seepage	Severe: seepage slope	Severe: slope seepage	Poor: hard to pack slope
WhD, WyE, WyF: Wayah-----	Severe: slope	Severe: seepage slope	Severe: seepage slope	Severe: seepage slope	Poor: slope
Burton-----	Severe: slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Severe: seepage slope depth to rock	Poor: slope depth to rock

Table 15.—Construction Materials

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
AcF: Ashe-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
Cleveland-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
Rock outcrop-----	Poor: depth to rock slope	Improbable: depth to rock	Improbable: depth to rock	Poor: depth to rock slope
BaD: Balsam-----	Poor: large stones slope	Improbable: large stones	Improbable: large stones	Poor: large stones area reclaim slope
BaE: Balsam-----	Poor: large stones slope	Improbable: large stones	Improbable: large stones	Poor: large stones area reclaim slope
BdA: Bandana-----	Fair: wetness	Probable	Probable	Poor: small stones area reclaim
BmA: Biltmore-----	Poor: too sandy	Probable	Improbable: too sandy	Poor: too sandy
BtD: Buladean-----	Fair: depth to rock slope	Improbable: excess fines	Improbable: excess fines	Poor: slope area reclaim
Chestnut-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
BtE, BtF: Buladean-----	Poor: depth to rock slope	Improbable: excess fines	Improbable: excess fines	Poor: slope area reclaim
Chestnut-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
ByC: Burton-----	Poor: depth to rock	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones
Craggey-----	Poor: depth to rock	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
CaD: Cashiers-----	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
CaE, CaF: Cashiers-----	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones slope
CdB, CdC: Chandler-----	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim
CeD, CeE, CeF: Chandler-----	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
Micaville-----	Poor: depth to rock slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
CfD: Cheoah-----	Fair: depth to rock slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
ChE, ChF: Cheoah-----	Poor: depth to rock slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
CnC2: Clifton-----	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey
CnD2, CnE2: Clifton-----	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: too clayey slope
CsD: Cullasaja-----	Poor: large stones slope	Improbable: large stones	Improbable: large stones	Poor: large stones area reclaim slope

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
DeA: Dellwood-----	Poor: large stones	Probable	Probable	Poor: too clayey small stones area reclaim
Reddies-----	Poor: large stones	Probable	Probable	Poor: small stones area reclaim
DoB, DrC: Dillsboro-----	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey area reclaim
DrD: Dillsboro-----	Poor: slope low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey area reclaim slope
DsC: Dillsboro-----	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: too clayey area reclaim
EcC: Evard-----	Good	Improbable: excess fines	Improbable: excess fines	Poor: too clayey small stones slope
Cowee-----	Poor: depth to rock	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones
EcD: Evard-----	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
Cowee-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
EdE, EdF: Evard-----	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope too clayey
Cowee-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
FeC2: Fannin-----	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Fair: too clayey small stones

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
FeD2, FeE2: Fannin-----	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Fair: slope too clayey
HaD: Harmiller-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
Shinbone-----	Fair: depth to rock low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
HaE: Harmiller-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
Shinbone-----	Poor: slope depth to rock low strength	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
HnD: Huntsdale-----	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
HuE, HuF: Huntsdale-----	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
KcD: Keener-----	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
Lostcove-----	Poor: large stones slope	Improbable: excess fines large stones	Improbable: excess fines large stones	Poor: large stones area reclaim slope
PeD: Pigeonroost-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock slope
Edneytown-----	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
PeE: Pigeonroost-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock slope
Edneytown-----	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: slope
PtD: Plott-----	Fair: slope	Probable	Improbable: excess fines	Poor: slope

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
PtE, PtF: Plott-----	Poor: slope	Probable	Improbable: excess fines	Poor: slope
RoA: Rosman-----	Good	Probable	Probable	Fair: area reclaim
SaB, ScC: Saunook-----	Good	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim
SdD: Saunook-----	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
Thunder-----	Poor: large stones slope	Improbable: excess fines large stones	Improbable: excess fines large stones	Poor: large stones area reclaim slope
SdE: Saunook-----	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
Thunder-----	Poor: large stones slope	Improbable: excess fines large stones	Improbable: excess fines large stones	Poor: large stones area reclaim slope
SrF: Sylco-----	Poor: depth to rock slope	Improbable: excess fines small stones	Improbable: excess fines small stones	Poor: depth to rock small stones slope
Rock outcrop-----	Poor: depth to rock slope	Improbable: depth to rock	Improbable: depth to rock	Poor: depth to rock slope
SsD: Sylco-----	Poor: depth to rock slope	Improbable: excess fines small stones	Improbable: excess fines small stones	Poor: depth to rock small stones slope
Soco-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
StE, StF: Soco-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
StE, StF: Stecoah-----	Poor: depth to rock slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
TbD: Tanasee-----	Fair: slope	Probable	Probable	Poor: area reclaim small stones slope
Balsam-----	Poor: large stones slope	Improbable: large stones	Improbable: large stones	Poor: large stones area reclaim slope
TbE: Tanasee-----	Poor: slope	Probable	Probable	Poor: area reclaim small stones slope
Balsam-----	Poor: large stones slope	Improbable: large stones	Improbable: large stones	Poor: large stones area reclaim slope
TsB, TsC: Thunder-----	Poor: large stones	Improbable: excess fines large stones	Improbable: excess fines large stones	Poor: large stones area reclaim
Saunook-----	Good	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim
TsD: Thunder-----	Poor: large stones slope	Improbable: excess fines large stones	Improbable: excess fines large stones	Poor: large stones area reclaim slope
Saunook-----	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
TsE: Thunder-----	Poor: large stones slope	Improbable: excess fines large stones	Improbable: excess fines large stones	Poor: large stones area reclaim slope
Saunook-----	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: small stones area reclaim slope
Ud, Un. Udorthents				

Table 15.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
Ur. Urban land				
W. Water				
WgC: Watauga-----	Poor: low strength	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim
WgD, WgE: Watauga-----	Poor: low strength slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
WhD: Wayah-----	Fair: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
Burton-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope
WyE, WyF: Wayah-----	Poor: slope	Improbable: excess fines	Improbable: excess fines	Poor: area reclaim slope
Burton-----	Poor: depth to rock slope	Improbable: excess fines thin layer	Improbable: excess fines thin layer	Poor: depth to rock small stones slope

Table 16.—Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
AcF: Ashe-----	Severe: seepage slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Cleveland-----	Severe: slope depth to rock	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Rock outcrop-----	Severe: slope depth to rock	Severe: slope depth to rock	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
BaD, BaE: Balsam-----	Severe: seepage slope	Severe: large stones seepage	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
BdA: Bandana-----	Severe: flooding seepage	Severe: piping wetness	Limitation: flooding	Limitation: flooding wetness droughty	Limitation: large stones wetness	Limitation: large stones wetness droughty
BmA: Biltmore-----	Severe: flooding seepage	Severe: seepage piping	Limitation: deep to water	Limitation: fast intake droughty	Limitation: too sandy	Limitation: droughty
BtD, BtE, BtF: Buladean-----	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: rooting depth slope
Chestnut-----	Severe: seepage slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope depth to rock

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
ByC: Burton-----	Severe: seepage slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock
Craggey-----	Severe: slope depth to rock	Severe: thin layer	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
CaD, CaE, CaF: Cashiers-----	Severe: seepage slope	Severe: hard to pack piping	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope
CdB: Chandler-----	Severe: seepage	Severe: hard to pack piping	Limitation: deep to water	Limitation: slope droughty	Limitation	Favorable
CdC: Chandler-----	Severe: seepage slope	Severe: hard to pack piping	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope
CeD, CeE, CeF: Chandler-----	Severe: seepage slope	Severe: hard to pack piping	Limitation: deep to water	Limitation: slope droughty	Limitation: slope	Limitation: slope
Micaville-----	Severe: seepage slope	Severe: hard to pack piping	Limitation: deep to water	Limitation: rooting depth slope droughty	Limitation: large stones slope	Limitation: large stones rooting depth slope
CfD, ChE, ChF: Cheoah-----	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
CnC2, CnD2, CnE2: Clifton-----	Severe: seepage slope	Severe: hard to pack	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
CsD: Cullasaja-----	Severe: seepage slope	Severe: large stones seepage	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope too sandy	Limitation: large stones slope droughty
DeA: Dellwood-----	Severe: seepage	Severe: large stones seepage	Limitation: flooding large stones	Limitation: flooding large stones droughty	Limitation: large stones too sandy	Limitation: large stones droughty
Reddies-----	Severe: seepage	Severe: seepage	Limitation: flooding large stones cutbanks cave	Limitation: flooding droughty	Limitation: large stones too sandy	Limitation: large stones droughty
DoB: Dillsboro-----	Moderate: seepage slope	Severe: hard to pack	Limitation: deep to water	Limitation: slope	Favorable	Favorable
DrC, DrD, DsC: Dillsboro-----	Severe: slope	Severe: hard to pack	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
EcC, EcD, EdE, EdF: Evard-----	Severe: slope	Severe: seepage piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
Cowee-----	Severe: slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
FeC2, FeD2, FeE2: Fannin-----	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
HaD, HaE: Harmiller-----	Severe: slope	Severe: piping thin layer	Limitation: deep to water	Limitation: rooting depth slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
HaD, HaE: Shinbone-----	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: rooting depth slope	Limitation: slope	Limitation: rooting depth slope
HnD, HuE, HuF: Huntsdale-----	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
KcD: Keener-----	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: large stones slope	Limitation: large stones slope	Limitation: large stones slope
Lostcove-----	Severe: slope	Severe: large stones seepage	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
PeD, PeE: Pigeonroost-----	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
Edneytown-----	Severe: seepage slope	Severe: seepage piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
PtD, PtE, PtF: Plott-----	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
RoA: Rosman-----	Severe: seepage	Severe: piping	Limitation: flooding	Limitation: flooding	Favorable	Favorable
SaB: Saunook-----	Severe: seepage	Severe: seepage	Limitation: deep to water	Limitation: slope	Favorable	Favorable
ScC: Saunook-----	Severe: seepage slope	Severe: seepage	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
SdD, SdE: Saunook-----	Severe: seepage slope	Severe: seepage	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
Thunder-----	Severe: seepage slope	Severe: large stones	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
SrF: Sylco-----	Severe: slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Rock outcrop-----	Severe: slope depth to rock	Severe: slope depth to rock	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
SsD: Sylco-----	Severe: slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: large stones slope depth to rock	Limitation: large stones slope droughty
Soco-----	Severe: seepage slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope depth to rock
StE, StF: Soco-----	Severe: seepage slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock droughty	Limitation: slope depth to rock	Limitation: slope depth to rock
Stecoah-----	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: rooting depth slope droughty	Limitation: slope	Limitation: rooting depth slope
TbD, TbE: Tanasee-----	Severe: seepage slope	Severe: seepage	Limitation: deep to water	Limitation: slope	Limitation: large stones slope	Limitation: large stones slope

Table 16.--Water Management--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
TbD, TbE: Balsam-----	Severe: seepage slope	Severe: large stones seepage	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
TsB: Thunder-----	Severe: seepage	Severe: large stones	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones	Limitation: large stones droughty
Saunook-----	Severe: seepage	Severe: seepage	Limitation: deep to water	Limitation: slope	Favorable	Limitation: large stones
TsC, TsD, TsE: Thunder-----	Severe: seepage slope	Severe: large stones	Limitation: deep to water	Limitation: large stones slope droughty	Limitation: large stones slope	Limitation: large stones slope droughty
Saunook-----	Severe: seepage slope	Severe: seepage	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: large stones slope
Ud, Un: Udorthents-----	Limitation: variable	Slight	Limitation: deep to water	Limitation: variable	Limitation: variable	Limitation: variable
Ur: Urban land-----	Limitation: variable	Limitation: variable	Limitation: variable	Limitation: variable	Limitation: variable	Limitation: variable
W. Water						
WgC, WgD, WgE: Watauga-----	Severe: slope	Severe: seepage piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope

Table 16.—Water Management—Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
WhD, WyE, WyF: Wayah-----	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
Burton-----	Severe: seepage slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope depth to rock	Limitation: large stones slope depth to rock	Limitation: large stones slope depth to rock

Table 17.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated. The symbol > means greater than; < means lesser than)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
AcF: Ashe-----	0-6	Very gravelly sandy loam	GM, SC-SM, SM	A-1-b, A-2-4, A-4	0-10	10-20	60-80	50-75	30-50	20-49	25-35	NP-7
	6-32	Gravelly sandy loam, cobbly sandy loam, sandy loam	SM	A-2, A-4	0-2	5-20	75-95	65-95	55-95	30-49	0-25	NP
	32-43	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Cleveland---	0-14	Gravelly sandy loam	GM, SM	A-1, A-2-4, A-4	0-2	2-10	65-90	50-80	45-75	20-40	0-25	NP-3
	14-25	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
BaD, BaE: Balsam-----	0-13	Gravelly fine sandy loam	SM	A-1-b, A-2-7, A-5, A-2-5	5-20	15-37	75-91	70-85	30-75	20-49	41-88	NP-18
	13-27	Very gravelly loamy coarse sand, very cobbly sandy loam, very gravelly sandy loam	GM, SM	A-1-b, A-2-4	5-40	15-45	51-85	45-75	34-60	15-35	15-40	NP-7
	27-74	Extremely gravelly sandy loam, very gravelly sandy loam, extremely gravelly coarse sandy loam	GM, SM	A-1-b, A-2-4	5-40	15-45	51-85	45-75	34-60	15-35	15-40	NP-7
	74-90	Very gravelly loamy coarse sand, cobbly coarse sandy loam, very cobbly loam	GM, GP-GM, SM, SP-SM	A-1-b, A-2-4, A-3	5-40	15-45	33-85	23-75	14-60	5-25	15-30	NP-7

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
BdA: Bandana-----	0-8	Sandy loam	SM, SC-SM, ML, CL-ML	A-2-4, A-4	0	0-10	90-100	85-100	60-90	30-70	15-35	NP-10
	8-37	Sandy loam, gravelly sandy loam, fine sandy loam	SM, SC-SM	A-4, A-2-4	0	0-15	90-100	65-100	50-80	25-49	15-25	NP-5
	37-62	Very gravelly sand, extremely gravelly sand, very cobbly loamy sand	GM, SC-SM, SM	A-1-a	0-5	5-50	50-85	25-70	15-40	5-20	10-15	NP
BmA: Biltmore----	0-10	Sand	SC-SM, SM, SP-SM	A-2-4	0	0-5	95-100	90-100	55-88	10-35	10-20	NP
	10-62	Sand, loamy sand, fine sand	SC-SM, SP-SM, SM	A-3, A-2-4	0	0-8	95-100	85-100	55-96	5-35	10-20	NP
BtD, BtE, BtF: Buladean---	0-3	Loam	SM, SC-SM, ML	A-2-4, A-4	0-2	0-5	90-100	85-100	60-90	30-75	25-40	NP-10
	3-26	Loam, sandy loam, coarse sandy loam	SM, SC-SM, ML	A-2-4, A-4	0-1	0-5	90-100	85-100	60-90	30-75	25-40	NP-10
	26-50	Coarse sandy loam, sandy loam, loamy sand	SM, SC-SM	A-2-4, A-4	0-1	0-5	80-100	75-100	60-95	20-49	15-30	NP-7
	50-86	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Chestnut---	0-2	Loam	SM, SC-SM, ML	A-4, A-5, A-2	0-2	0-5	85-100	80-95	60-95	30-55	20-50	NP-9
	2-27	Loam, gravelly fine sandy loam, sandy loam	ML, SM, SC-SM	A-2, A-4, A-5	0-5	0-25	75-100	65-97	60-85	34-52	20-45	NP-10
	27-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
ByC: Burton-----	0-18	Gravelly sandy loam	SM, GM	A-1-b, A-4, A-5, A-2-4	2-10	5-15	65-90	60-75	30-65	20-49	30-50	NP-7
	18-30	Gravelly loam, cobbly sandy loam, cobbly loam	SC-SM, SM	A-2, A-4	0-5	5-15	73-100	70-95	57-95	25-49	25-35	NP-7
	30-41	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Craggey-----	0-17	Gravelly loam	GM, SC-SM, SM	A-1-b, A-2	0-5	5-15	55-95	50-90	30-60	15-35	25-50	NP-7
	17-28	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
CaD, CaE, CaF: Cashiers---	0-9	Sandy loam	SM, ML, SC-SM	A-5, A-4, A-2-4	0-2	0-5	90-100	85-100	60-85	25-65	30-50	NP-7
	9-68	Sandy loam, fine sandy loam, gravelly sandy loam	SM, ML, SC-SM	A-4, A-2-4	0-2	0-5	70-95	60-95	50-85	25-65	30-50	NP-7
	68-75	Gravelly sandy loam, sandy loam, loamy sand	SC-SM, SM	A-4, A-2-4, A-1-b	0-2	0-15	70-95	60-95	30-75	20-50	30-50	NP-7
CdB, CdC: Chandler----	0-3	Gravelly loam	ML, MH, SM	A-5, A-4, A-2	0-5	0-15	70-85	60-75	30-65	20-50	30-76	NP-7
	3-26	Gravelly sandy loam, fine sandy loam, loam	SM, ML, MH	A-2, A-5, A-4	0-5	0-15	90-100	85-100	60-85	25-65	30-60	NP-7
	26-70	Loamy sand, sandy loam, sand	SC-SM, SM, SP-SM	A-2-4	0	0-5	95-100	90-100	55-95	5-35	0-20	NP-5

Table 17.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
CeD, CeE, CeF: Chandler---	0-3	Gravelly loam	SM, ML, MH	A-4, A-5, A-2	0-5	0-15	70-85	60-75	30-65	20-50	30-76	NP-7
	3-26	Gravelly sandy loam, fine sandy loam, loam	MH, SM, ML	A-5, A-4, A-2	0-5	0-15	90-100	85-100	60-85	25-65	30-60	NP-7
	26-70	Loamy sand, sandy loam, sand	SP-SM, SM, SC-SM	A-2-4	0	0-5	95-100	90-100	55-95	5-35	0-20	NP-5
Micaville--	0-3	Channery coarse sandy loam	SC-SM, SM	A-4, A-2-4	0-5	10-25	80-100	55-85	50-75	20-49	15-40	NP-7
	3-37	Channery coarse sandy loam, sandy loam, coarse sandy loam	SC-SM, SM	A-4, A-2-4	0-2	2-25	70-100	60-95	50-75	20-49	20-40	NP-7
	37-51	Gravelly sandy loam, gravelly loamy sand, sandy loam	SP-SM, SC-SM, SM	A-4, A-2-4, A-1-b	0-2	0-15	75-100	60-100	35-75	10-40	15-40	NP-7
	51-61	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
CfD, ChE, ChF: Cheoah----	0-12	Channery loam	GM, MH, ML, SM	A-7, A-4, A-5	0-5	5-15	70-95	55-90	40-80	36-65	30-64	NP-11
	12-46	Channery loam, channery fine sandy loam, channery silt loam	SC-SM, SM, ML	A-4	0-5	5-15	70-95	55-90	40-84	36-65	25-36	NP-10
	46-60	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
CnC2, CnD2, CnE2: Clifton----	0-10	Clay loam	ML	A-5, A-6, A-7, A-4	0	0-5	90-100	90-100	80-95	60-80	30-50	5-20
	10-34	Clay loam, clay	ML, MH	A-7	0	0-5	95-100	85-100	75-100	60-85	41-65	12-30
	34-79	Fine sandy loam, loam	SC, ML, CL, SM	A-4, A-6	0-5	0-15	90-100	85-100	70-100	45-65	15-35	NP-18

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
CsD: Cullasaja---	0-18	Cobbly fine sandy loam	SM	A-5, A-2-5	5-10	15-35	70-95	65-85	55-70	25-40	41-70	NP-7
	18-60	Very cobbly fine sandy loam, very cobbly sandy loam, very cobbly loam	GM, SM	A-1-b, A-2-4	10-20	30-60	55-85	50-75	35-60	15-30	25-40	NP-7
DeA: Dellwood----	0-12	Sandy loam	ML, SM	A-2-4, A-4	0-2	0-5	90-100	69-99	50-92	20-55	15-37	NP-4
	12-26	Very gravelly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand	GM, GP, GP-GM, SP	A-1-a	0-5	10-25	13-75	10-55	4-40	1-15	10-20	NP
	26-71	Extremely gravelly coarse sand, extremely gravelly sand, very cobbly sand	GM, GP, SP, GP-GM	A-1-a	0-5	30-50	13-75	10-40	4-40	1-15	10-15	NP
Reddies-----	0-12	Fine sandy loam	SM, ML	A-4, A-2-4	0	0-5	90-100	80-100	50-95	25-55	25-37	NP-7
	12-31	Fine sandy loam, sandy loam, gravelly sandy loam	SM, ML	A-4, A-2-4, A-1-b	0-1	0-15	70-100	60-95	30-85	15-55	25-35	NP-7
	31-79	Extremely gravelly coarse sand, extremely gravelly loamy sand, very cobbly sand	SP-SM, SM, GP-GM, GM	A-1-a	0-5	10-50	13-75	10-55	4-40	1-15	10-14	NP

Table 17.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
DoB, DrC, DrD, DsC: Dillsboro--	0-13	Clay loam	SC, CL	A-2, A-6, A-7	0-1	0-10	90-100	85-100	65-95	30-80	35-50	11-25
	13-72	Clay loam, clay	MH, ML	A-7	0-1	0-5	95-100	90-100	80-99	65-90	40-70	11-35
	72-87	Cobbly sandy clay loam, cobbly clay loam, very cobbly clay loam	CL, GC, SC	A-2, A-7, A-6	0-1	20-60	50-90	40-85	20-65	15-60	25-50	10-25
EcC, EcD, EcE, EcF: Evard-----	0-3	Loam	ML	A-4	0	0-5	90-100	90-100	85-95	60-75	0-35	NP-9
	3-28	Clay loam, sandy clay loam	SM, SC, ML, CL	A-2, A-4, A-7-6, A-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	28-55	Loam, sandy loam, sandy clay loam	CL, ML, SC, SM	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	0-25	NP-9
	55-62	Loam, sandy loam, loamy sand	SC-SM, SM	A-2-4, A-4	0	0-15	75-100	70-100	60-90	15-50	0-14	NP
Cowee-----	0-2	Loam	SM, SC-SM, ML	A-2, A-2-4, A-4, A-5	0-2	0-5	90-100	85-100	60-85	30-55	26-41	NP-12
	2-36	Clay loam, gravelly sandy clay loam, gravelly loam	CL, SC	A-7, A-6, A-4, A-2	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	36-62	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
FeC2, FeD2, FeE2: Fannin-----	0-2	Sandy clay loam	SM, ML, MH	A-6, A-4, A-2, A-7	0-2	0-10	90-100	85-100	70-100	30-80	30-55	5-25
	2-31	Sandy clay loam, clay loam, loam	SM, MH, ML	A-4, A-7, A-6	0	2-10	97-100	90-100	67-95	40-85	30-55	5-25
	31-79	Fine sandy loam, sandy loam, loam	SM, ML	A-5, A-4, A-2	0	0-14	75-100	70-98	60-90	15-70	30-50	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
HaD, HaE: Harmiller---	0-4	Sandy loam	ML, CL, SC, SM	A-4, A-2-4	0-1	0-5	85-100	80-100	65-85	30-75	15-30	NP-10
	4-22	Sandy clay loam, loam, channery loam	SM, SC-SM, ML	A-6, A-5, A-4, A-7	0-1	0-15	70-100	60-100	55-95	40-85	35-50	9-20
	22-31	Gravelly loamy sand, gravelly sandy loam, sandy loam	SM, GM, SC	A-2-4, A-4	0-1	0-25	60-100	40-90	30-80	20-49	15-25	NP-10
	31-61	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Shinbone----	0-4	Sandy loam	CL, ML, SC, SM	A-2-4, A-4	0-1	0-5	85-100	80-100	65-85	30-75	20-30	NP-10
	4-17	Channery loam, channery sandy clay loam, loam	CL, ML, SC, SM	A-4, A-5, A-6	0-1	5-15	70-95	60-95	55-85	35-80	25-50	5-20
	17-45	Channery sandy loam, channery fine sandy loam, channery loam	SM, ML, CL, SC	A-2-4, A-4	0-1	5-15	70-100	55-99	40-90	30-70	20-30	NP-10
	45-62	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
HnD, HuE, HuF: Huntsdale---	0-9	Silty clay loam	CL-ML, ML, CL	A-4, A-6	0-2	0-5	85-100	75-100	65-95	55-95	25-50	5-20
	9-58	Silt loam, clay loam, loam	CL, ML, SM, SC	A-4, A-6	0-2	0-5	90-100	85-100	75-90	40-85	25-40	NP-15
	58-80	Fine sandy loam, sandy loam, loam	CL, SM, SC, ML	A-4	0-2	0-5	90-100	80-100	60-90	35-75	15-35	NP-10

Table 17.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
KcD: Keener-----	0-5	Loam	SM, SC-SM, ML, CL-ML	A-4	0	0-5	96-100	86-98	68-98	40-80	0-25	NP-7
	5-55	Clay loam, loam	ML, CL-ML, CL	A-4	0	5-35	95-100	95-100	70-100	55-85	18-30	3-10
	55-62	Sandy clay loam, cobbly clay loam	ML, SM, SC-SM, SC, CL-ML	A-4	0	5-35	95-100	95-100	70-100	40-70	18-30	3-10
Lostcove----	0-3	Cobbly loam	SC-SM, SC, GM, SM	A-1, A-4, A-2-4	0-5	5-30	65-85	55-75	30-60	20-40	20-30	NP-10
	3-6	Cobbly loam, very gravelly fine sandy loam, very cobbly loam	GM, SM, GC-GM, SC-SM	A-2, A-1, A-4	0-5	5-50	50-80	40-80	30-70	20-52	20-30	NP-10
	6-43	Very cobbly sandy clay loam, very cobbly loam, very gravelly clay loam	SM, GM, GC-GM, GC	A-6, A-7-6, A-4, A-2-6	0-5	10-50	23-72	22-60	19-50	15-40	20-50	7-20
	43-62	Very cobbly sandy loam, very gravelly sandy loam, very gravelly sandy clay loam	SM, GM, GC-GM	A-1-b, A-2, A-4	0-5	10-50	35-72	35-60	20-50	10-40	20-40	NP-10
PeD, PeE: Pigeonroost-	0-3	Loam	ML, CL, SM, SC	A-2, A-4	0-1	0-15	90-100	85-100	60-90	30-75	20-30	NP-10
	3-26	Loam, sandy clay loam, gravelly sandy clay loam	SC, SM, ML, CL	A-6, A-4	0-1	0-15	85-100	70-100	65-90	40-80	25-40	7-14
	26-37	Sandy loam, loam, gravelly sandy loam	CL, ML, SC, SM	A-4, A-2	0-1	0-15	85-100	65-100	65-95	30-75	20-30	NP-10
	37-79	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
PeD, PeE: Edneytown----	0-4	Sandy loam	SC-SM, SM	A-4, A-2-4	0-1	0-2	95-100	90-100	60-70	30-40	0-25	NP-7
	4-37	Sandy clay loam, clay loam	CL, CL-ML, SC	A-6, A-4	0	0	98-100	95-100	80-97	45-75	25-35	5-15
	37-62	Sandy loam, loam	ML, SM, SC-SM	A-2-4, A-4	0	0-15	98-100	95-100	65-85	30-55	0-25	NP-9
PtD, PtE, PtF: Plott-----	0-16	Loam	MH, ML, SM	A-5, A-4, A-2	0-2	0-5	90-100	80-99	50-85	25-70	30-67	NP-7
	16-43	Loam, fine sandy loam, sandy loam	ML, SC-SM, SM	A-2, A-5, A-4	0-2	0-5	90-100	80-95	50-85	20-70	25-44	NP-10
	43-62	Loamy sand, gravelly fine sandy loam, cobbly sandy loam	GM, SC-SM, SM, SP-SM	A-1-b, A-2-4	0-5	5-15	58-92	56-89	20-72	10-30	25-36	NP-7
ROA: Rosman-----	0-10	Fine sandy loam	ML, SC-SM, SM	A-4, A-2-5, A-2-4	0	0	95-100	90-100	75-100	30-60	15-41	NP-7
	10-62	Fine sandy loam, sandy loam, loam	ML, SC-SM, SM	A-2-4, A-4	0	0	95-100	90-100	75-100	30-85	15-39	NP-8
SaB, ScC: Saunook-----	0-10	Silt loam	MH, ML	A-5, A-7-5	0	0-5	90-100	85-100	65-100	50-85	40-65	NP-20
	10-38	Silt loam, loam, clay loam	MH, ML	A-5, A-7, A-4, A-6	0-2	0-5	85-100	80-99	65-95	50-85	30-55	5-25
	38-50	Gravelly loam, gravelly silt loam, cobbly sandy loam	MH, ML, SM	A-7, A-6, A-5, A-4	0-5	2-15	65-95	50-90	45-85	35-70	30-55	NP-20
	50-99	Very cobbly sandy loam, cobbly loam, gravelly silt loam	GM, SC-SM, SM	A-1-b, A-2-5, A-2-4	0-15	5-20	45-75	30-65	25-60	15-49	25-50	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
SdD, SdE: Saunook-----	0-10	Silt loam	ML, MH	A-5, A-7-5	0	0-5	90-100	85-100	65-100	50-85	40-65	NP-20
	10-38	Silt loam, loam, clay loam	ML, MH	A-5, A-7, A-4, A-6	0-2	0-5	85-100	80-99	65-95	50-85	30-55	5-25
	38-50	Gravelly loam, gravelly silt loam, cobbly sandy loam	MH, ML, SM	A-4, A-5, A-6, A-7	0-5	2-15	65-95	50-90	45-85	35-70	30-55	NP-20
	50-99	Very cobbly sandy loam, cobbly loam, gravelly silt loam	GM, SC-SM, SM	A-2-4, A-2-5, A-1-b	0-15	5-20	45-75	30-65	25-60	15-49	25-50	NP-10
Thunder-----	0-8	Cobbly loam	GC-GM, SC, SC-SM	A-2, A-4	0-5	15-35	60-75	55-65	40-50	20-40	25-35	6-15
	8-21	Very cobbly loam, extremely cobbly loam, extremely cobbly sandy clay loam	GC-GM, SC, SC-SM	A-6, A-2, A-4	3-50	0-72	65-75	55-65	40-50	20-40	25-35	6-15
	21-52	Very cobbly sandy clay loam, extremely cobbly sandy clay loam	GC-GM, SC, SC-SM	A-2-6, A-6	3-50	0-72	65-75	55-65	40-50	20-40	35-45	15-25
	52-80	Extremely cobbly loamy sand, very cobbly coarse sandy loam	GC-GM, SC, SC-SM	A-1-b	3-50	0-72	40-60	30-45	25-35	15-20	0-30	NP-10

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
SrF: Sylco-----	0-5	Very channery loam	GC-GM, GC, SC	A-1-b, A-2-4, A-4	0-2	0-7	50-75	30-55	25-55	20-50	0-30	4-10
	5-22	Very channery loam, flaggy loam, very channery silty clay loam	SC-SM, GC, GC-GM, CL-ML, CL	A-1-b, A-2-4, A-4	0-2	6-20	55-85	30-80	25-75	20-70	20-30	5-10
	22-39	Very flaggy loam, very channery silt loam, very flaggy silty clay loam	SC, SC-SM, GC-GM, GC	A-4, A-2-4, A-1-b	0-2	15-45	35-70	30-65	25-55	20-45	20-30	5-10
	39-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Rock outcrop	0-60	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
SsD: Sylco-----	0-5	Very channery loam	GC, GC-GM, SC	A-1-b, A-2-4, A-4	0-2	0-7	50-75	30-55	25-55	20-50	0-30	4-10
	5-22	Very channery loam, flaggy loam, very channery silty clay loam	CL, CL-ML, GC, GC-GM, SC-SM	A-1-b, A-4, A-2-4	0-2	6-20	55-85	30-80	25-75	20-70	20-30	5-10
	22-39	Very flaggy loam, very channery silt loam, very flaggy silty clay loam	SC-SM, GC-GM, GC, SC	A-4, A-2-4, A-1-b	0-2	15-45	35-70	30-65	25-55	20-45	20-30	5-10
	39-50	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---
Soco-----	0-4	Fine sandy loam	ML, MH, SM	A-5, A-4	0-2	0-5	85-100	80-100	65-90	36-75	30-55	NP-7
	4-26	Loam, fine sandy loam, silt loam	SM, ML, SC-SM	A-4, A-6	0-2	0-5	85-100	80-100	65-92	36-77	25-40	NP-11
	26-34	Cobbly fine sandy loam, channery loam, channery fine sandy loam	ML, SC-SM, SM	A-6, A-4	0-5	5-15	70-95	55-91	40-91	35-65	25-40	NP-11
	34-62	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 17.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
StE, StF: Soco-----	0-4	Fine sandy loam	SM, MH, ML	A-5, A-4	0-2	0-5	85-100	80-100	65-90	36-75	30-55	NP-7
	4-26	Loam, fine sandy loam, silt loam	SM, SC-SM, ML	A-6, A-4	0-2	0-5	85-100	80-100	65-92	36-77	25-40	NP-11
	26-34	Cobbly fine sandy loam, channery loam, channery fine sandy loam	SC-SM, ML, SM	A-4, A-6	0-5	5-15	70-95	55-91	40-91	35-65	25-40	NP-11
	34-62	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Stecoah-----	0-5	Fine sandy loam	ML, MH, SM	A-5, A-4	0-2	0-5	85-100	80-100	65-90	36-75	30-55	NP-7
	5-31	Fine sandy loam, loam, channery loam	ML, SC-SM, SM	A-6, A-4	0-2	0-15	70-100	55-100	40-94	36-77	25-40	NP-12
	31-50	Channery fine sandy loam, channery loam, loam	SC-SM, SM, ML	A-4	0-5	5-15	70-100	55-100	40-91	35-69	24-40	NP-10
	50-62	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
TbD, TbE: Tanasee-----	0-13	Loam	MH, ML, SM	A-4, A-5, A-2-4	0-1	0-5	90-100	80-95	50-85	25-60	30-60	NP-7
	13-70	Gravelly sandy loam, gravelly fine sandy loam, loam	ML, SC-SM, SM	A-1, A-2-4, A-4, A-5	0-5	0-15	70-100	60-95	30-85	20-60	25-50	NP-7
	70-92	Gravelly coarse sandy loam, gravelly loamy coarse sand, gravelly sandy loam	SC-SM, SM	A-1-b, A-2-4	0-5	5-10	70-85	60-75	20-50	10-30	20-40	NP-7

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
TbD, TbE: Balsam-----	0-13	Sandy loam, gravelly fine sandy loam	SM	A-1-b, A-2-7, A-5, A-2-5	5-20	15-37	75-91	70-85	30-75	20-49	41-88	NP-18
	13-27	Very gravelly loamy coarse sand, very cobbly sandy loam, very gravelly sandy loam	GM, SM	A-1-b, A-2-4	5-40	15-45	51-85	45-75	34-60	15-35	15-40	NP-7
	27-74	Very gravelly sandy loam, extremely gravelly sandy loam, extremely gravelly coarse sandy loam	SM, GM	A-1-b, A-2-4	5-40	15-45	51-85	45-75	34-60	15-35	15-40	NP-7
	74-90	Very gravelly loamy coarse sand, cobbly coarse sandy loam, very cobbly loam	GM, SP-SM, GP-GM, SM	A-3, A-2-4, A-1-b	5-40	15-45	33-85	23-75	14-60	5-25	15-30	NP-7

Table 17.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
TsB, TsC, TsD, TsE: Thunder----	0-8	Cobbly loam	SC-SM, GC-GM, SC	A-2, A-4	0-5	15-35	60-75	55-65	40-50	20-40	25-35	6-15
	8-21	Very cobbly loam, extremely cobbly loam, extremely cobbly sandy clay loam	SC, GC-GM, SC-SM	A-6, A-2, A-4	3-50	0-72	65-75	55-65	40-50	20-40	25-35	6-15
	21-52	Very cobbly sandy clay loam, extremely cobbly sandy clay loam	GC-GM, SC, SC-SM	A-6, A-2-6	3-50	0-72	65-75	55-65	40-50	20-40	35-45	15-25
	52-80	Extremely cobbly loamy sand, very cobbly coarse sandy loam	GC-GM, SC, SC-SM	A-1-b	3-50	0-72	40-60	30-45	25-35	15-20	0-30	NP-10
Saunook----	0-10	Silt loam	ML, MH	A-5, A-7-5	0	0-5	90-100	85-100	65-100	50-85	40-65	NP-20
	10-38	Silt loam, loam, clay loam	ML, MH	A-5, A-6, A-7, A-4	0-2	0-5	85-100	80-99	65-95	50-85	30-55	5-25
	38-50	Gravelly loam, gravelly silt loam, cobbly sandy loam	SM, MH, ML	A-4, A-5, A-7, A-6	0-5	2-15	65-95	50-90	45-85	35-70	30-55	NP-20
	50-99	Very cobbly sandy loam, cobbly loam, gravelly silt loam	SM, SC-SM, GM	A-1-b, A-2-4, A-2-5	0-15	5-20	45-75	30-65	25-60	15-49	25-50	NP-10
Ud, Un: Udorthents--	0-60	Sandy loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6, A-7	---	0-3	95-100	90-100	70-98	30-90	20-45	4-25
Ur: Urban land--	0-6	Variable	GP	A-1-a	---	---	---	---	---	---	0-14	---

Table 17.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
W. Water												
WgC, WgD, WgE:												
Watauga----	0-5	Sandy loam	SM, SC-SM, SC	A-2-4, A-4	0-2	0-15	90-100	85-98	50-75	25-49	15-35	NP-10
	5-58	Sandy clay loam, clay loam, loam	CL, SC, SM, ML	A-7, A-6	0	0-15	85-100	85-98	75-95	40-75	30-65	12-25
	58-87	Coarse sandy loam, sandy loam, loam	SM	A-4, A-2-4	0	0-14	75-100	70-98	60-90	15-50	15-40	NP-12
	87-99	Loamy coarse sand, loamy sand	SC-SM, SP-SM, SM	A-2-4	0	0-5	95-100	90-100	55-95	5-35	10-20	NP-5
WhD, WyE, WyF:												
Wayah-----	0-18	Clay loam	CL, MH, ML	A-7, A-6	0-2	0-5	90-100	90-100	65-95	60-80	35-55	12-25
	18-77	Sandy loam, loam, gravelly fine sandy loam	SM, ML, GM, SC-SM	A-1-b, A-2-4, A-4	0-5	3-15	53-100	50-100	30-90	20-55	25-40	NP-10
	77-86	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Burton-----	0-18	Gravelly sandy loam, gravelly loam	SM, GM	A-2-4, A-4, A-5, A-1-b	2-10	5-15	65-90	60-75	30-65	20-49	30-50	NP-7
	18-30	Gravelly loam, cobbly sandy loam, cobbly loam	SM, SC-SM	A-4, A-2	0-5	5-15	73-100	70-95	57-95	25-49	25-35	NP-7
	30-41	Unweathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 18.--Physical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	Pct	Pct					
<b>AcF:</b>												
Ashe-----	0-6	6-20	1.35-1.65	14.00-42.00	0.10-0.12	0.0-2.9	1.0-8.0	.15	.24	2	5	56
	6-32	6-20	1.45-1.65	14.00-42.00	0.08-0.12	0.0-2.9	0.0-1.0	.17	.24			
	32-43	---	---	0.00-0.07	0.00-0.00	---	---	---	---			
Cleveland----	0-14	6-20	1.20-1.50	14.00-42.00	0.05-0.10	0.0-2.9	0.5-8.0	.17	.28	1	8	0
	14-25	---	---	0.00-0.07	0.00-0.01	---	---	---	---			
Rock outcrop.												
<b>BaD, BaE:</b>												
Balsam-----	0-13	6-20	0.50-1.00	14.00-42.00	0.20-0.25	0.0-2.9	8.0-20	.10	.20	5	8	0
	13-27	4-20	1.00-1.50	14.00-42.00	0.06-0.10	0.0-2.9	1.0-5.0	.05	.17			
	27-74	4-20	1.00-1.50	14.00-42.00	0.06-0.10	0.0-2.9	0.5-2.0	.05	.17			
	74-90	2-15	1.20-1.60	14.00-42.00	0.04-0.09	0.0-2.9	0.5-1.0	.05	.20			
<b>BdA:</b>												
Bandana-----	0-8	10-20	1.30-1.50	14.00-42.00	0.12-0.18	0.0-2.9	3.0-8.0	.20	.20	4	3	86
	8-37	5-20	1.30-1.50	14.00-42.00	0.10-0.16	0.0-2.9	0.0-1.0	.17	.20			
	37-62	1-5	1.40-1.60	42.00-141.00	0.02-0.05	0.0-2.9	0.0-2.0	.05	.10			
<b>BmA:</b>												
Biltmore-----	0-10	0-9	1.20-1.65	42.00-141.00	0.07-0.11	0.0-2.9	0.5-2.0	.10	.10	5	2	134
	10-62	0-12	1.20-1.70	42.00-141.00	0.06-0.10	0.0-2.9	0.0-0.5	.10	.10			
<b>BtD, BtE, BtF:</b>												
Buladean-----	0-3	12-27	1.30-1.65	14.00-42.00	0.14-0.20	0.0-2.9	1.0-8.0	.20	.20	4	5	56
	3-26	5-20	1.30-1.65	14.00-42.00	0.12-0.18	0.0-2.9	0.0-2.0	.20	.20			
	26-50	2-18	1.45-1.75	14.00-42.00	0.07-0.14	0.0-2.9	0.0-0.5	.15	.15			
	50-86	---	---	0.00-14.00	0.00-0.01	---	---	---	---			
Chestnut-----	0-2	5-20	1.35-1.60	14.00-42.00	0.10-0.15	0.0-2.9	1.0-8.0	.24	.24	3	5	56
	2-27	5-20	1.35-1.60	14.00-42.00	0.08-0.12	0.0-2.9	0.0-2.0	.15	.24			
	27-80	---	---	0.00-14.00	0.00-0.01	---	---	---	---			
<b>ByC:</b>												
Burton-----	0-18	5-20	1.10-1.30	14.00-42.00	0.13-0.18	0.0-2.9	8.0-20	.15	.24	2	5	56
	18-30	5-20	1.35-1.60	14.00-42.00	0.10-0.15	0.0-2.9	1.0-5.0	.15	.24			
	30-41	---	---	0.00-0.07	0.00-0.01	---	---	---	---			
Craggy-----	0-17	8-27	1.10-1.30	14.00-42.00	0.10-0.15	0.0-2.9	8.0-20	.15	.20	1	5	56
	17-28	---	---	0.00-0.07	0.00-0.01	---	---	---	---			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	Pct	Pct					
CaD, CaE, CaF: Cashiers-----	0-9	5-20	1.30-1.50	14.00-42.00	0.14-0.20	0.0-2.9	6.0-14	.32	.32	4	3	86
	9-68	5-20	1.30-1.50	14.00-42.00	0.13-0.18	0.0-2.9	0.0-0.5	.32	.32			
	68-75	5-18	1.30-1.50	14.00-42.00	0.10-0.14	0.0-2.9	0.0-0.5	.32	.32			
CdB, CdC: Chandler-----	0-3	5-18	1.30-1.50	14.00-42.00	0.12-0.18	0.0-2.9	1.0-8.0	.32	.32	3	3	86
	3-26	5-20	1.30-1.50	14.00-42.00	0.11-0.15	0.0-2.9	0.0-0.5	.32	.32			
	26-70	5-18	1.30-1.50	14.00-42.00	0.10-0.14	0.0-2.9	0.0-0.5	.28	.28			
CeD, CeE, CeF: Chandler-----	0-3	5-18	1.30-1.50	14.00-42.00	0.12-0.18	0.0-2.9	1.0-8.0	.32	.32	3	3	86
	3-26	5-20	1.30-1.50	14.00-42.00	0.11-0.15	0.0-2.9	0.0-0.5	.32	.32			
	26-70	5-18	1.30-1.50	14.00-42.00	0.10-0.14	0.0-2.9	0.0-0.5	.28	.28			
Micaville-----	0-3	5-20	1.00-1.40	14.00-42.00	0.10-0.16	0.0-2.9	1.0-8.0	.24	.32	3	3	86
	3-37	5-20	1.20-1.60	14.00-42.00	0.10-0.14	0.0-2.9	0.0-0.5	.28	.32			
	37-51	2-18	1.20-1.80	14.00-42.00	0.10-0.14	0.0-2.9	0.0-0.5	.28	.32			
	51-61	---	---	0.00-14.00	0.00-0.01	---	---	---	---			
CfD, ChE, ChF: Cheoah-----	0-12	7-22	1.35-1.60	14.00-42.00	0.12-0.18	0.0-2.9	6.0-14	.15	.24	4	5	56
	12-46	5-20	1.35-1.60	14.00-42.00	0.11-0.17	0.0-2.9	0.0-0.5	.20	.32			
	46-60	---	---	1.40-4.00	0.00-0.10	---	---	---	---			
CnC2, CnD2, CnE2: Clifton-----	0-10	27-40	1.25-1.35	4.00-14.00	0.15-0.20	0.0-2.9	0.5-4.0	.28	.28	3	5	56
	10-34	35-55	1.20-1.60	4.00-14.00	0.15-0.20	0.0-2.9	0.0-0.5	.28	.28			
	34-79	5-27	1.20-1.35	14.00-42.00	0.11-0.15	0.0-2.9	0.0-0.5	.28	.28			
CsD: Cullasaja-----	0-18	5-20	0.50-1.20	14.00-42.00	0.10-0.16	0.0-2.9	4.0-18	.10	.20	5	8	0
	18-60	5-20	1.00-1.60	14.00-42.00	0.07-0.10	0.0-2.9	0.5-2.0	.05	.17			
DeA: Dellwood-----	0-12	5-18	1.30-1.50	14.00-42.00	0.10-0.15	0.0-2.9	3.0-8.0	.20	.20	3	3	86
	12-26	1-12	1.40-1.60	42.00-141.00	0.02-0.05	0.0-2.9	0.5-2.0	.05	.10			
	26-71	1-4	1.40-1.60	42.00-141.00	0.02-0.05	0.0-2.9	0.0-1.0	.05	.10			
Reddies-----	0-12	5-18	1.30-1.50	14.00-42.00	0.10-0.18	0.0-2.9	3.0-8.0	.20	.20	4	3	86
	12-31	5-16	1.35-1.55	14.00-42.00	0.08-0.15	0.0-2.9	0.5-1.0	.10	.20			
	31-79	1-5	1.40-1.60	42.00-141.00	0.02-0.05	0.0-2.9	0.0-0.5	.05	.15			

Table 18.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	Pct	Pct					
DoB, DrC, DrD, DsC:												
Dillsboro----	0-13	27-35	1.20-1.60	4.00-14.00	0.17-0.19	0.0-2.9	2.0-8.0	.24	.24	4	5	56
	13-72	35-60	1.20-1.60	4.00-14.00	0.17-0.19	3.0-5.9	0.0-1.0	.28	.28			
	72-87	20-35	1.20-1.60	4.00-14.00	0.08-0.14	0.0-2.9	0.0-0.5	.10	.24			
EcC, EcD, EdE, EdF:												
Evard-----	0-3	7-25	1.30-1.50	4.00-14.00	0.15-0.20	0.0-2.9	1.0-8.0	.28	.28	5	3	86
	3-28	18-35	1.30-1.50	4.00-14.00	0.12-0.16	0.0-2.9	0.0-0.5	.24	.24			
	28-55	12-30	1.20-1.40	4.00-14.00	0.10-0.25	0.0-2.9	0.0-0.5	.24	.24			
	55-62	5-20	1.20-1.40	4.00-14.00	0.08-0.12	0.0-2.9	0.0-0.5	.24	.24			
Cowee-----	0-2	8-25	1.25-1.60	14.00-42.00	0.12-0.20	0.0-2.9	1.0-8.0	.28	.28	3	5	56
	2-36	18-35	1.30-1.60	4.00-14.00	0.12-0.18	0.0-2.9	0.5-1.0	.24	.28			
	36-62	---	---	0.00-14.00	0.00-0.01	---	---	---	---			
FeC2, FeD2, FeE2:												
Fannin-----	0-2	20-35	1.30-1.50	4.00-14.00	0.12-0.18	0.0-2.9	0.5-4.0	.28	.28	3	5	56
	2-31	18-35	1.30-1.50	4.00-14.00	0.11-0.17	0.0-2.9	0.0-1.0	.32	.32			
	31-79	5-25	1.30-1.50	4.00-14.00	0.08-0.12	0.0-2.9	0.0-0.5	.32	.32			
HaD, HaE:												
Harmiller----	0-4	5-18	1.20-1.40	14.00-42.00	0.12-0.18	0.0-2.9	1.0-8.0	.24	.24	3	5	56
	4-22	18-30	1.40-1.80	4.00-14.00	0.12-0.18	0.0-2.9	0.0-0.5	.28	.28			
	22-31	2-18	1.40-1.80	4.00-14.00	0.10-0.16	0.0-2.9	0.0-0.5	.10	.20			
	31-61	---	---	0.00-14.00	0.00-0.01	---	---	---	---			
Shinbone-----	0-4	5-18	1.40-1.60	14.00-42.00	0.12-0.18	0.0-2.9	1.0-8.0	.24	.24	4	5	56
	4-17	18-30	1.40-1.65	4.00-14.00	0.12-0.18	0.0-2.9	0.0-1.0	.17	.28			
	17-45	5-20	1.40-1.85	4.00-14.00	0.10-0.15	0.0-2.9	0.0-0.5	.20	.24			
	45-62	---	---	0.00-14.00	0.00-0.01	---	---	---	---			
HnD, HuE, HuF:												
Huntsdale-----	0-9	27-40	1.30-1.50	14.00-42.00	0.12-0.16	0.0-2.9	4.0-12	.28	.28	5	6	48
	9-58	18-35	1.30-1.50	4.00-14.00	0.12-0.18	0.0-2.9	0.0-0.5	.24	.24			
	58-80	2-22	1.35-1.60	4.00-14.00	0.12-0.18	0.0-2.9	0.0-0.5	.20	.20			
KcD:												
Keener-----	0-5	5-25	1.35-1.60	14.00-42.00	0.14-0.18	0.0-2.9	4.0-10	.24	.24	5	---	---
	5-55	10-35	1.30-1.45	4.00-14.00	0.10-0.15	0.0-2.9	0.5-1.0	.20	.24			
	55-62	10-35	1.30-1.45	14.00-42.00	0.08-0.12	0.0-2.9	0.5-1.0	.20	.24			
Lostcove-----	0-3	7-25	1.30-1.50	14.00-42.00	0.13-0.19	0.0-2.9	4.0-10	.10	.24	5	8	0
	3-6	7-27	1.30-1.50	14.00-42.00	0.08-0.12	0.0-2.9	0.0-1.0	.10	.28			
	6-43	18-35	1.30-1.65	4.00-14.00	0.04-0.09	0.0-2.9	0.0-1.0	.10	.28			
	43-62	7-35	1.30-1.65	4.00-14.00	0.05-0.10	0.0-2.9	0.0-0.5	.10	.28			

Table 18.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	Pct	Pct					
PeD, PeE: Pigeonroost---	0-3	8-25	1.35-1.60	14.00-42.00	0.14-0.20	0.0-2.9	1.0-8.0	.24	.24	3	5	56
	3-26	18-35	1.30-1.50	4.00-14.00	0.12-0.18	0.0-2.9	0.0-0.5	.28	.28			
	26-37	8-20	1.35-1.60	4.00-14.00	0.14-0.20	0.0-2.9	0.0-0.5	.24	.24			
	37-79	---	---	0.00-14.00	0.00-0.01	---	---	---	---			
Edneytown-----	0-4	8-20	1.40-1.60	14.00-42.00	0.10-0.14	0.0-2.9	1.0-8.0	.17	.17	5	3	86
	4-37	18-35	1.30-1.40	4.00-14.00	0.12-0.18	0.0-2.9	0.0-0.5	.24	.24			
	37-62	10-22	1.30-1.50	4.00-14.00	0.11-0.14	---	0.0-0.5	.24	.24			
PtD, PtE, PtF: Plott-----	0-16	7-25	1.00-1.20	14.00-42.00	0.18-0.28	0.0-2.9	6.0-14	.24	.24	5	5	56
	16-43	5-20	1.20-1.40	14.00-42.00	0.14-0.24	0.0-2.9	0.0-1.0	.24	.24			
	43-62	2-18	1.20-1.60	14.00-42.00	0.05-0.20	0.0-2.9	0.0-0.5	.15	.24			
RoA: Rosman-----	0-10	8-18	1.25-1.40	14.00-42.00	0.12-0.18	0.0-2.9	4.0-8.0	.24	.24	5	3	86
	10-62	4-18	1.25-1.50	14.00-42.00	0.10-0.18	0.0-2.9	0.5-2.0	.24	.24			
SaB, ScC: Saunook-----	0-10	12-27	1.00-1.40	4.00-14.00	0.14-0.20	0.0-2.9	6.0-14	.28	.28	5	6	48
	10-38	18-35	1.00-1.50	4.00-14.00	0.12-0.18	0.0-2.9	0.5-2.0	.24	.24			
	38-50	12-27	1.00-1.50	4.00-14.00	0.10-0.16	0.0-2.9	0.5-1.0	.20	.24			
	50-99	10-27	1.00-1.50	14.00-42.00	0.08-0.14	0.0-2.9	0.0-0.5	.15	.24			
SdD, SdE: Saunook-----	0-10	12-27	1.00-1.40	4.00-14.00	0.14-0.20	0.0-2.9	6.0-14	.28	.28	5	6	48
	10-38	18-35	1.00-1.50	4.00-14.00	0.12-0.18	0.0-2.9	0.5-2.0	.24	.24			
	38-50	12-27	1.00-1.50	4.00-14.00	0.10-0.16	0.0-2.9	0.5-1.0	.20	.24			
	50-99	10-27	1.00-1.50	14.00-42.00	0.08-0.14	0.0-2.9	0.0-0.5	.15	.24			
Thunder-----	0-8	15-27	1.40-1.60	14.00-42.00	0.08-0.10	0.0-2.9	6.0-14	.05	.17	5	8	0
	8-21	15-35	1.40-1.60	4.00-14.00	0.08-0.12	0.0-2.9	0.0-0.5	.05	.17			
	21-52	25-40	1.40-1.60	4.00-14.00	0.08-0.12	3.0-5.9	0.0-0.5	.05	.17			
	52-80	5-20	1.50-1.70	14.00-42.00	0.04-0.08	0.0-2.9	0.0-0.5	.05	.17			
SrF: Sylco-----	0-5	15-25	1.00-1.20	4.00-14.00	0.11-0.16	0.0-2.9	1.0-8.0	.20	.28	2	8	0
	5-22	15-35	1.30-1.50	4.00-14.00	0.10-0.15	0.0-2.9	0.5-1.0	.20	.28			
	22-39	15-35	1.20-1.50	4.00-14.00	0.05-0.10	0.0-2.9	0.5-1.0	.15	.28			
	39-50	---	---	0.00-14.00	0.00-0.00	---	---	---	---			
Rock outcrop.												

Table 18.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	Pct	Pct					
SsD:												
Sylco-----	0-5	15-25	1.00-1.20	4.00-14.00	0.11-0.16	0.0-2.9	1.0-8.0	.20	.28	2	8	0
	5-22	15-35	1.30-1.50	4.00-14.00	0.10-0.15	0.0-2.9	0.5-1.0	.20	.28			
	22-39	15-35	1.20-1.50	4.00-14.00	0.05-0.10	0.0-2.9	0.5-1.0	.15	.28			
	39-50	---	---	0.00-14.00	0.00-0.00	---	---	---	---			
Soco-----	0-4	5-18	1.35-1.60	14.00-42.00	0.14-0.22	0.0-2.9	1.0-8.0	.28	.28	3	5	56
	4-26	5-20	1.35-1.60	14.00-42.00	0.12-0.20	0.0-2.9	0.5-1.0	.32	.32			
	26-34	5-18	1.40-1.65	14.00-42.00	0.09-0.15	0.0-2.9	0.0-0.5	.15	.24			
	34-62	---	---	1.40-4.00	0.00-0.01	---	---	---	---			
StE, StF:												
Soco-----	0-4	5-18	1.35-1.60	14.00-42.00	0.14-0.22	0.0-2.9	1.0-8.0	.28	.28	3	5	56
	4-26	5-20	1.35-1.60	14.00-42.00	0.12-0.20	0.0-2.9	0.5-1.0	.32	.32			
	26-34	5-18	1.40-1.65	14.00-42.00	0.09-0.15	0.0-2.9	0.0-0.5	.15	.24			
	34-62	---	---	1.40-4.00	0.00-0.01	---	---	---	---			
Stecoah-----	0-5	5-18	1.35-1.60	14.00-42.00	0.14-0.22	0.0-2.9	1.0-8.0	.28	.28	4	5	56
	5-31	5-20	1.35-1.60	14.00-42.00	0.10-0.17	0.0-2.9	0.5-1.0	.28	.32			
	31-50	5-18	1.40-1.65	14.00-42.00	0.10-0.15	0.0-2.9	0.0-0.5	.15	.24			
	50-62	---	---	1.40-4.00	0.00-0.01	---	---	---	---			
TbD, TbE:												
Tanasee-----	0-13	7-25	1.10-1.30	14.00-42.00	0.16-0.22	0.0-2.9	8.0-20	.24	.24	5	3	86
	13-70	5-18	1.35-1.60	14.00-42.00	0.10-0.16	0.0-2.9	1.0-3.0	.15	.24			
	70-92	1-6	1.40-1.65	14.00-42.00	0.05-0.09	0.0-2.9	0.5-1.0	.10	.20			
Balsam-----	0-13	6-20	0.50-1.00	14.00-42.00	0.20-0.25	0.0-2.9	8.0-20	.10	.20	5	8	0
	13-27	4-20	1.00-1.50	14.00-42.00	0.06-0.10	0.0-2.9	1.0-5.0	.05	.17			
	27-74	4-20	1.00-1.50	14.00-42.00	0.06-0.10	0.0-2.9	0.5-2.0	.05	.17			
	74-90	2-15	1.20-1.60	14.00-42.00	0.04-0.09	0.0-2.9	0.5-1.0	.05	.20			
TsB, TsC, TsD, TsE:												
Thunder-----	0-8	15-27	1.40-1.60	14.00-42.00	0.08-0.10	0.0-2.9	6.0-14	.05	.17	5	8	0
	8-21	15-35	1.40-1.60	4.00-14.00	0.08-0.12	0.0-2.9	0.0-0.5	.05	.17			
	21-52	25-40	1.40-1.60	4.00-14.00	0.08-0.12	3.0-5.9	0.0-0.5	.05	.17			
	52-80	5-20	1.50-1.70	14.00-42.00	0.04-0.08	0.0-2.9	0.0-0.5	.05	.17			
Saunook-----	0-10	12-27	1.00-1.40	4.00-14.00	0.14-0.20	0.0-2.9	6.0-14	.28	.28	5	6	48
	10-38	18-35	1.00-1.50	4.00-14.00	0.12-0.18	0.0-2.9	0.5-2.0	.24	.24			
	38-50	12-27	1.00-1.50	4.00-14.00	0.10-0.16	0.0-2.9	0.5-1.0	.20	.24			
	50-99	10-27	1.00-1.50	14.00-42.00	0.08-0.14	0.0-2.9	0.0-0.5	.15	.24			

Table 18.—Physical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind erodi- bility group	Wind erodi- bility index
								Kw	Kf	T		
	In	Pct	g/cc	um/sec	In/in	Pct	Pct					
Ud, Un: Udorthents----	0-60	10-50	1.30-1.65	0.01-14.00	0.10-0.17	3.0-5.9	0.0-1.0	.28	.28	5	5	56
Ur. Urban land												
W. Water												
WgC, WgD, WgE: Watauga-----	0-5	5-20	1.35-1.55	14.00-42.00	0.12-0.16	0.0-2.9	1.0-8.0	.24	.24	3	3	86
	5-58	15-35	1.30-1.50	4.00-14.00	0.15-0.20	0.0-2.9	0.0-0.5	.32	.32			
	58-87	5-20	1.30-1.50	4.00-14.00	0.08-0.12	0.0-2.9	0.0-0.5	.32	.32			
	87-99	2-15	1.20-1.60	14.00-42.00	0.06-0.10	---	---	.15	.15			
WhD, WyE, WyF: Wayah-----	0-18	20-35	1.00-1.20	14.00-42.00	0.16-0.22	0.0-2.9	8.0-20	.28	.28	3	5	56
	18-77	5-20	1.20-1.60	14.00-42.00	0.09-0.13	0.0-2.9	0.5-2.0	.15	.24			
	77-86	---	---	0.00-14.00	0.00-0.01	---	---	---	---			
Burton-----	0-18	5-20	1.10-1.30	14.00-42.00	0.13-0.18	0.0-2.9	8.0-20	.15	.24	2	5	56
	18-30	5-20	1.35-1.60	14.00-42.00	0.10-0.15	0.0-2.9	1.0-5.0	.15	.24			
	30-41	---	---	0.00-0.07	0.00-0.01	---	---	---	---			

Table 19.—Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
<b>AcF:</b>				
Ashe-----	0-6	3.8-23	2.8-17	3.5-6.0
	6-32	1.5-7.2	1.1-5.4	3.5-6.0
	32-43	---	---	---
Cleveland-----	0-14	2.6-23	2.0-17	3.6-6.0
	14-25	---	---	---
Rock outcrop.				
<b>BaD, BaE:</b>				
Balsam-----	0-13	20-50	15-38	3.5-6.0
	13-27	3.2-16	2.4-12	3.5-6.0
	27-74	2.1-9.5	1.6-7.1	3.5-6.0
	74-90	1.6-6.0	1.2-4.5	3.5-6.0
<b>BdA:</b>				
Bandana-----	0-8	9.2-23	6.9-17	5.1-6.5
	8-37	1.2-7.2	0.9-5.4	5.1-6.5
	37-62	0.2-5.8	0.2-4.3	5.1-6.5
<b>BmA:</b>				
Biltmore-----	0-10	1.1-6.8	0.8-5.1	5.1-7.8
	10-62	0.0-4.1	0.0-3.1	5.1-7.8
<b>BtD, BtE, BtF:</b>				
Buladean-----	0-3	5.2-25	3.9-19	3.5-6.0
	3-26	1.2-9.5	0.9-7.1	3.5-6.0
	26-50	0.5-5.6	0.4-4.2	3.5-6.0
	50-86	---	---	---
Chestnut-----	0-2	3.5-23	2.6-17	3.5-6.0
	2-27	1.2-9.5	0.9-7.1	3.5-6.0
	27-80	---	---	---
<b>ByC:</b>				
Burton-----	0-18	19-50	14-38	3.5-6.0
	18-30	3.5-16	2.6-12	3.5-6.0
	30-41	---	---	---
Craggy-----	0-17	20-52	15-39	3.5-6.0
	17-28	---	---	---
<b>CaD, CaE, CaF:</b>				
Cashiers-----	0-9	15-36	11-27	3.6-6.0
	9-68	1.2-6.1	0.9-4.6	3.6-6.0
	68-75	1.2-5.6	0.9-4.2	3.6-6.0
<b>CdB, CdC:</b>				
Chandler-----	0-3	3.5-22	2.6-17	3.6-6.0
	3-26	1.2-6.1	0.9-4.6	3.6-6.0
	26-70	1.2-5.6	0.9-4.2	3.6-6.0

Table 19.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
		In meq/100 g	meq/100 g	pH
<b>CeD, CeE, CeF:</b>				
Chandler-----	0-3	3.5-22	2.6-17	3.6-6.0
	3-26	1.2-6.1	0.9-4.6	3.6-6.0
	26-70	1.2-5.6	0.9-4.2	3.6-6.0
<b>Micaville-----</b>	0-3	3.5-23	2.6-17	3.5-6.0
	3-37	1.2-6.1	0.9-4.6	3.5-6.0
	37-51	0.5-5.6	0.4-4.2	3.5-6.0
	51-61	---	---	---
<b>CfD, ChE, ChF:</b>				
Cheoah-----	0-12	15-37	11-28	3.5-5.5
	12-46	1.2-6.1	0.9-4.6	3.5-5.5
	46-60	---	---	---
<b>CnC2, CnD2, CnE2:</b>				
Clifton-----	0-10	7.9-19	5.9-14	4.5-6.5
	10-34	8.8-15	6.6-11	4.5-6.5
	34-79	1.2-7.9	0.9-5.9	4.5-6.5
<b>CsD:</b>				
Cullasaja-----	0-18	10-46	7.7-34	4.5-6.5
	18-60	2.4-9.5	1.8-7.1	4.5-6.0
<b>DeA:</b>				
Dellwood-----	0-12	8.0-22	6.0-17	4.5-7.3
	12-26	1.4-7.5	1.0-5.6	4.5-7.3
	26-71	0.2-3.2	0.2-2.4	4.5-7.3
<b>Reddies-----</b>	0-12	8.0-22	6.0-17	4.5-7.3
	12-31	2.4-6.2	1.8-4.7	4.5-7.3
	31-79	0.2-2.4	0.2-1.8	4.5-7.3
<b>DoB, DrC, DrD, DsC:</b>				
Dillsboro-----	0-13	11-27	8.4-20	4.5-6.0
	13-72	8.8-17	6.6-13	4.5-6.0
	72-87	5.0-9.9	3.8-7.4	4.5-6.0
<b>EcC, EcD, EdE, EdF:</b>				
Evard-----	0-3	4.0-24	3.0-18	4.5-6.0
	3-28	4.5-9.9	3.4-7.4	4.5-6.0
	28-55	3.0-8.6	2.2-6.5	4.5-6.0
	55-62	1.2-6.1	0.9-4.6	4.5-6.0
<b>Cowee-----</b>	0-2	4.2-24	3.2-18	3.5-6.0
	2-36	5.6-11	4.2-8.2	3.5-6.0
	36-62	---	---	---
<b>FeC2, FeD2, FeE2:</b>				
Fannin-----	0-2	6.1-18	4.6-13	3.6-6.5
	2-31	4.5-11	3.4-8.2	3.6-6.5
	31-79	1.2-7.4	0.9-5.5	3.6-6.5
<b>HaD, HaE:</b>				
Harmiller-----	0-4	3.5-22	2.6-17	3.5-6.0
	4-22	4.5-8.6	3.4-6.5	3.5-6.0
	22-31	0.5-5.6	0.4-4.2	3.5-6.0
	31-61	---	---	---

Table 19.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
		In	meq/100 g	meq/100 g
HaD, HaE: Shinbone-----	0-4	3.5-22	2.6-17	3.5-6.0
	4-17	4.5-9.8	3.4-7.3	3.5-6.0
	17-45	1.2-6.1	0.9-4.6	3.5-6.0
	45-62	---	---	---
HnD, HuE, HuF: Huntsdale-----	0-9	16-37	12-28	3.5-6.0
	9-58	4.5-9.9	3.4-7.4	3.5-6.0
	58-80	0.5-6.6	0.4-5.0	3.5-6.0
KcD: Keener-----	0-5	10-29	7.7-22	3.6-6.0
	5-55	3.6-11	2.7-8.2	3.6-6.0
	55-62	3.6-11	2.7-8.2	3.6-6.0
Lostcove-----	0-3	11-29	8.1-22	3.5-6.0
	3-6	1.8-9.0	1.3-6.8	3.5-6.0
	6-43	4.5-11	3.4-8.2	3.5-6.0
	43-62	1.8-9.9	1.3-7.4	3.5-6.0
PeD, PeE: Pigeonroost-----	0-3	4.2-24	3.2-18	3.5-6.0
	3-26	4.5-9.9	3.4-7.4	3.5-6.0
	26-37	2.0-6.1	1.5-4.6	3.5-6.0
	37-79	---	---	---
Edneytown-----	0-4	4.2-23	3.2-17	3.6-6.0
	4-37	4.5-9.9	3.4-7.4	3.6-6.0
	37-62	---	---	3.6-6.0
PtD, PtE, PtF: Plott-----	0-16	15-38	11-28	3.5-6.0
	16-43	1.2-7.2	0.9-5.4	4.5-6.0
	43-62	0.5-5.6	0.4-4.2	4.5-6.0
RoA: Rosman-----	0-10	11-22	8.2-17	5.1-6.5
	10-62	2.1-9.0	1.6-6.8	5.1-6.5
SaB, ScC: Saunook-----	0-10	16-38	12-29	4.5-6.5
	10-38	5.6-13	4.2-9.9	4.5-6.5
	38-50	4.1-9.0	3.1-6.8	4.5-6.5
	50-99	2.5-7.9	1.9-5.9	4.5-6.5
SdD, SdE: Saunook-----	0-10	16-38	12-29	4.5-6.5
	10-38	5.6-13	4.2-9.9	4.5-6.5
	38-50	4.1-9.0	3.1-6.8	4.5-6.5
	50-99	2.5-7.9	1.9-5.9	4.5-6.5
Thunder-----	0-8	17-38	13-29	4.5-6.5
	8-21	3.8-9.9	2.8-7.4	4.5-6.5
	21-52	6.2-11	4.7-8.3	4.5-6.5
	52-80	1.2-6.1	0.9-4.6	4.5-6.5

Table 19.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
		In	meq/100 g	meq/100 g
SrF:				
Sylco-----	0-5	6.0-24	4.5-18	3.6-5.5
	5-22	4.9-11	3.7-8.2	3.6-5.5
	22-39	4.9-11	3.7-8.2	3.6-5.5
	39-50	---	---	---
Rock outcrop.				
SsD:				
Sylco-----	0-5	6.0-24	4.5-18	3.6-5.5
	5-22	4.9-11	3.7-8.2	3.6-5.5
	22-39	4.9-11	3.7-8.2	3.6-5.5
	39-50	---	---	---
Soco-----	0-4	3.5-22	2.6-9.8	3.5-5.5
	4-26	2.4-7.2	1.8-5.4	3.5-5.5
	26-34	1.2-5.6	0.9-4.2	3.5-5.5
	34-62	---	---	---
StE, StF:				
Soco-----	0-4	3.5-22	2.6-17	3.5-5.5
	4-26	2.4-7.2	1.8-5.4	3.5-5.5
	26-34	1.2-5.6	0.9-4.2	3.5-5.5
	34-62	---	---	---
Stecoah-----	0-5	3.5-22	2.6-17	3.5-5.5
	5-31	2.4-7.2	1.8-5.4	3.5-5.5
	31-50	1.2-5.6	0.9-4.2	3.5-5.5
	50-62	---	---	---
TbD, TbE:				
Tanasee-----	0-13	20-51	15-38	3.6-5.5
	13-70	3.5-11	2.6-8.4	3.6-5.5
	70-92	1.4-3.8	1.0-2.8	3.6-5.5
Balsam-----	0-13	20-50	15-38	3.5-6.0
	13-27	3.2-16	2.4-12	3.5-6.0
	27-74	2.1-9.5	1.6-7.1	3.5-6.0
	74-90	1.6-6.0	1.2-4.5	3.5-6.0
TsB, TsC, TsD, TsE:				
Thunder-----	0-8	17-38	13-29	4.5-6.5
	8-21	3.8-9.9	2.8-7.4	4.5-6.5
	21-52	6.2-11	4.7-8.3	4.5-6.5
	52-80	1.2-6.1	0.9-4.6	4.5-6.5
Saunook-----	0-10	16-38	12-29	4.5-6.5
	10-38	5.6-13	4.2-9.9	4.5-6.5
	38-50	4.1-9.0	3.1-6.8	4.5-6.5
	50-99	2.5-7.9	1.9-5.9	4.5-6.5
Ud, Un:				
Udorthents-----	0-60	2.5-15	1.9-11	4.5-7.8
Ur.				
Urban land				
W.				
Water				

Table 19.—Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Effective cation- exchange capacity	Soil reaction
	In	meq/100 g	meq/100 g	pH
WgC, WgD, WgE: Watauga-----	0-5	3.5-23	2.6-17	3.6-6.0
	5-58	3.8-9.9	2.8-7.4	3.6-6.0
	58-87	1.2-6.1	0.9-4.6	3.6-6.0
	87-99	---	---	3.6-6.0
WhD, WyE, WyF: Wayah-----	0-18	23-54	17-40	3.5-5.5
	18-77	2.4-9.5	1.8-7.1	4.5-6.0
	77-86	---	---	---
Burton-----	0-18	19-50	14-38	3.5-6.0
	18-30	3.5-16	2.6-12	3.5-6.0
	30-41	---	---	---

Table 20.—Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Hydro-logic group	Month	Water table		Ponding		Flooding		
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
AcF: Ashe-----	B	Jan-Dec	---	---	---	---	None	---	None
Cleveland-----	C	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop-----	D	Jan-Dec	---	---	---	---	None	---	None
BaD, BaE: Balsam-----	B	Jan-Dec	---	---	---	---	None	---	None
BdA: Bandana-----	B	January	1.0-2.0	>6.0	---	---	None	Very brief	Occasional
		February	1.0-2.0	>6.0	---	---	None	Very brief	Occasional
		March	1.0-2.0	>6.0	---	---	None	Very brief	Occasional
		April	1.0-2.0	>6.0	---	---	None	Very brief	Occasional
		May	1.0-2.0	>6.0	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	---	---	---	---	None	Very brief	Occasional
		December	1.0-2.0	>6.0	---	---	None	Very brief	Occasional
BmA: Biltmore-----	A	January	3.5-6.0	>6.0	---	---	None	Very brief	Frequent
		February	3.5-6.0	>6.0	---	---	None	Very brief	Frequent
		March	3.5-6.0	>6.0	---	---	None	Very brief	Frequent
		April	3.5-6.0	>6.0	---	---	None	Very brief	Frequent
		May	3.5-6.0	>6.0	---	---	None	Very brief	Frequent
		June	---	---	---	---	None	Very brief	Frequent
		July	---	---	---	---	None	Very brief	Frequent
		August	---	---	---	---	None	Very brief	Frequent
		September	---	---	---	---	None	Very brief	Frequent
		October	---	---	---	---	None	Very brief	Frequent
		November	---	---	---	---	None	Very brief	Frequent
		December	3.5-6.0	>6.0	---	---	None	Very brief	Frequent

Table 20.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
BtD, BtE, BtF: Buladean-----	B	Jan-Dec	---	---	---	---	None	---	None
Chestnut-----	B	Jan-Dec	---	---	---	---	None	---	None
ByC: Burton-----	B	Jan-Dec	---	---	---	---	None	---	None
Craggy-----	D	Jan-Dec	---	---	---	---	None	---	None
CaD, CaE, CaF: Cashiers-----	B	Jan-Dec	---	---	---	---	None	---	None
CdB, CdC: Chandler-----	B	Jan-Dec	---	---	---	---	None	---	None
CeD, CeE, CeF: Chandler-----	B	Jan-Dec	---	---	---	---	None	---	None
Micaville-----	B	Jan-Dec	---	---	---	---	None	---	None
CfD, ChE, ChF: Cheoah-----	B	Jan-Dec	---	---	---	---	None	---	None
CnC2, CnD2, CnE2: Clifton-----	B	Jan-Dec	---	---	---	---	None	---	None
CsD: Cullasaja-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 20.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
DeA: Dellwood-----	A	January	2.0-4.0	>6.0	---	---	None	Very brief	Occasional
		February	2.0-4.0	>6.0	---	---	None	Very brief	Occasional
		March	2.0-4.0	>6.0	---	---	None	Very brief	Occasional
		April	2.0-4.0	>6.0	---	---	None	Very brief	Occasional
		May	2.0-4.0	>6.0	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	---	---	---	---	None	Very brief	Occasional
		December	2.0-4.0	>6.0	---	---	None	Very brief	Occasional
Reddies-----	B	January	2.0-3.5	>6.0	---	---	None	Very brief	Occasional
		February	2.0-3.5	>6.0	---	---	None	Very brief	Occasional
		March	2.0-3.5	>6.0	---	---	None	Very brief	Occasional
		April	2.0-3.5	>6.0	---	---	None	Very brief	Occasional
		May	2.0-3.5	>6.0	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	---	---	---	---	None	Very brief	Occasional
		December	2.0-3.5	>6.0	---	---	None	Very brief	Occasional
DoB, DrC, DrD: Dillsboro-----	B	Jan-Dec	---	---	---	---	None	---	None
DsC: Dillsboro-----	B	January	---	---	---	---	None	Very brief	Rare
		February	---	---	---	---	None	Very brief	Rare
		March	---	---	---	---	None	Very brief	Rare
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
		July	---	---	---	---	None	Very brief	Rare
		August	---	---	---	---	None	Very brief	Rare
		September	---	---	---	---	None	Very brief	Rare
		October	---	---	---	---	None	Very brief	Rare
		November	---	---	---	---	None	Very brief	Rare
		December	---	---	---	---	None	Very brief	Rare

Table 20.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
EcC, EcD, EdE, EdF: Evard-----	B	Jan-Dec	---	---	---	---	None	---	None
Cowee-----	B	Jan-Dec	---	---	---	---	None	---	None
FeC2, FeD2, FeE2: Fannin-----	B	Jan-Dec	---	---	---	---	None	---	None
HaD, HaE: Harmiller-----	B	Jan-Dec	---	---	---	---	None	---	None
Shinbone-----	B	Jan-Dec	---	---	---	---	None	---	None
HnD, HuE, HuF: Huntsdale-----	B	Jan-Dec	---	---	---	---	None	---	None
KcD: Keener-----	B	Jan-Dec	---	---	---	---	None	---	None
Lostcove-----	B	January	5.0-6.0	>6.0	---	---	None	---	None
		February	5.0-6.0	>6.0	---	---	None	---	None
		March	5.0-6.0	>6.0	---	---	None	---	None
		April	5.0-6.0	>6.0	---	---	None	---	None
		May	5.0-6.0	>6.0	---	---	None	---	None
		December	5.0-6.0	>6.0	---	---	None	---	None
PeD, PeE: Pigeonroost-----	B	Jan-Dec	---	---	---	---	None	---	None
Edneytown-----	B	Jan-Dec	---	---	---	---	None	---	None
PtD, PtE, PtF: Plott-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 20.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
RoA: Rosman-----	B	January	3.5-5.0	>6.0	---	---	None	Very brief	Occasional
		February	3.5-5.0	>6.0	---	---	None	Very brief	Occasional
		March	3.5-5.0	>6.0	---	---	None	Very brief	Occasional
		April	3.5-5.0	>6.0	---	---	None	Very brief	Occasional
		May	3.5-5.0	>6.0	---	---	None	Very brief	Occasional
		June	---	---	---	---	None	Very brief	Occasional
		July	---	---	---	---	None	Very brief	Occasional
		August	---	---	---	---	None	Very brief	Occasional
		September	---	---	---	---	None	Very brief	Occasional
		October	---	---	---	---	None	Very brief	Occasional
		November	---	---	---	---	None	Very brief	Occasional
		December	3.5-5.0	>6.0	---	---	None	Very brief	Occasional
SaB, ScC: Saunook-----	B	Jan-Dec	---	---	---	---	None	---	None
SdD, SdE: Saunook-----	B	Jan-Dec	---	---	---	---	None	---	None
Thunder-----	B	Jan-Dec	---	---	---	---	None	---	None
SrF: Sylco-----	C	Jan-Dec	---	---	---	---	None	---	None
Rock outcrop-----	D	Jan-Dec	---	---	---	---	None	---	None
SsD: Sylco-----	C	Jan-Dec	---	---	---	---	None	---	None
Soco-----	B	Jan-Dec	---	---	---	---	None	---	None
StE, StF: Soco-----	B	Jan-Dec	---	---	---	---	None	---	None
Stecoah-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 20.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
TbD, TbE: Tanasee-----	B	Jan-Dec	---	---	---	---	None	---	None
Balsam-----	B	Jan-Dec	---	---	---	---	None	---	None
TsB, TsC, TsD, TsE: Thunder-----	B	Jan-Dec	---	---	---	---	None	---	None
Saunook-----	B	Jan-Dec	---	---	---	---	None	---	None
Ud, Un: Udorthents-----	B	Jan-Dec	---	---	---	---	None	---	None
Ur. Urban land									
W. Water									
WgC, WgD, WgE: Watauga-----	B	Jan-Dec	---	---	---	---	None	---	None
WhD, WyE, WyF: Wayah-----	B	Jan-Dec	---	---	---	---	None	---	None
Burton-----	B	Jan-Dec	---	---	---	---	None	---	None

Table 21.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		In	In		In	In			
AcF:									
Ashe-----	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	Low	High
Cleveland-----	Bedrock (lithic)	10-20	---	Indurated	0	---	Moderate	Low	High
Rock outcrop-----	Bedrock (lithic)	0-0	---	---	0	---	None	---	---
BaD, BaE:									
Balsam-----	---	---	---	---	0	---	Moderate	High	High
BdA:									
Bandana-----	Strongly contrasting textural stratification	20-40	---	Noncemented	0	---	Low	High	Moderate
BmA:									
Biltmore-----	---	---	---	---	0	---	Low	Low	Moderate
BtD, BtE, BtF:									
Buladean-----	Bedrock (paralithic)	40-60	---	Weakly cemented	0	---	Moderate	Low	High
Chestnut-----	Bedrock (paralithic)	20-40	---	Weakly cemented	0	---	Moderate	Low	High
ByC:									
Burton-----	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	High	High
Craggy-----	Bedrock (lithic)	10-20	---	Indurated	0	---	Moderate	High	High
CaD, CaE, CaF:									
Cashiers-----	---	---	---	---	0	---	Moderate	Low	Moderate
CdB, CdC:									
Chandler-----	---	---	---	---	0	---	Moderate	Low	High
CeD, CeE, CeF:									
Chandler-----	---	---	---	---	0	---	Moderate	Low	High
Micaville-----	Bedrock (paralithic)	40-60	---	Weakly cemented	0	---	Moderate	Moderate	High

Table 21.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion		
	Kind	Depth to top	Thickness	Hardness	Initial		Total	Uncoated steel	Concrete
		In	In		In	In			
CfD, ChE, ChF: Cheoah-----	Bedrock (paralithic)	40-60	---	Weakly cemented	0	---	Moderate	Low	High
CnC2, CnD2, CnE2: Clifton-----	---	---	---	---	0	---	Moderate	Low	Moderate
CsD: Cullasaja-----	---	---	---	---	0	---	Moderate	High	High
DeA: Dellwood-----	Strongly contrasting textural stratification	8-20	---	Noncemented	0	---	Low	Low	Moderate
Reddies-----	Strongly contrasting textural stratification	20-40	---	Noncemented	0	---	Low	Low	Moderate
DoB, DrC, DrD, DsC: Dillsboro-----	---	---	---	---	0	---	Moderate	High	Moderate
EcC, EcD, EdE, EdF: Evard-----	---	---	---	---	0	---	Moderate	Moderate	High
Cowee-----	Bedrock (paralithic)	20-40	---	Weakly cemented	0	---	Moderate	Moderate	High
FeC2, FeD2, FeE2: Fannin-----	---	---	---	---	0	---	Moderate	Moderate	Moderate
HaD, HaE: Harmiller-----	Bedrock (paralithic)	20-40	---	Weakly cemented	0	---	Moderate	Low	High
Shinbone-----	Bedrock (paralithic)	40-60	---	Weakly cemented	0	---	Moderate	Low	High
HnD, HuE, HuF: Huntdale-----	---	---	---	---	0	---	Moderate	Moderate	High
KcD: Keener-----	---	---	---	---	0	---	Moderate	Moderate	Moderate
Lostcove-----	---	---	---	---	0	---	Moderate	Low	High

Table 21.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Subsidence		Potential for frost action	Risk of corrosion		
	Kind	Depth to top	Thickness	Hardness	Initial		Total	Uncoated steel	Concrete
		In	In		In	In			
PeD, PeE: Pigeonroost-----	Bedrock (paralithic)	20-40	---	Weakly cemented	0	---	Moderate	Moderate	High
Edneytown-----	---	---	---	---	0	---	Moderate	Moderate	Moderate
PtD, PtE, PtF: Plott-----	---	---	---	---	0	---	Moderate	Low	High
ROA: Rosman-----	---	---	---	---	0	---	Low	Moderate	Moderate
SaB, ScC: Saunook-----	---	---	---	---	0	---	Moderate	Low	High
SdD, SdE: Saunook-----	---	---	---	---	0	---	Moderate	Low	High
Thunder-----	---	---	---	---	0	---	Moderate	Moderate	Moderate
SrF: Sylco-----	Bedrock (lithic)	20-40	---	---	0	---	Moderate	Low	Moderate
Rock outcrop-----	Bedrock (lithic)	0-0	---	---	0	---	None	---	---
SsD: Sylco-----	Bedrock (lithic)	20-40	---	---	0	---	Moderate	Low	Moderate
Soco-----	Bedrock (paralithic)	20-40	---	Weakly cemented	0	---	Moderate	Moderate	High
StE, StF: Soco-----	Bedrock (paralithic)	20-40	---	Weakly cemented	0	---	Moderate	Moderate	High
Stecoah-----	Bedrock (paralithic)	40-60	---	Weakly cemented	0	---	Moderate	Moderate	High
TbD, TbE: Tanasee-----	---	---	---	---	0	---	Moderate	Low	High
Balsam-----	---	---	---	---	0	---	Moderate	High	High
TsB, TsC, TsD, TsE: Thunder-----	---	---	---	---	0	---	Moderate	Moderate	Moderate
Saunook-----	---	---	---	---	0	---	Moderate	Low	High

Table 21.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Subsidence		Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness	Initial	Total		Uncoated steel	Concrete
		<u>In</u>	<u>In</u>		<u>In</u>	<u>In</u>			
Ud, Un: Udorthents-----	---	---	---	---	0	---	Low	Moderate	High
Ur. Urban land									
W. Water									
WgC, WgD, WgE: Watauga-----	---	---	---	---	0	---	Moderate	Moderate	Moderate
WhD, WyE, WyF: Wayah-----	Bedrock (paralithic)	60-100	---	Weakly cemented	0	---	Moderate	Low	High
Burton-----	Bedrock (lithic)	20-40	---	Indurated	0	---	Moderate	High	High

Table 22.—Classification of the Soils

(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series. Soils were classified using the 1994 edition of Keys to Soil Taxonomy)

Soil name	Family or higher taxonomic class
Ashe-----	Coarse-loamy, mixed, mesic Typic Dystrachrepts
Balsam-----	Loamy-skeletal, mixed, frigid Typic Haplumbrepts
Bandana-----	Coarse-loamy, mixed, nonacid, mesic Aeric Fluvaquents
Biltmore-----	Mixed, mesic Typic Udipsamments
Buladean-----	Coarse-loamy, mixed, mesic Typic Dystrachrepts
Burton-----	Fine-loamy, mixed, frigid Typic Haplumbrepts
Cashiers-----	Fine-loamy, micaceous, mesic Umbric Dystrachrepts
Chandler-----	Coarse-loamy, micaceous, mesic Typic Dystrachrepts
Cheoah-----	Fine-loamy, mixed, mesic Typic Haplumbrepts
Chestnut-----	Coarse-loamy, mixed, mesic Typic Dystrachrepts
Cleveland-----	Loamy, mixed, mesic Lithic Dystrachrepts
Clifton-----	Clayey, mixed, mesic Typic Hapludults
Cowee-----	Fine-loamy, mixed, mesic Typic Hapludults
Craggy-----	Loamy, mixed, frigid Lithic Haplumbrepts
Cullasaja-----	Loamy-skeletal, mixed, mesic Typic Haplumbrepts
Dellwood-----	Sandy-skeletal, mixed, mesic Fluventic Haplumbrepts
*Dillsboro-----	Clayey, mixed, mesic Humic Hapludults
Edneytown-----	Fine-loamy, mixed, mesic Typic Hapludults
Evard-----	Fine-loamy, oxidic, mesic Typic Hapludults
Fannin-----	Fine-loamy, micaceous, mesic Typic Hapludults
Harmiller-----	Fine-loamy, siliceous, mesic Typic Hapludults
Huntdale-----	Fine-loamy, mixed, mesic Umbric Dystrachrepts
Keener-----	Fine-loamy, siliceous, mesic Typic Hapludults
Lostcove-----	Loamy-skeletal, siliceous, mesic Typic Hapludults
Micaville-----	Coarse-loamy, micaceous, mesic Typic Dystrachrepts
Pigeonroost-----	Fine-loamy, mixed, mesic Typic Hapludults
Plott-----	Fine-loamy, mixed, mesic Typic Haplumbrepts
*Reddies-----	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluventic Haplumbrepts
Rosman-----	Coarse-loamy, mixed, mesic Fluventic Haplumbrepts
Saunook-----	Fine-loamy, mixed, mesic Humic Hapludults
Shinbone-----	Fine-loamy, siliceous, mesic Typic Hapludults
Soco-----	Coarse-loamy, mixed, mesic Typic Dystrachrepts
Stecoah-----	Coarse-loamy, mixed, mesic Typic Dystrachrepts
Sylco-----	Loamy-skeletal, mixed, mesic Typic Dystrachrepts
Tanasee-----	Fine-loamy, mixed, frigid Typic Haplumbrepts
Thunder-----	Loamy-skeletal, mixed, mesic Humic Hapludults
Udorthents-----	Udorthents
Watauga-----	Fine-loamy, micaceous, mesic Typic Hapludults
Wayah-----	Fine-loamy, mixed, frigid Typic Haplumbrepts

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