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; Yancey Soil and Water Conservation District; and Yancey County Board of Commissioners

Soil Survey of Yancey 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.

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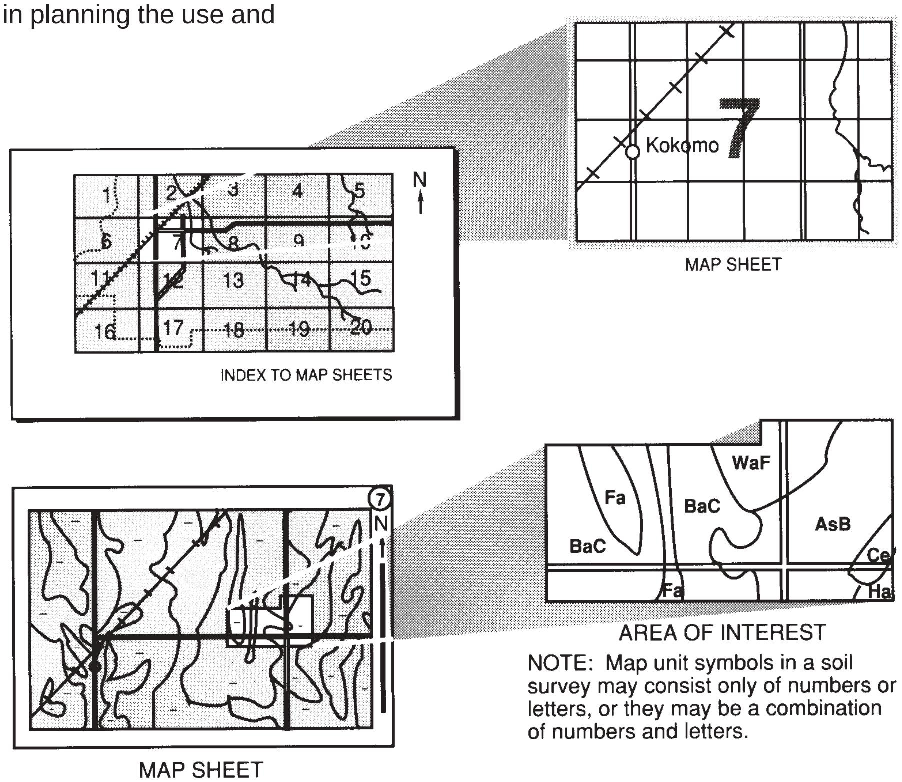
Detailed Soil Maps

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.

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 1995. Soil names and descriptions were approved in 1997. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1997. This soil survey was made cooperatively by the United States Department of Agriculture, Natural Resources Conservation Service and Forest Service; the North Carolina Department of Environment and Natural Resources; the North Carolina Agricultural Research Service; the North Carolina Cooperative Extension Service; the Yancey Soil and Water Conservation District; and the Yancey County Board of Commissioners. The survey is part of the technical assistance furnished to the Yancey Soil and Water Conservation District. The Yancey 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.

Cover: View of Bowlens Pyramid from Green Mountain Gap.

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.

Contents

Issued 2003

Foreword

This soil survey contains information that affects land use planning in Yancey 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 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
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Soil Survey of
Yancey County, North Carolina

By Bruce P. Smith, Jr., Natural Resources Conservation Service

Soils surveyed by Bruce P. Smith, Jr., Robert Ranson, Phyllis Hockett, and Brian Wood, Natural Resources Conservation Service

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

Yancey County is located in the northern mountains of western North Carolina (fig. 1). It is about 240 miles west of Raleigh, the State Capital. It consists of 200,704 acres, or approximately 313 square miles, of very steep mountains, rolling intermountain hills, and narrow valleys. Elevation ranges from 1,769 feet above sea level on the Nolichucky River at the Tennessee State line to 6,684 feet at Mount Mitchell, the highest elevation east of the Rocky Mountains.

The county is in the southern Blue Ridge Mountain Physiographic Province. It is bordered on the east by Mitchell County, on the south by McDowell and Buncombe Counties, and on the west by Madison County. It is bordered on the north by Unicoi County, Tennessee. In 1990, according to the U.S. Census Bureau, the county had a population of 15,419. The estimated 1999 population was 16,860. In 1990, Burnsville, the county seat, had a population of 1,567.

This soil survey updates the survey of Yancey County published in 1952 *(4)*. 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 Yancey County. It describes history and development; economic development; physiography, relief, and drainage; and climate.

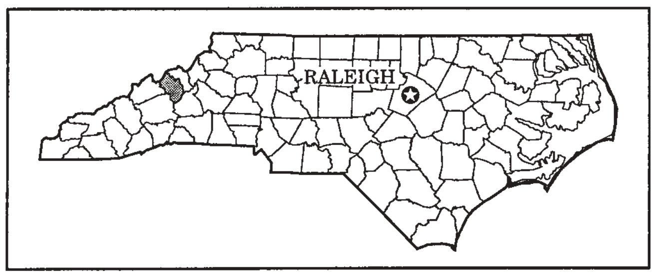

Figure 1.—Location of Yancey County in North Carolina.

History and Development

The Yancey County Chamber of Commerce and the Yancey History Association helped prepare this section.

The survey area, part of the Toe River Valley, was home to the Cherokee and Catawba Indians. They used the area primarily as a hunting ground.

Early explorers included Daniel Boone, French botanist André Michaux, English botanist John Fraser, and the “Father of American Botany,” Dr. Asa Gray.

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, these early settlers of the valley lived in virtual isolation. A road from Burnsville to the Blue Ridge was built by 1840. However, the area remained inaccessible to the rest of the state until the Civil War.

In 1883, the N.C. General Assembly created Yancey County from sections of Buncombe and Burke Counties. The county was named in honor of Bartlett Yancey, a distinguished North Carolina Congressman who was instrumental in the creation of the N.C. Public School System. He was also an advocate of correcting the inequality in representation in the General Assembly by the creation of new western counties.

At the turn of the last 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 crossed over into Yancey County near Kona and eventually was extended to Micaville and Burnsville in 1901. Until the railroad penetrated the valley, Yancey 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 railroad also allowed for rapid resource extraction, in particular timber and minerals. Mining for feldspar, quartz, and mica has taken place since the late 1880’s. Countless small mines were operated by local families, especially in the eastern half of the county. With the help of the railroad, logging extended into the most remote coves, including areas on Mount Mitchell, which was logged from 1912 to 1921.

Tourism has played a significant role in the history and development of Yancey County. Mount Mitchell State Park, North Carolina’s first, was created in 1915. It was accessed by the logging railroad from Black Mountain in Buncombe County, which was converted to an auto toll road in 1922, and later by the Blue Ridge Parkway. The Blue Ridge Parkway was built during the 1930’s and 1940’s along the southern boundary of the county. It has brought thousands of visitors to the area. Cattail Creek and the South Toe area have been developed for summer homes since the 1940’s and 1950’s.

Following a decline after World War II, the population of Yancey 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 have reduced outmigration. Construction is also providing an increasing number of jobs. Yancey County offers a high quality of life, and entrepreneurs are moving to the area to start small businesses. Many retirees, who had built summer homes in the area in the past, are permanently settling here.

Economic Development

Initially, Yancey County had a subsistence-based agricultural economy. At the turn of the last century, 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, and the move away from mica-based electrical conductors to quartz-based semiconductors closed down countless small mines.

Today, the county has a mixed industrial and agricultural economy. There is one mining company in operation, extracting dunite which is used as a molding and casting sand. With 157,117 acres, or 78 percent of the county, in timberland, forest products are also an important industry. The growing conditions in the county are conducive to the production of quality hardwoods. According to the Yancey Chamber of Commerce, the 1995 income from forest products was $4,936,000. The industrial base also includes several textile plants, a bedding spring manufacturing plant, and an outboard motor manufacturing plant. In 1995, approximately 30 percent of the workforce was in manufacturing, 41 percent in services, and 29 percent in agriculture.

In 1992, according to the North Carolina Department of Agriculture, the county had 671 farms, covering 38,394 acres. There were 14,088 acres of cropland with 4,154 acres of harvested cropland. Cash receipts in 1995 totaled $16,883,000. The major agricultural products are burley tobacco, hay, and beef cattle. Specialty crops, apples, and trout are also grown. Burley tobacco is grown on most farms and supplements the income of many factory workers. The production of Christmas trees and native ornamentals has grown rapidly in recent years. Generally, farms are small and specialized and grow high-value crops.

Tourism and its related businesses are becoming vital parts of the economy. The scenic 880 acres along the Blue Ridge Parkway, the 35,051 acres of Pisgah National Forest managed by the U.S. Forest Service, and the 1,469 acres of Mount Mitchell State Park are hubs for much of this activity. Also, second home construction and the mountain arts and craft tradition contribute greatly to the economic development of Yancey County.

Physiography, Relief, and Drainage

The 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

Figure 2.—At 6,684 feet above sea level, Mount Mitchell (upper right corner) is the highest summit east of the Rockies.

flood plains. Elevation ranges from 1,769 feet above sea level on the Nolichucky River at the Tennessee State line to 6,684 feet at Mount Mitchell on the Black Mountain Range (fig. 2).

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 bedrock outcrops occur. This landscape is subject to very cold temperatures and windswept conditions. High mountains are confined to the northern portion of the county between Big Bald and Little Bald on the Bald Mountains and to the southern portion of the county on the Black Mountain Range.

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. The soils are shallow to very deep to hard or weathered bedrock and are well drained or 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 moderate 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 bedrock outcrops occur. Intermediate mountains are throughout the county. Flattop Mountain, Sampson Mountain, Seven Mile Ridge, and Phillips 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 to strongly sloping soils on ridgetops. The soils are shallow to very deep to weathered bedrock and are well drained or somewhat excessively drained. Very deep, strongly sloping to steep, well drained soils are in coves and drainageways. The clay content of the subsoil is moderate or high. The soils on cool aspects, in coves, and in drainageways have thick surface layers with a high content of organic matter. Low mountains occur throughout the county and are typically extensions of larger mountain ranges, such as the Walnut, Cane, Sampson, and Green Mountains. They also occur within the intermountain hills landscape.

The intermountain hills landscape ranges from 1,800 to 2,800 feet in elevation. It has strongly sloping to steep soils on side slopes and gently sloping to strongly sloping soils on ridgetops. The 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 moderate or high. Soils on the ridgetops commonly contain more clay than soils on the side slopes. Soils in coves are very deep, gently sloping to moderately steep, and well drained. Surface layers, where uneroded, commonly contain rock fragments and have a moderate or high content of organic matter. The clay content of the subsoil is moderate or high. The intermountain hills occur along Bald Creek, Possum Trout, Prices Creek, Jacks Creek, and Brush Creek, in and around Horton Hill, Burnsville, Micaville, and Newdale, and up the South Toe River to Busick.

Terraces have nearly level to strongly sloping soils, are narrow, and run parallel to the streams. The soils are very deep and have a high content of clay in the subsoil. Surface layers, where uneroded, commonly contain rock fragments and have a moderate or high content of organic matter. Many terraces occur between the Cane River and River Side communities. Generally, terraces occur above the larger flood plains of intermountain hills and low mountain areas.

Flood plains have nearly level soils and run parallel to the stream channel. In general, soils next to major streams and rivers and at the upper end of watersheds are moderately well drained and shallow to moderately deep to gravelly strata. Soils in the Murchison-Pensacola area are an example. At the lower end of watersheds, soils are well drained to somewhat poorly drained and moderately deep to very deep to gravelly strata. Soils along Whit Bottom and Banks Creek are examples. Along smaller streams and branches, soils are moderately well drained or somewhat poorly drained and moderately deep to gravelly strata. Soils along Jacks Creek are an example. Poorly drained soils occur on the broader flood plains throughout the county. The clay content of the subsoil for soils in these areas is low but ranges to moderate along the lesser streams and at the lower end of watersheds. Soil surface layers, where they have not been scoured by flooding, have a moderate or high content of organic matter.

Yancey County is drained to the east by the South Toe River and to the west by the Cane River. Both rivers originate in the Black Mountain Range in the southern part of the county. Drainage is to the north. The South Toe River flows into the North Toe River, which flows northwest until it joins the Cane River at Huntdale and becomes the Nolichucky River. The Nolichucky River continues northwest through the Nolichucky Gorge, into Unicoi County, Tennessee, and eventually into the French Broad River.

The north-central part of the county also drains north and into the North Toe River. Major drainage areas are Jacks Creek and Mine Fork Creek.

In the South Toe River Watershed, the major drainage areas are Little Crabtree Creek, Ayles Creek, Brown Creek, Shuford Creek, Big White Oak Creek, Little White Oak Creek, Locust Creek, Colbert Creek, Rock Creek, Still Fork Creek, and Big Crabtree Creek.

In the Cane River Watershed, the major drainage areas in the northern half are Bald Mountain Creek, Little Creek, and Big Creek. The major drainage areas in the southern half are Elk Wallow Creek, Ball Creek, Indian Creek, Prices Creek, Elk Fork, Cattail Creek, Still House Creek, and Bolens Creek.

Climate

In Yancey 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. As elevation increases, rainfall amounts increase and temperature decreases. Temperatures are cooler on north- to east-facing aspects. Daily temperatures can fluctuate widely with cold or warm spells that are 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. In summer, precipitation falls chiefly during thunderstorms. Several inches of moisture are added to the soil in summer by fog condensing on trees and flowing down the trunk at the higher elevations. In winter, precipitation in valleys is chiefly rain with occasional snow. In the mountains, especially above 4,000 feet in elevation, it is chiefly 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. In Yancey County, snow cover does not last except at the high elevations and on northerly aspects.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Celo in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 34.1 degrees F and the average daily minimum temperature is 21.1 degrees. The lowest temperature on record, which occurred at Celo on January 21, 1985, is -16 degrees. In summer, the average temperature is 67.0 degrees and the average daily maximum temperature is 78.9 degrees. The highest temperature on record, which occurred at Celo on June 25, 1952, is 97 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 (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall. Slow air drainage allows frost pockets to form in late spring and early fall in nearly level or gently sloping areas that are low on the landscape. These areas have a shorter growing season than the county average.

Annual precipitation varies throughout the county. It averages about 58 inches around Celo to more than 75 inches on Mount Mitchell. Estimated annual rainfall is 50 to 56 inches along the North Carolina-Tennessee State line and 46 to 50 inches from the Indian Creek area northeast to the Green Mountain area.

The average annual precipitation at Celo is 58.78 inches. Of this, about 24.54 inches, or 42 percent, usually falls in May through September. The growing season for most crops falls within this period. Heavy rains from prolonged storms occasionally cover the entire area (or individual watersheds) and cause severe flooding in valleys. The heaviest 1-day rainfall during the period of record was 6.67 inches at Celo on August 9, 1990. Thunderstorms occur on about 45 days each year, and most occur between May and August.

The average seasonal snowfall is 19.3 inches. The greatest snow depth at any one time during the period of record was 24 inches, recorded on March 14, 1993. On average, 16 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record is 17 inches, recorded on March 23, 1981.

The average relative humidity in mid-afternoon is about 58 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, average daytime relative humidity is higher. The sun shines 58 percent of the time in summer and 57 percent in winter. The prevailing wind is highly dependent on location in this mountainous county. Valleys channel the windflow in all directions throughout the year. Average windspeed is highest, around 9 miles per hour, in the winter and early spring months. High mountain ridgetops and side slopes and prominent intermediate mountain ridgetops are windswept. Sustained winds over 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” *(5, 9)*.

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 $^{1}/_{4}$ 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 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 *(6)*.

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

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. 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.

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, Dillard loam, 2 to 8 percent slopes, rarely flooded, is a phase of the Dillard 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 separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Toecane-Tusquitee complex, 30 to 50 percent slopes, very bouldery, 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 Unaka-Rock outcrop complex, 50 to 95 percent slopes, very bouldery, 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.

Soil Survey as a Land Management Tool

The purpose of this soil survey is not to prescribe (dictate), specific methods of overcoming limitations but to point out or flag soil properties and site features so they can be addressed by land managers and users. In the following detailed map unit descriptions, these are referred to as management concerns. Management measures are options or reference points to consider for a given use.

Soil interpretations and limitations are based on the potential risk that soil properties and site features pose a given use. During the survey these were referenced by field observations, by laboratory analysis, and through contact with local land use professionals. Updating soil interpretations is a dynamic process. As more information is collected and land use management practices are developed or modified, interpretations and suitabilities may be revised.

Site-specific features should also be considered. An onsite investigation may be necessary to determine if any or all of the management concerns affect the use in question or if the management measures are relative. The goals of the land manager or user and the resources available to them then determine the suitability (favorability) of any soil map unit for a given use.

Map Unit Descriptions

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

Setting

Landscape: Low and intermediate mountains throughout the county
Elevation range: 2,200 to 5,000 feet
Landform: Ridges and south- to west-facing mountain slopes
Landform position: Summits and side slopes
Shape of areas: Irregular
Size of areas: As much as 139 acres

Composition

Ashe soil and similar inclusions: 40 percent
Cleveland soil and similar inclusions: 20 percent
Rock outcrop: 20 percent
Dissimilar inclusions: 20 percent

Typical Profile

Ashe

Surface layer:
0 to 4 inches—very dark grayish brown gravelly loam
4 to 6 inches—brown gravelly sandy loam

Subsoil:
6 to 26 inches—strong brown loam
26 to 34 inches—dark yellowish brown gravelly loam

Bedrock:

34 to 45 inches—unweathered, slightly fractured biotite gneiss

Cleveland

Surface layer:
0 to 5 inches—very dark grayish brown loam
5 to 7 inches—dark yellowish brown loam

Subsoil:
7 to 15 inches—strong brown loam

Bedrock:
15 to 26 inches—unweathered, moderately fractured biotite gneiss

Rock outcrop

Composition: Dominantly biotite 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, soils subject to 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: 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 Toecane 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
- 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 sandy 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: Unsuited
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: Unsuited
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: Unsuited
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: Unsuited
Management concerns:
- This map unit is severely limited for timber production because of the slope, 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: Unsuited
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: Unsuited
Management concerns:
- This map unit is severely limited for septic tanks because of the slope, depth to bedrock, extent of rock outcrops, and the very bouldery surface. A site on better suited soils should be selected.

Local roads and streets

Suitability: Unsuited

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 the very bouldery surface. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
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

BbF—Balsam cobbly loam, 50 to 95 percent slopes, rubbly

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,300 to 6,000 feet
Landform: Drainageways and coves
Landform position: Side slopes and head slopes
Shape of areas: Long and narrow
Size of areas: As much as 81 acres

Composition

Balsam soil and similar inclusions: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Surface layer:
0 to 5 inches—black cobbly loam
5 to 11 inches—very dark brown cobbly loam

Subsoil:
11 to 20 inches—dark brown very cobbly fine sandy loam
20 to 42 inches—dark yellowish brown very cobbly loam

Underlying material:
42 to 62 inches—strong brown and dark yellowish brown very cobbly 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: 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 50 percent stones and boulders that average about 10 to 48 inches in diameter and 1 to 3 feet apart
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soil subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a short growing season
Soil reaction: Extremely acid to moderately acid throughout the profile
Parent material: Colluvium derived from felsic, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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 toeslopes
• Burton soils that have hard bedrock at a depth of 20 to 40 inches, on the outer edge of map unit delineations
• Craggey soils that have hard bedrock at a depth of 10 to 20 inches, on the outer edge of map unit delineations
• Soils that have bedrock at a depth of less than 6.0 feet, in drainageways
• Unprotected areas that are windswept

Similar inclusions:
• Balsam soils that have a surface layer of loamy sand, loamy coarse sand, coarse sandy loam, or fine sandy loam

Land Use

Dominant Uses: Woodland and wildlife habitat

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, rubbly surface, and short growing season. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for the production of pasture and hay crops because of the slope, erodibility, rubbly surface, and short growing season. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for the production of orchards and ornamental crops because of the slope, erodibility, rubbly 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: Unsuited
Management concerns:
• This map unit is severely limited for timber production because of the slope, erodibility, rubbly surface, short growing season, and low productivity. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the slope, erodibility, rubbly surface, extreme freezing, and seeps and springs. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the slope, rubbly surface, extreme freezing, and seeps and springs. A site on better suited soils should be selected.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for local roads and streets because of the slope, erodibility, and rubbly surface. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the slope, erodibility, and rubbly surface. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: 7s
Woodland ordination symbol: 10R, based on red spruce as the indicator species

BcD—Balsam-Tanasee complex, 15 to 30 percent slopes, extremely bouldery

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,300 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: As much as 54 acres

Composition

Balsam soil and similar inclusions: 60 percent
Tanasee soil and similar inclusions: 30 percent
Dissimilar inclusions: 10 percent

Typical Profile

Balsam

Surface layer:
0 to 5 inches—black cobbly loam
5 to 11 inches—very dark brown cobbly loam

Subsoil:
11 to 20 inches—dark brown very cobbly fine sandy loam
20 to 36 inches—dark yellowish brown very cobbly loam

Underlying material:
36 to 62 inches—strong brown and dark yellowish brown very cobbly sandy loam

Tanasee

Surface layer:
0 to 7 inches—black loam
7 to 15 inches—dark brown loam

Subsoil:
15 to 28 inches—yellowish brown sandy loam
28 to 44 inches—brownish yellow gravelly sandy loam
44 to 62 inches—yellowish brown gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Balsam—loamy with many rock fragments; Tanasee—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: 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: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a short growing season
Soil reaction: Balsam—extremely acid to moderately acid throughout the profile; Tanasee—extremely acid to strongly acid throughout the profile
Parent material: Colluvium derived from felsic, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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:
- Areas of rubble land in drainageways and below rock outcrops
- Random areas of soils that are similar to the Tanasee soil but have more clay in the subsoil
- Burton soils that have hard bedrock at a depth of 20 to 40 inches, along the outer edge of map unit delineations
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways
- Unprotected areas that are windswept

Similar inclusions:
- Balsam soils that have a surface layer of loamy sand, loamy coarse sand, coarse sandy loam, or fine sandy loam
- Tanasee soils that have a surface layer of sandy loam or fine sandy loam
- Unprotected areas that are windswept

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
Management concerns:
- This map unit is severely limited for the production of pasture and hay crops because of the extremely bouldery surface and short growing season. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
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: Unsuited
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: Balsam—unsuited; Tanasee—poorly suited
Management concerns:
• This map unit is not managed for dwellings.

Septic tank absorption fields

Suitability: Balsam—unsuited; Tanasee—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, 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: Balsam—7s; Tanasee—6e
Woodland ordination symbol: 10R, based on red spruce as the indicator species

BcE—Balsam-Tanasee complex, 30 to 50 percent slopes, extremely bouldery

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,300 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: As much as 127 acres

Composition

Balsam soil and similar inclusions: 60 percent
Tanasee soil and similar inclusions: 30 percent
Dissimilar inclusions: 10 percent

Typical Profile

Balsam

Surface layer:
0 to 5 inches—black cobbly loam
5 to 11 inches—very dark brown cobbly loam

Subsoil:
11 to 20 inches—dark brown very cobbly fine sandy loam
20 to 36 inches—dark yellowish brown very cobbly loam

Underlying material:
36 to 62 inches—strong brown and dark yellowish brown very cobbly sandy loam

Tanasee

Surface layer:
0 to 7 inches—black loam
7 to 15 inches—dark brown loam

Subsoil:
15 to 28 inches—yellowish brown sandy loam
28 to 44 inches—brownish yellow gravelly sandy loam
44 to 60 inches—yellowish brown gravelly sandy loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Balsam—loamy with many rock fragments; Tanasee—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 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: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a short growing season
Soil reaction: Balsam—extremely acid to moderately acid throughout the profile; Tanasee—extremely acid to strongly acid throughout the profile
Parent material: Colluvium derived from felsic, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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:
- Areas of rubble land in drainageways and below rock outcrops
- Random areas of soils that are similar to the Tanasee soil but have more clay in the subsoil
- 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
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways
- Unprotected areas that are windswept

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

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
Management concerns:
- This map unit is severely limited for the production of pasture and hay crops because of the extremely bouldery surface and short growing season. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, 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: Unsuited
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: Balsam—unsuited; Tanasee—poorly suited
Management concerns:
- This map unit is not managed for dwellings.

Septic tank absorption fields

Suitability: Balsam—unsuited; Tanasee—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, 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: Balsam—7s; Tanasee—7e
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: 2,100 to 2,800 feet
Landform: Flood plains throughout the county
Landform position: Planar to slightly concave bottomland slopes
Shape of areas: Long and narrow
Size of areas: As much as 125 acres

Composition

Bandana soil and similar inclusions: 75 percent
Dissimilar inclusions: 25 percent

Typical Profile

Surface layer:
0 to 9 inches—brown sandy loam

Subsoil:
9 to 19 inches—dark yellowish brown sandy loam

Underlying material:
19 to 31 inches—grayish brown sandy loam that has mottles in shades of brown
31 to 37 inches—gray very gravelly sandy loam
37 to 62 inches—mixed 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 of the profile and sandy-skeletal in the lower part
Permeability: Moderately rapid in the upper part of the profile 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: Soil subject to 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:
• 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 Dillard soils that have more clay in the subsoil than the Bandana soil, on low stream terraces and toeslopes
• Well drained Saunook soils that have more clay in the subsoil than the Bandana soil, on toeslopes

• 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, woodland, and wildlife habitat

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: Unsuited
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 crops 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, 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 susceptible ornamentals.
• In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are

susceptible to phytophthora root disease. These areas should be avoided.
• 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: Unsuited
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: Unsuited
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: Unsuited
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, 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 drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
• 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: 1,800 to 2,700 feet

Landform: Flood plains dominantly along the Cane, South Toe, and North Toe Rivers
Landform position: Planar to slightly convex bottomland slopes
Shape of areas: Long and narrow
Size of areas: As much as 27 acres

Composition

Biltmore soil and similar inclusions: 90 percent
Dissimilar inclusions: 10 percent

Typical Profile

Surface layer:
0 to 8 inches—yellowish brown sand

Underlying material:
8 to 20 inches—yellowish brown loamy fine sand
20 to 23 inches—yellowish brown loamy sand
23 to 37 inches—dark yellowish brown loamy sand
37 to 63 inches—light gray loamy sand that has mottles in shades of brown

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: Soil subject to 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, on the slightly higher landscapes
• Soils that are moderately well drained, in depressions and backwater areas
• Rosman soils that have a loamy subsoil and are occasionally flooded, in the slightly higher positions
• 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
• 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: Unsuited
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: Unsuited
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 hazard of frequent 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: Unsuited
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: Unsuited
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: Unsuited
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, droughtiness, 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 soil and improves trafficability.
• This soil has a low available water capacity and becomes droughty during periods of low rainfall.
• 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 drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

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 western and southern parts of the county
Elevation range: 2,500 to 4,800 feet
Landform: Ridges
Landform position: Summits and upper side slopes
Shape of areas: Long and narrow or irregular
Size of areas: As much as 62 acres

Composition

Buladean soil and similar inclusions: 50 percent
Chestnut soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Buladean

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 32 inches—strong brown sandy loam

Underlying material:
32 to 47 inches—yellowish brown gravelly sandy loam saprolite

Bedrock:
47 to 58 inches—weathered, moderately fractured biotite granitic gneiss

Chestnut

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

Subsoil:
3 to 13 inches—strong brown loam
13 to 24 inches—yellowish brown sandy loam
24 to 32 inches—brown gravelly sandy loam

Bedrock:
32 to 43 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 and upper side slopes, soils subject to 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
- 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 a thicker surface layer with have more organic matter than 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
- Prominent ridges and 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
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.
• Areas of the Chestnut soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

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 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 be avoided.
• Areas of the Chestnut soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

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 from 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 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 or to 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 on 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 or to 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, soil fertility, and frost action 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 helps 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Chestnut soil are difficult to manage for lawns and landscaping, 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 western and southern parts of the county
Elevation range: 2,400 to 4,800 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: As much as 176 acres

Composition

Buladean soil and similar inclusions: 50 percent
Chestnut soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Buladean

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 32 inches—strong brown sandy loam

Underlying material:
32 to 47 inches—yellowish brown gravelly sandy loam saprolite

Bedrock:
47 to 58 inches—weathered, moderately fractured biotite granitic gneiss

Chestnut

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

Subsoil:
3 to 13 inches—strong brown loam
13 to 24 inches—yellowish brown sandy loam
24 to 32 inches—brown gravelly sandy loam

Bedrock:
32 to 43 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, soils subject to 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 a thicker surface layer with have more organic matter than 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 the Buladean and Chestnut soils, on north- to east-facing side slopes
• Widely scattered areas of rock outcrop
• Prominent ridges and upper side slopes that are windswept
• Toecane soils that have a thicker surface layer with more organic matter than 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 in areas 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, building site development, and ornamental crops

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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.
• Areas of the Chestnut soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

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 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 be avoided.
• Areas of the Chestnut soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

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 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.
• 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 or to 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 on 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 or to 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 helps 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Chestnut soil are difficult to manage for lawns and landscaping, 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 western and southern parts of the county
Elevation range: 2,200 to 4,800 feet
Landform: South- to west-facing mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 287 acres

Composition

Buladean soil and similar inclusions: 45 percent
Chestnut soil and similar inclusions: 40 percent
Dissimilar inclusions: 15 percent

Typical Profile

Buladean

Surface layer:
0 to 5 inches—very dark grayish brown loam

Subsoil:
5 to 32 inches—strong brown sandy loam

Underlying material:
32 to 47 inches—yellowish brown gravelly sandy loam saprolite

Bedrock:
47 to 58 inches—weathered, moderately fractured biotite granitic gneiss

Chestnut

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

Subsoil:
3 to 13 inches—strong brown loam
13 to 24 inches—yellowish brown sandy loam
24 to 32 inches—brown gravelly sandy loam

Bedrock:
32 to 43 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 prominent upper side slopes, soils subject to 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 Buleadean and Chestnut soils and have soft bedrock at a depth of 40 to more than 60 inches
• Saunook soils that have a thicker surface layer with more organic matter than 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 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 Toecane 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
• 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: Unsuited
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: Unsuited
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: Unsuited
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: Unsuited
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: Unsuited
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: Unsuited

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: Unsuited
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

BwD—Burton-Craggey complex, windswept, 15 to 30 percent slopes, rocky

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,400 to 6,600 feet
Landform: Ridges
Landform position: Summits and upper side slopes
Shape of areas: Long and narrow
Size of areas: As much as 129 acres

Composition

Burton soil and similar inclusions: 55 percent
Craggey soil and similar inclusions: 30 percent
Dissimilar inclusions: 15 percent

Typical Profile

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly fine sandy loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

Craggey

Surface layer:
0 to 11 inches—black gravelly loam

Subsoil:
11 to 16 inches—dark yellowish brown gravelly loam

Bedrock:
16 to 27 inches—unweathered, slightly fractured metagraywacke

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: 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
Extent of rock outcrop: About 2 percent rock outcrop on the soil surface
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a 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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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; water saturation for short periods during heavy rainfall or snow melt in areas of the Craggey soil

Minor Components

Dissimilar inclusions:
- Random areas of soils that have bedrock at a depth of 40 to more than 60 inches
- Random areas of soils that have a high mica content in the subsoil and underlying material
- 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
- Balsam soils that have more rock fragments in the subsoil than the Burton and Craggey soils, in concave areas at the head of drains
- Nonwindswept areas on protected north- to east-facing slopes

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: Unsuited
Management concerns:
- This map unit is severely limited for crop production because of the slope, erodibility, depth to bedrock, extent of rock outcrops, and short growing season. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for the production of pasture and hay crops because of the depth to bedrock, extent of rock outcrops, and short growing season. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for orchards and ornamental crops because of the depth to bedrock, extent of rock outcrops, 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: Unsuited
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 extent of rock outcrops. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for dwellings because of the depth to bedrock, the extent of rock outcrops, extreme freezing, and damaging high winds. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for septic tank absorption fields because of the depth to bedrock, the extent of rock outcrops, and extreme freezing. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for roads and streets because of the depth to bedrock, the extent of rock outcrops, and extreme freezing. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for lawns and landscaping because of the depth to bedrock, the extent of rock outcrops, damaging high winds, and short growing season. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: Burton—6e; 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

BxE—Burton-Craggey-Rock outcrop complex, windswept, 30 to 50 percent slopes, very bouldery

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,400 to 6,600 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Shape of areas: Irregular or long and narrow
Size of areas: As much as 236 acres

Composition

Burton soil and similar inclusions: 40 percent
Craggey soil and similar inclusions: 30 percent
Rock outcrop: 10 percent
Dissimilar inclusions: 20 percent

Typical Profile

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly fine sandy loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

Craggey

Surface layer:
0 to 11 inches—black gravelly loam

Subsoil:
11 to 16 inches—dark yellowish brown gravelly loam

Bedrock:
16 to 27 inches—unweathered, slightly fractured metagraywacke

Rock outcrop

Composition: Dominantly metagraywacke bedrock

Properties and Qualities of the Burton and Craggey Soils

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: 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: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a 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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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; water saturation for short periods during heavy rainfall or snow melt in areas of the Craggey soil

Minor Components

Dissimilar inclusions:
- Random areas of soils that have bedrock at a depth of 40 to more than 60 inches
- Random areas of soils that have a high mica content in the subsoil and underlying material
- Tanasee soils that have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and in saddles and gaps
- Balsam soils that have more rock fragments in the subsoil than the Burton and Craggey soils, in concave areas at the head of drains and in drainageways
- Nonwindswept areas on protected north- to east-facing slopes
- Areas of rubble land below rock outcrops

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: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of slope, erodibility, depth to bedrock, very bouldery surface, extent of rock outcrops, and short growing season. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for the production of pasture and hay crops because of the depth to bedrock, very bouldery surface, extent of rock outcrops, and short growing season. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the depth to bedrock, very bouldery surface, extent of rock outcrops, 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: Unsuited
Management concerns:
• This map unit is severely limited for timber production because of damaging high winds, short growing season, low productivity, depth to bedrock, and the extent of rock outcrops. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the depth to bedrock, extent of rock outcrops, very bouldery surface, extreme freezing, and damaging high winds. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the depth to bedrock, extent of rock outcrops, very bouldery surface, and extreme freezing. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the depth to bedrock, extent of rock outcrops, very bouldery surface, and extreme freezing. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the depth to bedrock, extent of rock outcrops, very bouldery surface, damaging high winds, and short growing season. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: Burton and Craggey—7e; Rock outcrop—8s
Woodland ordination symbol: Burton and Craggey—2R, based on northern red oak as the indicator species; Rock outcrop—none assigned

BxF—Burton-Craggey-Rock outcrop complex, windswept, 50 to 95 percent slopes, very bouldery

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,600 to 6,600 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 192 acres

Composition

Burton soil and similar inclusions: 40 percent
Craggey soil and similar inclusions: 30 percent

Rock outcrop: 10 percent
Dissimilar inclusions: 20 percent

Typical Profile

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

Craggey

Surface layer:
0 to 11 inches—black gravelly loam

Subsoil:
11 to 16 inches—dark yellowish brown gravelly loam

Bedrock:
16 to 27 inches—unweathered, slightly fractured metagraywacke

Rock outcrop

Composition: Dominantly metagraywacke bedrock

Properties and Qualities of the Burton and Craggey Soils

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: 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: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a 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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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; water saturation for short periods during heavy rainfall or snow melt in areas of the Craggey soil; soils subject to mass movement when saturated

Minor Components

Dissimilar inclusions:
- Random areas of soils that have bedrock at a depth of 40 to more than 60 inches
- Random areas of soils that have a high mica content in the subsoil and underlying material
- Balsam soils that have more rock fragments in the subsoil than the Burton and Craggey soils, in concave areas at the head of drains and in drainageways
- Areas of rubble land below rock outcrops
- Tanasee soils that have bedrock at a depth of more than 60 inches, in concave areas at the head of drains and in saddles and gaps
- Nonwindswept areas on protected north- to east-facing slopes

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

Pasture and hayland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for the production of pasture and hay crops because of the slope, erodibility, depth to bedrock, very bouldery surface, and short growing season. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, depth to bedrock, extent of rock outcrops, very 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: Unsuited
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 extent of rock outcrops. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the slope, erodibility, depth to bedrock, extent of rock outcrops, extreme freezing, and damaging high winds. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the slope, depth to bedrock, extent of rock outcrops, very bouldery surface, and extreme freezing. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the slope, erodibility, depth to bedrock, extent of rock outcrops, very bouldery surface, and extreme freezing. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the slope, erodibility, depth to bedrock, extent of rock outcrops, very bouldery surface, damaging high winds, and short growing season. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: Burton and Craggey—7e; Rock outcrop—8s
Woodland ordination symbol: Burton and Craggey—2R, based on northern red oak as the indicator species; Rock outcrop—none assigned

CaB—Cashiers fine sandy loam, 2 to 8 percent slopes

Setting

Landscape: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,600 to 3,800 feet
Landform: North- to east-facing ridges and those shaded by the higher mountains
Landform position: Summits
Shape of areas: Long and narrow
Size of areas: As much as 13 acres

Composition

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

Typical Profile

Surface layer:
0 to 8 inches—dark brown fine sandy loam
8 to 13 inches—dark yellowish brown fine sandy loam

Subsoil:
13 to 29 inches—brown sandy loam
29 to 50 inches—dark yellowish brown sandy loam

Underlying material:
50 to 78 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: 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): High or very high
Potential frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; soil subject to rime ice in winter on prominent ridges
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 the Cashiers soil and have soft bedrock at a depth of 40 to more than 60 inches, on shoulder slopes
• Random areas of Huntdale soils that have more clay and less mica in the subsoil than the Cashiers soil
• Udorthents, loamy, stony, associated with abandoned mica and feldspar mines
• Prominent ridges that are windswept

Similar inclusions:
• Cashiers soils that have a surface layer of coarse sandy loam, sandy loam, or loam

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Ornamental crops 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, soil fertility, and pesticide retention
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.
• 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: Well suited
Management concerns: Erodibility, pesticide retention, ball and burlap harvesting, climate, and soil fertility
Management measures and considerations:
• 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.

• 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, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

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:
• This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content in 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 very 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: Suited
Management concerns: 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 in the subsoil and underlying material.
• 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 is subject to uneven settling and may be unstable if not properly compacted.

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 on 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, difficult to compact, and unstable, especially when used as fill, due to the high mica content in 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: Well suited
Management concerns: 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, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 7A, based on yellow-poplar as the indicator species

CaC—Cashiers fine sandy loam, 8 to 15 percent slopes

Setting

Landscape: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,600 to 3,800 feet
Landform: North- to east-facing ridges and those shaded by the higher mountains
Landform position: Summits
Shape of areas: Long and narrow
Size of areas: As much as 21 acres

Composition

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

Typical Profile

Surface layer:
0 to 8 inches—dark brown fine sandy loam
8 to 13 inches—dark yellowish brown fine sandy loam

Subsoil:
13 to 29 inches—brown sandy loam
29 to 50 inches—dark yellowish brown sandy loam

Underlying material:
50 to 78 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: 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): High or very high
Potential frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; soil subject to rime ice in winter on prominent ridges
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 the Cashiers soil and have soft bedrock at a depth of 40 to more than 60 inches, on shoulder slopes
• Random areas of Huntdale soils that have more clay and less mica in the subsoil than the Cashiers soil
• Udorthents, loamy, stony, associated with abandoned mica and feldspar mines
• Prominent ridges that are windswept

Similar inclusions:
• Cashiers soils that have a surface layer of coarse sandy loam, sandy loam, or loam

Land Use

Dominant Uses: Woodland and wildlife habitat
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, 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 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.
• 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: Erodibility, equipment use, pesticide retention, ball and burlap harvesting, climate, 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.
• 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 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, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

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:
• This soil is highly erodible, difficult to compact, and unstable, especially when used as fill, due to the high mica content in 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 very 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.
• This soil is best reforested by managing for natural regeneration of hardwoods.

Urban Development

Dwellings

Suitability: 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 in the subsoil and underlying material.
• Designing structures so that they conform with natural slopes 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: Slope
Management measures and considerations:
• The local Health Department should be contacted for guidance on 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: 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 in 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, Fraser fir and other ornmentals are susceptible to phytophthora root disease. These areas should be avoided.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 7A, based on yellow-poplar as the indicator species

CcD—Cashiers fine sandy loam, 15 to 30 percent slopes, stony

Setting

Landscape: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,600 to 4,000 feet
Landform: North- to east-facing ridges and those shaded by the higher mountains
Landform position: Summits and upper side slopes
Shape of areas: Long and narrow on summits and irregular on side slopes
Size of areas: As much as 29 acres

Composition

Cashiers soil and similar inclusions: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Surface layer:
0 to 8 inches—dark brown fine sandy loam
8 to 13 inches—dark yellowish brown fine sandy loam

Subsoil:
13 to 29 inches—brown sandy loam
29 to 50 inches—dark yellowish brown sandy loam

Underlying material:
50 to 78 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: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; soil subject to rime ice in winter on prominent ridges
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 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 Huntdale soils that have more clay and less mica in the subsoil than the Cashiers soil
• Saunook soils that have more clay in the subsoil than the Cashiers soil, in saddles and gaps and in concave areas at the head of drains
• Udorthents, loamy, stony, associated with abandoned mica and feldspar mines
• Prominent ridges that are windswept

Similar inclusions:
• Cashiers soils that have a surface layer of coarse sandy loam, 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 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 be avoided.

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 in 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, high content of organic matter in the surface layer, and the very 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, 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 in the subsoil and underlying material.
• Designing structures on the contour with the natural slope or building in the 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 on 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 in 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 be avoided.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: 7R, based on yellow-poplar as the indicator species

CcE—Cashiers fine sandy loam, 30 to 50 percent slopes, stony

Setting

Landscape: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,600 to 4,000 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: As much as 54 acres

Composition

Cashiers soil and similar inclusions: 75 percent
Dissimilar inclusions: 25 percent

Typical Profile

Surface layer:
0 to 8 inches—dark brown fine sandy loam
8 to 13 inches—dark yellowish brown fine sandy loam

Subsoil:
13 to 29 inches—brown sandy loam
29 to 50 inches—dark yellowish brown sandy loam

Underlying material:
50 to 78 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: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; soil subject to rime ice in winter on prominent ridges and upper side slopes
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 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 Huntdale 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
- Udorthents, loamy, stony, associated with abandoned mica and feldspar mines
- Thunder and Toecane soils that have more rock

fragments in the subsoil than the Cashiers soil, in drainageways
• Widely scattered areas of rock outcrop

Similar inclusions:
• Cashiers soils that have a surface layer of coarse sandy loam, sandy loam, or loam

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Ornamental crops, pasture, and building site development

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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 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 be avoided.

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 in 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, high content of organic matter in the surface layer, and very high content of mica.
• 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 in 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 on 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 in 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 be avoided.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: 7R, based on yellow-poplar as the indicator species

CcF—Cashiers fine sandy loam, 50 to 95 percent slopes, stony

Setting

Landscape: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,600 to 4,000 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: As much as 52 acres

Composition

Cashiers soil and similar inclusions: 75 percent
Dissimilar inclusions: 25 percent

Typical Profile

Surface layer:
0 to 8 inches—dark brown fine sandy loam
8 to 13 inches—dark yellowish brown fine sandy loam

Subsoil:
13 to 29 inches—brown sandy loam
29 to 50 inches—dark yellowish brown sandy loam

Underlying material:
50 to 78 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: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; soil subject to rime ice in winter on prominent upper side slopes
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 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 Huntdale soils that have more clay and less mica in the subsoil than the Cashiers soil
• Udorthents, loamy, stony, associated with abandoned mica and feldspar mines
• 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
• Toecane soils that have more rock fragments in the subsoil than the Cashiers soil, in areas below rock outcrops and in drainageways
• Widely scattered areas of rock outcrop
• Prominent upper side slopes that are windswept

Similar inclusions:
• Cashiers soils that have a surface layer of coarse sandy loam, sandy loam, or loam

Land Use

Dominant Uses: Woodland and wildlife habitat

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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: Unsuited
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 in 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: Unsuited
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: Unsuited
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: Unsuited
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: Unsuited
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

CdC—Chandler-Micaville complex, 8 to 15 percent slopes

Setting

Landscape: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,600 to 3,800 feet
Landform: Ridges
Landform position: Summits
Shape of areas: Long and narrow
Size of areas: As much as 33 acres

Composition

Chandler soil and similar inclusions: 55 percent
Micaville soil and similar inclusions: 35 percent
Dissimilar inclusions: 10 percent

Typical Profile

Chandler

Surface layer:
0 to 4 inches—dark yellowish brown fine sandy loam

Subsoil:
4 to 28 inches—strong brown loam
28 to 37 inches—yellowish brown sandy loam

Underlying material:
37 to 45 inches—yellowish brown sandy loam saprolite
45 to 69 inches—multicolored coarse sand saprolite

Micaville

Surface layer:
0 to 3 inches—dark yellowish brown sandy loam

Subsoil:
3 to 18 inches—strong brown sandy loam
18 to 25 inches—strong brown gravelly sandy loam

Underlying material:
25 to 54 inches—multicolored sandy loam saprolite

Bedrock:
54 to 65 inches—weathered, slightly 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: 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, soils subject to 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 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
• Fannin soils that have more clay in the subsoil than the Chandler and Micaville soils, on nose slopes and shoulder slopes
• Prominent ridges that are windswept

Similar inclusions:
• Chandler soils that have a surface layer of coarse sandy loam, sandy loam, or loam
• Micaville soils that have a surface layer of coarse sandy loam, fine sandy loam, or loam

Land Use

Dominant Uses: Pasture, hayland, woodland, and wildlife habitat
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 limits equipment use in the steeper areas.
• 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, 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 be avoided.

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: 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 in the subsoil and underlying material.
• Designing structures so that they conform with natural slopes 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 or to pack if used in fill slopes.

Septic tank absorption fields

Suitability: Suited
Management concerns: Chandler—slope; Micaville—slope and depth to bedrock
Management measures and considerations:
• The local Health Department should be contacted for guidance on 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: Suited
Management concerns: Low strength, slope, erodibility, slippage, 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 in 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.
• The soft bedrock underlying these soils does not require special equipment for excavation but is difficult to vegetate or to pack if used in fill slopes.

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 be avoided.
• 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, 11A in areas of the Chandler soil and 10A in areas of the Micaville soil

CeD—Chandler-Micaville complex, 15 to 30 percent slopes, stony

Setting

Landscape: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,400 to 4,200 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: As much as 105 acres

Composition

Chandler soil and similar inclusions: 55 percent
Micaville soil and similar inclusions: 35 percent
Dissimilar inclusions: 10 percent

Typical Profile

Chandler

Surface layer:
0 to 4 inches—dark yellowish brown fine sandy loam

Subsoil:
4 to 28 inches—strong brown loam
28 to 37 inches—yellowish brown sandy loam

Underlying material:
37 to 45 inches—yellowish brown sandy loam saprolite
45 to 69 inches—multicolored coarse sand saprolite

Micaville

Surface layer:
0 to 3 inches—dark yellowish brown sandy loam

Subsoil:
3 to 18 inches—strong brown sandy loam
18 to 25 inches—strong brown gravelly sandy loam

Underlying material:
25 to 54 inches—multicolored sandy loam saprolite

Bedrock:
54 to 65 inches—weathered, slightly 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, soils subject to 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 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
- 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
- Udorthents, loamy, stony, associated with abandoned mica and feldspar mines
- Widely scattered areas of rock outcrop, on narrow ridges
- Prominent ridges that are windswept

Similar inclusions:
- Chandler soils that have a surface layer of coarse sandy loam, sandy loam, or loam
- Micaville 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: 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 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 be avoided.

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 in 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 in 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 or to 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 on 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 in 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 or to 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 helps 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 be avoided.
• 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: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,400 to 4,200 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: As much as 215 acres

Composition

Chandler soil and similar inclusions: 40 percent
Micaville soil and similar inclusions: 35 percent
Dissimilar inclusions: 25 percent

Typical Profile

Chandler

Surface layer:
0 to 4 inches—dark yellowish brown fine sandy loam

Subsoil:
4 to 28 inches—strong brown loam
28 to 37 inches—yellowish brown sandy loam

Underlying material:
37 to 45 inches—yellowish brown sandy loam saprolite
45 to 69 inches—multicolored coarse sand saprolite

Micaville

Surface layer:
0 to 3 inches—dark yellowish brown sandy loam

Subsoil:
3 to 18 inches—strong brown sandy loam
18 to 25 inches—strong brown gravelly sandy loam

Underlying material:
25 to 54 inches—multicolored sandy loam saprolite

Bedrock:
54 to 65 inches—weathered, slightly 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, soils subject to 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 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
• 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 the Chandler and Micaville soils, on north- to east-facing side slopes
• Thunder and Toecane 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, stony, associated with abandoned mica and feldspar mines
• Widely scattered areas of rock outcrop
• Prominent ridges that are windswept

Similar inclusions:
• Chandler soils that have a surface layer of coarse sandy loam, sandy loam, or loam
• Micaville 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: Pasture, ornamental crops, and building site development

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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 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 be avoided.

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 in 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 content of mica.
• 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 in 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 or to 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 on 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, and differential settling 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 in 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 or to 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 be avoided.
• 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: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,200 to 4,200 feet
Landform: South- to west-facing mountain slopes
Landform position: Sides slopes
Shape of areas: Irregular
Size of areas: As much as 109 acres

Composition

Chandler soil and similar inclusions: 40 percent
Micaville soil and similar inclusions: 40 percent
Dissimilar inclusions: 20 percent

Typical Profile

Chandler

Surface layer:
0 to 4 inches—dark yellowish brown fine sandy loam

Subsoil:
4 to 28 inches—strong brown loam
28 to 37 inches—yellowish brown sandy loam

Underlying material:
37 to 45 inches—yellowish brown sandy loam saprolite
45 to 69 inches—multicolored coarse sand saprolite

Micaville

Surface layer:
0 to 3 inches—dark yellowish brown sandy loam

Subsoil:
3 to 18 inches—strong brown sandy loam
18 to 25 inches—strong brown gravelly sandy loam

Underlying material:
25 to 54 inches—multicolored sandy loam saprolite

Bedrock:
54 to 65 inches—weathered, slightly 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 prominent upper side slopes, soils subject to 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 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
• 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
• Toecane 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
• 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
• Widely scattered areas of rock outcrop
• Udorthents, loamy, stony, associated with abandoned mica and feldspar mines
• Prominent upper side slopes that are windswept

Similar inclusions:
• Chandler soils that have a surface layer of coarse sandy loam, sandy loam, or loam
• Micaville 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: Unsuited
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: Unsuited
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: Unsuited
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 in 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: Unsuited
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: Unsuited
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: Unsuited
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: Unsuited
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

CkF—Chestoa-Ditney-Rock outcrop complex, 30 to 95 percent slopes, very bouldery

Setting

Landscape: Low and intermediate mountains in the Flattop area
Elevation range: 1,800 to 4,600 feet
Landform: Chestoa—north- to east-facing mountain slopes and those shaded by the higher mountains; Ditney—north- to east-facing mountain slopes and west-facing mountain slopes
Landform position: Summits and side slopes
Shape of areas: Irregular
Size of areas: As much as 793 acres

Composition

Chestoa soil and similar inclusions: 45 percent
Ditney soil and similar inclusions: 20 percent
Rock outcrop: 20 percent
Dissimilar inclusions: 15 percent

Typical Profile

Chestoa

Surface layer:
0 to 3 inches—black sandy loam
3 to 8 inches—very dark brown sandy loam

Subsurface layer:
8 to 10 inches—grayish brown sandy loam

Subsoil:
10 to 13 inches—strong brown sandy loam
13 to 18 inches—light yellowish brown channery sandy loam
18 to 26 inches—yellowish brown channery sandy loam

Bedrock:
26 to 32 inches—unweathered, slightly fractured quartzite

Ditney

Surface layer:
0 to 3 inches—black fine sandy loam

Subsoil:
3 to 17 inches—yellowish brown sandy loam
17 to 25 inches—yellowish brown very gravelly sandy loam

Bedrock:
25 to 36 inches—unweathered, moderately fractured, low-grade arkosic metasandstone

Rock outcrop

Composition: Dominantly arkosic metasandstone

Properties and Qualities of the Chestoa and Ditney Soils

Depth class: Moderately deep
Drainage class: Chestoa—excessively drained; Ditney—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 stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart
Organic matter content (surface layer): Chestoa—high or very high; Ditney—low to high

Potential frost action: Chestoa—low; Ditney—moderate
Special climatic conditions: Soils subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; on prominent ridges and upper side slopes, soils subject to 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: 20 to 40 inches to hard 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:
• Lostcove soils that have more clay than the Chestoa and Ditney soils, have more rock fragments in the subsoil, and have bedrock at a depth of more than 60 inches, on footslopes, in drainageways, and on benches below rock outcrops
• Unicoi soils that have hard bedrock at a depth of 7 to 20 inches, in areas adjacent to rock outcrops
• Keener soils that have more clay in the subsoil than the Chestoa and Ditney soils and have bedrock at a depth of more than 60 inches, on benches and in saddles and gaps
• Drainageways where landslides have occurred
• Prominent ridges that are windswept

Similar inclusions:
• Chestoa soils that have a loamy sand or loam surface layer
• Chestoa soils that have a surface layer with less organic matter
• Ditney soils that have a surface layer of coarse sandy loam or loam

Land Use

Dominant Uses: Woodland and wildlife habitat

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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: Unsuited
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: Unsuited
Management concerns:
• This map unit is severely limited for timber production because of the slope, erodibility, 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: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the slope, erodibility, extent of rock outcrops, depth to and instability of the underlying bedrock, and the very bouldery surface. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the slope, extent of rock outcrops, depth to bedrock, and the very bouldery surface. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and

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

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the slope, erodibility, extent of rock outcrops, and the very bouldery surface. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: Chestoa and Ditney—7e; Rock outcrop—8s
Woodland ordination symbol: Chestoa—5R, based on yellow-poplar as the indicator species; Ditney—8R, based on eastern white pine as the indicator species; Rock outcrop—none assigned

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

Setting

Landscape: Intermountain hills and low mountains dominantly in the Jacks Creek, Green Mountain, and central areas 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: As much as 37 acres

Composition

Clifton soil and similar inclusions: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Surface layer:
0 to 8 inches—strong brown clay loam

Subsoil:
8 to 30 inches—yellowish red clay
30 to 40 inches—yellowish red clay loam
40 to 50 inches—yellowish red loam

Underlying material:
50 to 79 inches—multicolored 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: 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: 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

Similar inclusions:
• Clifton soils that have a surface layer of loam or sandy clay loam
• Random areas that have reaction in the lower part of the subsoil ranging 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,

tilth, 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 be avoided.

• 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 from 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 on sanitary facilities.
• Installing septic system distribution lines during periods when the soil is not wet helps to prevent 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, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
• 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 Jacks Creek, Green Mountain, and central areas of the county
Elevation range: 2,200 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: As much as 175 acres

Composition

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

Typical Profile

Surface layer:
0 to 8 inches—strong brown clay loam

Subsoil:
8 to 30 inches—yellowish red clay
30 to 40 inches—yellowish red clay loam
40 to 50 inches—yellowish red loam

Underlying material:
50 to 79 inches—multicolored 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: 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: 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
• Saunook soils that have a surface layer with more organic matter than that of the Clifton soil and have less clay in the subsoil, in concave areas and drainageways

Similar inclusions:
• Clifton soils that have a surface layer of loam or sandy clay loam
• Random areas that have reaction in the lower part of the subsoil ranging 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, tilth, 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 is 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 limitated 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 be avoided.
• 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 from 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 on 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 prevent 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 be avoided.
• 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 mountains dominantly in the Jacks Creek, Green Mountain, and central areas of the county
Elevation range: 2,300 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: As much as 179 acres

Composition

Clifton soil and similar inclusions: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Surface layer:
0 to 8 inches—strong brown clay loam

Subsoil:
8 to 30 inches—yellowish red clay
30 to 40 inches—yellowish red clay loam
40 to 50 inches—yellowish red loam

Underlying material:
50 to 79 inches—multicolored 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: 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: 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
• Saunook soils that have a surface layer with more organic matter than that of the Clifton soil and have less clay in the subsoil, in concave areas at the head of drains and on footslopes
• Widely scattered areas of rock outcrop

Similar inclusions:
• Clifton soils that have a surface layer of loam or sandy clay loam
• Random areas that have reaction in the lower part of the subsoil ranging to neutral

Land Use

Dominant Uses: Pasture, woodland, and wildlife habitat
Other Uses: Building site development

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 be avoided.
• 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 from 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 on 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 prevent 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.
• 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 be avoided.
• 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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: 7e
Woodland ordination symbol: 12R, based on eastern white pine as the indicator species

CrE—Craggey-Rock outcrop-Clingman complex, windswept, 30 to 50 percent slopes, rubbly

Setting

Landscape: High mountains of the Black Mountain Range
Elevation range: 4,600 to 6,600 feet
Landform: Ridges 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: As much as 53 acres

Composition

Craggey soil and similar inclusions: 40 percent
Rock outcrop: 30 percent
Clingman soil and similar inclusions: 20 percent
Dissimilar inclusions: 10 percent

Typical Profile

Craggey

Surface layer:
0 to 11 inches—black gravelly loam

Subsoil:
11 to 16 inches—dark yellowish brown gravelly loam

Bedrock:
16 to 27 inches—unweathered, slightly fractured metagraywacke

Rock outcrop

Composition: Dominantly metagraywacke bedrock

Clingman

Surface layer:
0 to 7 inches—black peat
7 to 15 inches—very dark brown mucky peat

Subsurface layer:
15 to 19 inches—dark grayish brown loamy sand

Bedrock:
19 to 30 inches—unweathered, slightly fractured metagraywacke

Properties and Qualities of the Craggey and Clingman Soils

Depth class: Craggey—shallow; Clingman—very shallow or shallow
Drainage class: 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: 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 35 percent stones and boulders that average 10 to 48 inches in diameter and 1 to 3 feet apart
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a short growing season
Soil reaction: Craggey—extremely acid to moderately acid throughout the profile; Clingman—ultra acid or extremely acid in the organic material and extremely acid to strongly acid throughout the rest of the profile
Parent material: Craggey—residuum affected by soil creep, weathered from felsic, high-grade metamorphic rock; Clingman—organic deposits underlain by mineral layers, weathered from felsic, high-grade metamorphic rock
Depth to bedrock: Craggey—10 to 20 inches to hard bedrock; Clingman—3 to 20 inches to hard bedrock
Other distinctive properties: Water movement along bedrock contact; random areas of seeps and springs; water saturation for short periods during heavy rainfall or snow melt

Minor Components

Dissimilar inclusions:
- Random areas of Burton soils that have bedrock at a depth of 20 to 40 inches
- Balsam soils that have more rock fragments in the subsoil than the Craggey and Clingman soils, in drainageways and in areas below rock outcrop
- Random areas of Tanasee soils that have bedrock at a depth of more than 60 inches
- Random areas of soils that have a high mica content in the subsoil and underlying material

Similar inclusions:
- Craggey soils that have a surface layer of coarse sandy loam, sandy loam, or fine sandy loam
- Clingman soils that have a thicker mineral subsoil

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, depth to bedrock, rubbly surface, extent of rock outcrops, and short growing season. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for the production of pasture and hay crops because of the depth to bedrock, rubbly surface, extent of rock outcrops, and short growing season. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the depth to bedrock, rubbly surface, extent of rock outcrops, 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: Unsuited
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, rubbly surface, and extent of rock outcrops. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the depth to bedrock, rubbly surface, extent of rock outcrops, extreme freezing, and damaging high winds. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the depth to bedrock, rubbly surface, extent of rock outcrops, and extreme freezing. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the depth to bedrock, rubbly surface, extent of rock outcrops, and extreme freezing. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the depth to bedrock, rubbly surface, extent of rock outcrops, damaging high winds, and short growing season. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: Craggey and Clingman—7e; Rock outcrop—8s
Woodland ordination symbol: Craggey and Clingman—2R, based on northern red oak as the indicator species; Rock outcrop—none assigned

CrF—Craggey-Rock outcrop-Clingman complex, windswept, 50 to 95 percent slopes, rubbly

Setting

Landscape: High mountains of the Black Mountain Range
Elevation range: 4,600 to 6,600 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 121 acres

Composition

Craggey soil and similar inclusions: 45 percent
Rock outcrop: 30 percent
Clingman soil and similar inclusions: 10 percent
Dissimilar inclusions: 15 percent

Typical Profile

Craggey

Surface layer:
0 to 11 inches—black gravelly loam

Subsoil:
11 to 16 inches—dark yellowish brown gravelly loam

Bedrock:
16 to 27 inches—unweathered, slightly fractured metagraywacke

Rock outcrop

Composition: Dominantly metagraywacke bedrock

Clingman

Surface layer:
0 to 7 inches—black peat
7 to 15 inches—very dark brown mucky peat

Subsurface layer:
15 to 19 inches—dark grayish brown loamy sand

Bedrock:
19 to 30 inches—unweathered, slightly fractured metagraywacke

Properties and Qualities of the Craggey and Clingman Soils

Depth class: Craggey—shallow; Clingman—very shallow or shallow
Drainage class: 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: 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 35 percent stones and boulders that average 10 to 48 inches in diameter and 1 to 3 feet apart
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a short growing season
Soil reaction: Craggey—extremely acid to moderately acid throughout the profile; Clingman—ultra acid or extremely acid in the organic material and extremely acid to strongly acid throughout the rest of the profile
Parent material: Craggey—residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic rock; Clingman—organic deposits underlain by mineral layers, weathered from felsic, high-grade metamorphic rock
Depth to bedrock: Craggey—10 to 20 inches to hard bedrock; Clingman—3 to 20 inches to hard bedrock
Other distinctive properties: Water movement along bedrock contact; random areas of seeps and springs; water saturation for short periods during heavy rainfall or snow melt; soils subject to mass movement when saturated

Minor Components

Dissimilar inclusions:
- Random areas of Burton soils that have bedrock at a depth of 20 to 40 inches
- Balsam soils that have more rock fragments in the subsoil than the Craggey and Clingman soils, in drainageways
- Random areas of Tanasee soils that have bedrock at a depth of more than 60 inches
- Random areas of soils that have a high mica content in the subsoil and underlying material

Similar inclusions:
- Craggey soils that have a surface layer of coarse sandy loam, sandy loam, or fine sandy loam
- Clingman soils that have a mineral horizon more than 4 inches thick

Land Use

Dominant Uses: Woodland and wildlife habitat

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for crop production because of the slope, erodibility, depth to bedrock, rubbly surface, extent of rock outcrops, and short growing season. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for the production of pasture and hay crops because of the depth to bedrock, rubbly surface, extent of rock outcrops, and short growing season. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the depth to bedrock, rubbly surface, extent of rock outcrops, 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: Unsuited
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, rubbly surface, and extent of rock outcrops. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the slope, erodibility, depth to bedrock, rubbly surface, extent of rock outcrops, extreme freezing, and damaging high winds. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the slope, depth to bedrock, rubbly surface, extent of rock outcrops, and extreme freezing. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the slope, erodibility, depth to bedrock, rubbly surface, extent of rock outcrops, and extreme freezing. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the slope, erodibility, depth to bedrock, rubbly surface, extent of rock outcrops, damaging high winds, and short growing season. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: Craggey and Clingman—7e; Rock outcrop—8s
Woodland ordination symbol: Craggey and Clingman—2R, based on northern red oak as the indicator species; Rock outcrop—none assigned

DeA—Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded

Setting

Landscape: Mountain valleys
Elevation range: 2,000 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: As much as 329 acres

Composition

Dellwood soil and similar inclusions: 45 percent
Reddies soil and similar inclusions: 35 percent
Dissimilar inclusions: 20 percent

Typical Profile

Dellwood

Surface layer:
0 to 4 inches—very dark grayish brown loamy fine sand
4 to 15 inches—dark brown loamy fine sand

Underlying material:
15 to 67 inches—multicolored very gravelly coarse sand

Reddies

Surface layer:
0 to 2 inches—very dark grayish brown fine sandy loam
2 to 13 inches—dark brown fine sandy loam

Subsoil:
13 to 23 inches—dark yellowish brown fine sandy loam

Underlying material:
23 to 30 inches—dark yellowish brown very gravelly fine sandy loam
30 to 62 inches—multicolored extremely cobbly loamy coarse sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
General texture class: Dellwood—sandy in the upper part of the profile and sandy-skeletal in the lower part; Reddies—sandy in the upper part of the profile 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: Soils subject to 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
• Somewhat poorly drained Bandana soils that have a subsoil that is loamy in the upper part and that 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
• 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, old stream channels, and backwater areas
• Moderately well drained Dillard soils that have more clay and less rock fragments in the subsoil than the Dellwood and Reddies soils, on low stream terraces and toeslopes
• 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 sandy loam or loam surface layer

Land Use

Dominant Uses: Cropland and ornamental crops
Other Uses: Pasture, hayland, recreation, 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

Figure 3.—Soils in the Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded, are droughty. Crop yields are improved with proper irrigation.

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. 3).
• 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: Unsuited
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 orchards or 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 is limited for the production of Fraser fir and other susceptible 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 be avoided.
• 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.
• 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.
• 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 the Reddies soil.
• Ball and burlap harvesting is severely limited in areas of the Dellwood soil 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: Unsuited
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: Unsuited
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: Unsuited
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 because of the flooding and is severely limited for use as lawns and landscaping 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 plant varieties that are adapted to droughty conditions help to increase the survival rate 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 is 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 be avoided.
• 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

DrB—Dillard loam, 2 to 8 percent slopes, rarely flooded

Setting

Landscape: Mountain valleys
Elevation range: 2,500 to 3,000 feet
Landform: Low stream terraces and colluvial fans throughout the county
Landform position: Concave to planar toeslopes
Shape of areas: Long and narrow
Size of areas: As much as 37 acres

Composition

Dillard soil and similar inclusions: 75 percent
Dissimilar inclusions: 25 percent

Typical Profile

Surface layer:
0 to 8 inches—brown loam

Subsoil:
8 to 17 inches—brownish yellow sandy clay loam
17 to 23 inches—pale brown clay loam
23 to 27 inches—brown clay loam

Underlying material:
27 to 32 inches—yellowish brown clay loam
32 to 63 inches—light gray sandy clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Moderately well drained
General texture class: Loamy
Permeability: Moderately slow
Available water capacity: Moderate or high
Depth to seasonal high water table: 2.0 to 3.0 feet from December through May
Hazard of flooding: Rare, throughout the year with standing water for less than 2 days
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 or high
Potential frost action: Moderate
Soil reaction: Strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to moderately acid in the B and C horizons

Parent material: Old alluvium 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:
• Well drained Saunook soils on footslopes
• 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
• Poorly drained soils that have loamy to clayey subsoils, in depressions, old stream channels, and backwater areas
• Well drained Rosman soils that have a loamy subsoil, along stream channels
• 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 stream channels

Similar inclusions:
• Dillard soils that have a surface layer of sandy loam, fine sandy loam, or clay loam
• Dillard soils that have more organic matter in the surface layer

Land Use

Dominant Uses: Cropland
Other Uses: Pasture and hayland

Agricultural Development

Cropland

Suitability: Well suited
Management concerns: Erodibility, climate, tilth, 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.
• Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
• 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: Erodibility, flooding, 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.
• 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, wetness, flooding, climate, root disease, and soil fertility
Management measures and considerations:
• Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
• 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.
• Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
• Because of the seasonal high water table, wetness, and 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 susceptible ornamentals.
• In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.

Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods and very high for 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, wetness, erodibility, and corrosivity
Management measures and considerations:
• An onsite investigation is needed to determine the suitability and limitations of any area within this map unit for dwellings.

Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Wetness, seeps and springs, and restricted permeability
Management measures and considerations:
• The local Health Department should be contacted for guidance on sanitary facilities.
• This map unit is difficult to manage for septic tank absorption fields due to a seasonal high water table at a depth of 2.0 to 3.0 feet.
• Excavations may cut into seeps and springs. These areas should be avoided.

Local roads and streets

Suitability: Poorly suited
Management concerns: Low strength, seeps and springs, erodibility, and flooding
Management measures and considerations:
• When the soil is wet, unsurfaced roads are highly erodible and very slick due the content of silt and clay in the subsoil.
• 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.

Lawns and landscaping

Suitability: Suited
Management concerns: Erodibility, wetness, flooding, root disease, soil fertility, soil compaction, and climate
Management measures and considerations:
• Designing plantings on natural contours helps to increase water infiltration. Vegetating disturbed areas and using erosion-control structures, such as sediment fences, help to keep eroding soil on site.
• Because of the seasonal high water table, wetness, and 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 susceptible ornamentals.
• In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
• 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.
• 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.

Interpretive Groups

Land capability classification: 2w
Woodland ordination symbol: 12A, based on eastern white pine as the indicator species

DuD—Ditney-Unicoi complex, 15 to 30 percent slopes, very stony

Setting

Landscape: Low and intermediate mountains in the Flattop area
Elevation range: 3,000 to 4,700 feet
Landform: Ridges
Landform position: Summits and upper side slopes
Shape of areas: Long and narrow
Size of areas: As much as 51 acres

Composition

Ditney soil and similar inclusions: 45 percent
Unicoi soil and similar inclusions: 35 percent
Dissimilar inclusions: 20 percent

Typical Profile

Ditney

Surface layer:
0 to 3 inches—black fine sandy loam

Subsoil:
3 to 17 inches—yellowish brown sandy loam
17 to 25 inches—yellowish brown very gravelly sandy loam

Bedrock:
25 to 36 inches—unweathered, moderately fractured, low-grade arkosic metasandstone

Unicoi

Surface layer:
0 to 3 inches—brown gravelly loam

Subsoil:
3 to 15 inches—yellowish brown very cobbly loam

Bedrock:
15 to 26 inches—unweathered, highly fractured, low-grade arkosic metasandstone

Soil Properties and Qualities

Depth class: Ditney—moderately deep; Unicoi—shallow
Drainage class: Ditney—well drained; Unicoi—excessively drained
General texture class: Ditney—loamy; Unicoi—loamy with many rock fragments
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: 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): Low to high
Potential frost action: Moderate
Special climatic conditions: On prominent ridges, soils subject to 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: Ditney—20 to 40 inches to hard bedrock; Unicoi—7 to 20 inches to hard 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 Harmiller and Shinbone soils that have more clay in the subsoil than the Ditney and Unicoi soils and have soft bedrock at a depth of 20 to 60 inches
• Widely scattered areas of rock outcrop
• Keener soils that have more clay in the subsoil than the Ditney and Unicoi soils and have bedrock at a depth of more than 60 inches, on benches and in saddles and gaps
• Prominent ridges that are windswept
• Chestoa soils that have thicker surface layers with more organic matter than the Ditney and Unicoi soils and have hard bedrock at a depth of 20 to 40 inches, on Flattop Mountain

Similar inclusions:
• Ditney soils that have a sandy loam or loam surface layer
• Unicoi soils that have a surface layer of sandy loam or fine sandy loam

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, depth to bedrock, and very stony surface. A site on better suited soils should be selected.

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.
• Removing the larger stones or limiting equipment use to the larger open areas may be needed.
• This map unit is difficult to manage for the production of pasture and hay crops because of the limited rooting depth.
• 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: Ditney—poorly suited; Unicoi—unsuited
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 moderate for eastern white pine
Suitability: Poorly suited
Management concerns: Equipment use, erodibility, windthrow hazard, and seedling survival
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, 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 the droughty nature of these soils, cut and fill slopes can 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: Ditney—poorly suited; Unicoi—unsuited
Management concerns:
• This map unit is not managed for dwellings.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the depth to bedrock. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Poorly suited
Management concerns: Depth to bedrock, slope, erodibility, slippage, 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.
• 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 the droughty nature of these soils, cut and fill slopes can be difficult to revegetate.
• 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: Ditney—poorly suited; Unicoi—unsuited
Management concerns:
• This map unit is not managed for lawns and landscaping.

Interpretive Groups

Land capability classification: Ditney—6e; Unicoi—7s
Woodland ordination symbol: Based on eastern white pine as the indicator species, 8R in areas of the Ditney soil and 7R in areas of the Unicoi soil

DuE—Ditney-Unicoi complex, 30 to 50 percent slopes, very stony

Setting

Landscape: Low and intermediate mountains in the Flattop area
Elevation range: 2,200 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: As much as 73 acres

Composition

Ditney soil and similar inclusions: 55 percent
Unicoi soil and similar inclusions: 35 percent
Dissimilar inclusions: 10 percent

Typical Profile

Ditney

Surface layer:
0 to 3 inches—black fine sandy loam

Subsoil:
3 to 17 inches—yellowish brown sandy loam
17 to 25 inches—yellowish brown very gravelly sandy loam

Bedrock:
25 to 36 inches—unweathered, moderately fractured, low-grade arkosic metasandstone

Unicoi

Surface layer:
0 to 3 inches—brown gravelly loam

Subsoil:
3 to 15 inches—yellowish brown very cobbly loam

Bedrock:
15 to 26 inches—unweathered, highly fractured, low-grade arkosic metasandstone

Soil Properties and Qualities

Depth class: Ditney—moderately deep; Unicoi—shallow
Drainage class: Ditney—well drained; Unicoi—excessively drained
General texture class: Ditney—loamy; Unicoi—loamy with many rock fragments
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: 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, soils subject to 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: Ditney—20 to 40 inches to hard bedrock; Unicoi—7 to 20 inches to hard 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 Harmiller and Shinbone soils that have more clay in the subsoil than the Ditney and Unicoi soils and have soft bedrock at a depth of 20 to 60 inches
• Widely scattered areas of rock outcrop
• Lostcove soils that have higher clay content and more rock fragments in the subsoil than the Ditney and Unicoi soils, in drainageways and on benches below rock outcrops
• Keener soils that have more clay in the subsoil than the Ditney and Unicoi soils and have bedrock at a depth of more than 60 inches, on benches and in saddles and gaps
• Chestoa soils that have thicker surface layers with more organic matter than the Ditney and Unicoi soils and have hard bedrock at a depth of 20 to 40 inches, on north-facing slopes
• Prominent ridges that are windswept

Similar inclusions:
• Ditney soils that have a sandy loam or loam surface layer
• Unicoi soils that have a surface layer of sandy loam or fine sandy loam

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, depth to bedrock, and very stony surface. A site on better suited soils should be selected.

Pasture and hayland

Suitability for pasture: Poorly suited

Suitability for hayland: Unsuited
Management concerns:
• This map unit is not managed for pasture and hayland.

Orchards and ornamental crops

Suitability: Ditney—poorly suited; Unicoi—unsuited
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 moderate for eastern white pine
Suitability: Poorly suited
Management concerns: Equipment use, erodibility, windthrow hazard, and seedling survival
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.
• 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 the droughty nature of these soils, cut and fill slopes can be difficult to revegetate.
• Extensive blasting, shaping, and grading are needed if roads are to be constructed on the contour.
• 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 because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Ditney—poorly suited; Unicoi—unsuited
Management concerns:
• This map unit is not managed for dwellings.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the depth to bedrock. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, erodibility, depth to bedrock, slippage, 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. 4).
• 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 the droughty nature of these soils, cut and fill slopes can be difficult to revegetate.
• 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: Ditney—poorly suited; Unicoi—unsuited
Management concerns:
• This map unit is not managed for lawns and landscaping.

Interpretive Groups

Land capability classification: Ditney—7e; Unicoi—7s
Woodland ordination symbol: Based on eastern white pine as the indicator species, 8R in areas of the Ditney soil and 7R in areas of the Unicoi soil

DwF—Ditney-Unicoi complex, 50 to 95 percent slopes, very rocky

Setting

Landscape: Low and intermediate mountains in the Flattop area

Figure 4.—Low-grade metasedimentary rock underlies soils such as Ditney, Unicoi, and Chestoa. This bedrock is unstable when lateral support is removed during construction of roads.

Elevation range: 2,500 to 4,000 feet
Landform: South- to west-facing mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 299 acres

Composition

Ditney soil and similar inclusions: 45 percent
Unicoi soil and similar inclusions: 35 percent
Dissimilar inclusions: 20 percent

Typical Profile

Ditney

Surface layer:
0 to 3 inches—black fine sandy loam

Subsoil:
3 to 17 inches—yellowish brown sandy loam
17 to 25 inches—yellowish brown very gravelly sandy loam

Bedrock:
25 to 36 inches—unweathered, moderately fractured, low-grade arkosic metasandstone

Unicoi

Surface layer:
0 to 3 inches—brown gravelly loam

Subsoil:
3 to 15 inches—yellowish brown very cobbly loam

Bedrock:
15 to 26 inches—unweathered, highly fractured, low-grade arkosic metasandstone

Soil Properties and Qualities

Depth class: Ditney—moderately deep; Unicoi—shallow
Drainage class: Ditney—well drained; Unicoi—excessively drained
General texture class: Ditney—loamy; Unicoi—loamy with many rock fragments
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: 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
Extent of rock outcrop: About 10 percent rock outcrop on the soil surface
Organic matter content (surface layer): Low to high
Potential frost action: Moderate
Special climatic conditions: On prominent upper side slopes, soils subject to 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: Ditney—20 to 40 inches to hard bedrock; Unicoi—7 to 20 inches to hard 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:
- Lostcove soils that have more clay than the Ditney and Unicoi 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
- Keener soils that have more clay in the subsoil than the Ditney and Unicoi soils and have bedrock at a depth of more than 60 inches, on footslopes
- Drainageways where landslides have occurred
- Soils that have thicker surface layers with more organic matter than the Ditney and Unicoi soils, on north- to east-facing side slopes

Similar inclusions:
- Ditney soils that have a sandy loam or loam surface layer
- Unicoi soils that have a surface layer of sandy loam or fine sandy loam

Land Use

Dominant Uses: Woodland and wildlife habitat

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for crop production because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for the production of pasture and hay crops because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Woodland Management and Productivity

Potential for commercial species: Not used
Suitability: Unsuited

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

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the slope, depth to bedrock, and extent of rock outcrops. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: Ditney—7e; Unicoi—7s
Woodland ordination symbol: Based on eastern white pine as the indicator species, 8R in areas of the Ditney soil and 7R in areas of the Unicoi soil

EaC2—Evard-Cowee complex, 8 to 15 percent slopes, eroded

Setting

Landscape: Intermountain hills and low mountains dominantly in the central and eastern parts 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: As much as 37 acres

Composition

Evard soil and similar inclusions: 50 percent
Cowee soil and similar inclusions: 45 percent
Dissimilar inclusions: 5 percent

Typical Profile

Evard

Surface layer:
0 to 4 inches—dark reddish brown clay loam

Subsoil:
4 to 12 inches—yellowish red clay loam
12 to 32 inches—red clay loam
32 to 49 inches—red loam

Underlying material:
49 to 63 inches—red loam saprolite

Cowee

Surface layer:
0 to 4 inches—dark reddish brown clay loam

Subsoil:
4 to 19 inches—red clay loam
19 to 31 inches—yellowish red clay loam

Bedrock:
31 to 42 inches—weathered, highly 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: 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 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 thicker surface layers with more organic matter than the Evard and Cowee soils and have bedrock at a depth of more than 60 inches, in saddles and gaps
• Soils that have high base saturation in the lower part of the subsoil, dominantly in the Bald Creek, Jacks Creek, and Green Mountain areas
• Prominent ridges that are windswept

Similar inclusions:
• Evard and Cowee soils that have surface layers of sandy loam, fine sandy loam, or 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: 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, tilth, 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 the high clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, may increase their effectiveness.
• Areas of the Cowee soil are difficult to manage for cultivated crops because of the low available water capacity caused by the moderately deep rooting depth.

Pasture and hayland

Suitability: Well suited
Management concerns: Equipment use, erodibility, soil fertility, rooting depth, and pesticide retention 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 increases 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 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.
• Areas of the Cowee soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

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 the high clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the clay content, 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 is limited for the production of Fraser fir and other susceptible ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Areas of the Cowee soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

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 from compaction.
- Livestock should not be allowed to graze in areas managed for woodland.
- Soil-applied herbicides may be retained due to herbicide-clay bonding, and they may damage tree seedlings when cropland is converted to woodland.
- Productivity is limited in areas of the Cowee soil because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Suited

Management concerns: Evard—slope, erodibility, and corrosivity; Cowee—slope, erodibility, corrosivity, and depth to bedrock

Management measures and considerations:

- Designing structures so that they conform with natural slopes 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 or to 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 on 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: 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 these soils does not require special equipment for excavation but is difficult to vegetate or to pack if used in fill slopes.

Lawns and landscaping

Suitability: Evard—suited; Cowee—poorly sutied
Management concerns: Slope, erodibility, soil compaction, soil fertility, pesticide retention, root disease, 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.
• These soils 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 plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 is limited for the production of Fraser fir and other susceptible ornamentals.
• In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
• Because of the moderately deep rooting depth, areas of the Cowee soil are difficult to manage for lawns and landscaping, 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, 12A in areas of the Evard soil and 10D in areas of the Cowee soil

EcD—Evard-Cowee complex, 15 to 30 percent slopes, stony

Setting

Landscape: Intermountain hills and low and intermediate mountains dominantly in the northern, eastern, and central parts of the county
Elevation range: 2,200 to 3,500 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: As much as 76 acres

Composition

Evard soil and similar inclusions: 50 percent
Cowee soil and similar inclusions: 30 percent
Dissimilar inclusions: 20 percent

Typical Profile

Evard

Surface layer:
0 to 4 inches—dark reddish brown loam

Subsoil:
4 to 12 inches—yellowish red clay loam
12 to 32 inches—red clay loam
32 to 49 inches—red loam

Underlying material:
49 to 63 inches—red loam saprolite

Cowee

Surface layer:
0 to 4 inches—dark reddish brown gravelly loam

Subsoil:
4 to 19 inches—red clay loam
19 to 31 inches—yellowish red clay loam

Bedrock:
31 to 42 inches—weathered, highly 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
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: 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 thicker surface layers with more organic matter than 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 that have a high base saturation in the lower part of the subsoil, dominantly in the Bald Creek, Jacks Creek, and Green Mountain areas
• Prominent ridges and upper side slopes 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, orchards, and building site development

Agricultural Development

Cropland

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, tilth, 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.
• Areas of the Cowee soil are difficult to manage for cultivated crops because of the low available water capacity caused by the moderately deep rooting depth.

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.
• Areas of the Cowee soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

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 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 is 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 be avoided.

• Areas of the Cowee soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

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 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 from 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: 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 these soils does not require special equipment for excavation but is difficult to vegetate or to 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 on 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 these soils does not require special equipment for excavation but is difficult to vegetate or to pack if used in fill slopes.

Lawns and landscaping

Suitability: Poorly suited
Management concerns: Slope, erodibility, soil compaction, 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.
• 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 is 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Cowee soil are difficult to manage for lawns and landscaping, 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

EcE—Evard-Cowee complex, 30 to 50 percent slopes, stony

Setting

Landscape: Intermountain hills and low and intermediate mountains dominantly in the northern, eastern, and central parts of the county
Elevation range: 2,000 to 3,600 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: As much as 191 acres

Composition

Evard soil and similar inclusions: 50 percent
Cowee soil and similar inclusions: 30 percent
Dissimilar inclusions: 20 percent

Typical Profile

Evard

Surface layer:
0 to 4 inches—dark reddish brown loam

Subsoil:
4 to 12 inches—yellowish red clay loam
12 to 32 inches—red clay loam
32 to 49 inches—red loam

Underlying material:
49 to 63 inches—red loam saprolite

Cowee

Surface layer:
0 to 4 inches—dark reddish brown gravelly loam

Subsoil:
4 to 19 inches—red clay loam
19 to 31 inches—yellowish red clay loam

Bedrock:
31 to 42 inches—weathered, highly 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 thicker surface layers with more organic matter than 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 thicker surface layers with more organic matter than the Evard and Cowee soils, on north- to east-facing side slopes
• Widely scattered areas of rock outcrop
• Thunder soils that have thicker surface layers with more organic matter than 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 Bald Creek, Jacks Creek, and Green Mountain areas

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, ornamental crops, and orchards

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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.
• 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.
• Areas of the Cowee soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

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 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 is 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 be avoided.
• Areas of the Cowee soil are difficult to manage for

orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

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 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 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.
• 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 these soils does not require special equipment for excavation but is difficult to vegetate or to 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 on 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, 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 is 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Cowee soil are difficult to manage for lawns and landscaping, 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

FeC2—Fannin sandy clay loam, 8 to 15 percent slopes, eroded

Setting

Landscape: Intermountain hills and low mountains dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,400 to 3,500 feet
Landform: Ridges
Landform position: Summits
Shape of areas: Long and narrow
Size of areas: As much as 177 acres

Composition

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

Typical Profile

Surface layer:
0 to 3 inches—brown sandy clay loam

Subsoil:
3 to 18 inches—red sandy clay loam
18 to 27 inches—red clay loam
27 to 31 inches—yellowish red sandy clay loam

Underlying material:
31 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: 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 thicker subsoils
• 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 the Fannin soil and have a thicker subsoil, in saddles and gaps
• Udorthents, loamy, stony, and areas associated with small, hand dug mica mines, in the central and southern parts of the county

Similar inclusions:
• Fannin soils that have a loam or clay loam surface layer
• Similar soils that have a brown subsoil

Land Use

Dominant Uses: Pasture, hayland, woodland, and wildlife habitat
Other Uses: Ornamental crops and building site development

Agricultural Development

Cropland

Suitability: Suited
Management concerns: Erodibility, equipment use, tilth, 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.
• Preparing seedbeds on the contour when renovating pastures and establishing seedbeds helps to prevent further 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 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 is limited for the production of Fraser fir and other susceptible ornamentals.
• In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

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 in 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 in the subsoil and underlying material.
• Designing structures so that they conform with natural slopes 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 on 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 in 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 susceptible ornamentals.
• In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

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 dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,200 to 3,500 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: As much as 96 acres

Composition

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

Typical Profile

Surface layer:
0 to 3 inches—brown sandy clay loam

Subsoil:
3 to 18 inches—red sandy clay loam
18 to 27 inches—red clay loam
27 to 31 inches—yellowish red sandy clay loam

Underlying material:
31 to 80 inches—multicolored 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: 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 have thicker subsoils
• 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 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, stony, and areas associated with small, hand dug mica mines, in the central and southern parts of the county

Similar inclusions:
• Fannin soils that have a loam or clay loam surface layer
• Similar soils that have a brown 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: Equipment use, erodibility, tilth, 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 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 is 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 be avoided.

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 in 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 in 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 on 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 in 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 is 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 be avoided.

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 dominantly in the central, southeastern, and southwestern parts of the county
Elevation range: 2,200 to 3,500 feet
Landform: South- to west-facing hillslopes and mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 128 acres

Composition

Fannin soil and similar inclusions: 75 percent
Dissimilar inclusions: 25 percent

Typical Profile

Surface layer:
0 to 3 inches—brown sandy clay loam

Subsoil:
3 to 18 inches—red sandy clay loam
18 to 27 inches—red clay loam
27 to 31 inches—yellowish red sandy clay loam

Underlying material:
31 to 80 inches—multicolored 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 thicker subsoils
• 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 the Fannin soil and have a thicker subsoil, in concave areas at the head of drains, on footslopes, and in drainageways
• Udorthents, loamy, stony, and areas associated with small, hand dug mica mines, in the central and southern parts of the county

Similar inclusions:
• Fannin soils that have a loam or clay loam surface layer
• Similar soils that have a brown subsoil

Land Use

Dominant Uses: Pasture, woodland, and wildlife habitat
Other Uses: Ornamental crops and building site development

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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.
• 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 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 is 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 be avoided.

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 in 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 in 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 on 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 in 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 is 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 be avoided.

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 Flattop area
Elevation range: 2,200 to 4,400 feet
Landform: Ridges
Landform position: Summits and upper side slopes

Shape of areas: Long and narrow or irregular on summits and irregular on side slopes
Size of areas: As much as 96 acres

Composition

Harmiller soil and similar inclusions: 55 percent
Shinbone soil and similar inclusions: 30 percent
Dissimilar inclusions: 15 percent

Typical Profile

Harmiller

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

Subsoil:
3 to 17 inches—yellowish brown loam
17 to 23 inches—brownish yellow gravelly loam
23 to 33 inches—brownish yellow gravelly coarse sandy loam

Bedrock:
33 to 44 inches—weathered, moderately fractured, low-grade metasandstone

Shinbone

Surface layer:
0 to 4 inches—very dark grayish brown loam

Subsoil:
4 to 7 inches—brown loam
7 to 16 inches—light yellowish brown channery loam
16 to 32 inches—brownish yellow channery loam

Underlying material:
32 to 45 inches—brownish yellow channery fine sandy loam saprolite

Bedrock:
45 to 81 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
Special climatic conditions: On prominent ridges, soils subject to 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 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 soils that are similar to the Harmiller and Shinbone soils but have less clay in the subsoil
- 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
- 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 shoulder slopes
- Unicoi soils that have less clay and more rock fragments in the subsoil than the Harmiller and Shinbone soils and have hard bedrock at a depth of 7 to 20 inches, on shoulder slopes and adjacent to widely scattered areas of rock outcrop
- Lostcove soils that have thicker subsoils with more rock fragments than the Harmiller and Shinbone soils, in drainageways
- Prominent ridges that are windswept

Similar inclusions:
- Harmiller and Shinbone soils that have surface layers of sandy loam or fine sandy 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.
• Areas of the Harmiller soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

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, rooting depth, and windthrow hazard; Shinbone—equipment use, erodibility, and rooting depth
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 the droughty nature of these soils, cut and fill slopes can 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 from compaction.
• Productivity is limited in areas of the Harmiller soil because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Poorly suited
Management concerns: Harmiller—slope, erodibility, corrosivity, and depth to bedrock; Shinbone—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.
• Because of the low natural fertility and the droughty nature of these soils, cut and fill slopes can 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 on 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 the droughty nature of these soils, cut and fill slopes can 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 depth to bedrock and droughtiness 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, and irrigation help to establish lawns and landscape plants.
• The use of native landscape plants that are tolerant of 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Harmiller soil are difficult to manage for lawns and landscaping, 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 Flattop area
Elevation range: 1,800 to 4,000 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: As much as 107 acres

Composition

Harmiller soil and similar inclusions: 45 percent
Shinbone soil and similar inclusions: 35 percent
Dissimilar inclusions: 20 percent

Typical Profile

Harmiller

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

Subsoil:
3 to 17 inches—yellowish brown loam
17 to 23 inches—brownish yellow gravelly loam
23 to 33 inches—brownish yellow gravelly coarse sandy loam

Bedrock:
33 to 44 inches—weathered, moderately fractured, low-grade metasandstone

Shinbone

Surface layer:
0 to 4 inches—very dark grayish brown loam

Subsoil:
4 to 7 inches—brown loam
7 to 16 inches—light yellowish brown channery loam
16 to 32 inches—brownish yellow channery loam

Underlying material:
32 to 45 inches—brownish yellow channery fine sandy loam saprolite

Bedrock:
45 to 81 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 soils that are similar to the Harmiller and Shinbone soils but have less clay in the subsoil
• Keener soils that have thicker subsoils than the Harmiller and Shinbone soils, in concave areas at the head of drains and on footslopes
• Lostcove soils that have thicker subsoils with more rock fragments than 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
• Unicoi soils that have less clay and more rock fragments in the subsoil than the Harmiller and Shinbone soils and have hard bedrock at a depth of 7 to 20 inches, adjacent to widely scattered areas of rock outcrop
• Widely scattered areas of rock outcrop

Similar inclusions:
• Harmiller and Shinbone soils that have surface layers of sandy loam or fine sandy loam

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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 the droughty nature of these soils, cut and fill slopes can 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 from 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 the droughty nature of these soils, cut and fill slopes can 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

HuC—Huntdale clay loam, 8 to 15 percent slopes, stony

Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,500 to 3,800
Landform: North- to east-facing ridges and those shaded by the higher mountains
Landform position: Summits
Shape of areas: Long and narrow or irregular
Size of areas: As much as 24 acres

Composition

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

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown clay loam

Subsoil:
9 to 28 inches—strong brown clay loam
28 to 34 inches—strong brown loam

Underlying material:
34 to 63 inches—yellowish red 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: 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): High or very high
Potential frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains

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 Edneytown and Evard soils that have thinner surface layers with less organic matter than the Huntdale soil
• Random areas of Fannin soils that have a thinner surface layer with less organic matter than that of the Huntdale soil and have more mica in the subsoil
• Cowee and Pigeonroost soils that have thinner surface layers with less organic matter than the Huntdale soil and have soft bedrock at a depth of 20 to 40 inches, on shoulder slopes
• Random areas of soils that have more mica in the subsoil
• Prominent ridges that are windswept

Similar inclusions:
• Huntdale soils that have a silty loam or loam surface layer
• 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: Suited
Management concerns:
• This map unit is not managed for cropland.

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.
• 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: Erodibility, equipment use, pesticide retention, ball and burlap harvesting, climate, 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.
• 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.
• 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 is limited for the production of Fraser fir and other susceptible ornamentals.
• In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

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 from compaction.
• Livestock should not be allowed to graze in areas managed for woodland.

Urban Development

Dwellings

Suitability: Suited
Management concerns: Slope, erodibility, and corrosivity
Management measures and considerations:
• Designing structures so that they conform with natural slopes 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: Suited
Management concerns: Restricted permeability and slope
Management measures and considerations:
• The local Health Department should be contacted for guidance on 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: 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: 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 future crops. 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 is limited for the production of Fraser fir and other susceptible ornamentals.
• In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: 8A, based on yellow-poplar as the indicator species

HuD—Huntdale clay loam, 15 to 30 percent slopes, stony

Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,500 to 3,800
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: As much as 31 acres

Composition

Huntdale soil and similar inclusions: 90 percent
Dissimilar inclusions: 10 percent

Typical Profile

Surface layer:
0 to 9 inches—dark yellowish brown clay loam

Subsoil:
9 to 28 inches—strong brown clay loam
28 to 34 inches—strong brown loam

Underlying material:
34 to 63 inches—yellowish red 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: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains
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:
- Edneytown and Evard soils that have thinner surface layers with less organic matter than the Huntdale soil, on south- to west-facing shoulder slopes, nose slopes, and side slopes
- Fannin soils that have a thinner surface layer with less organic matter than the Huntdale soil and have more mica in the subsoil, on south- to west-facing shoulder slopes, nose slopes, and side slopes
- Cowee and Pigeonroost soils that have thinner surface layers with less organic matter than the Huntdale 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 Huntdale soil
- Prominent ridges that are windswept

Similar inclusions:
- Huntdale soils that have a silt loam or loam surface layer
- Similar soils that have a red subsoil

Land Use

Dominant Uses: Woodland and wildlife habitat (fig. 5)
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

Figure 5.—Pure stands of even-aged yellow-poplar occur when pastureland is abandoned on Huntdale soils.

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 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 is 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 be avoided.

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 in 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 from 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 on 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 is 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 be avoided.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: 8R, based on yellow-poplar as the indicator species

HuE—Huntdale clay loam, 30 to 50 percent slopes, stony

Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,300 to 3,800
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: As much as 81 acres

Composition

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

Typical Profile

Surface layer:
0 to 9 inches—dark brown clay loam

Subsoil:
9 to 28 inches—strong brown clay loam
28 to 34 inches—strong brown loam

Underlying material:
34 to 63 inches—yellowish red 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: 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: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains
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:
• Edneytown and Evard soils that have thinner surface layers with less organic matter than the Huntdale soil, on south- to west-facing side slopes and spur ridges
• Fannin soils that have a thinner surface layer with less organic matter than the Huntdale soil and have more mica in the subsoil, on south- to west-facing side slopes and spur ridges
• Cowee and Pigeonroost soils that have thinner surface layers with less organic matter than 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
• Thunder soils that have more rock fragments in the subsoil than the Huntdale soil, in drainageways
• Random areas of soils that have bedrock at a depth of less than 60 inches
• Widely scattered areas of rock outcrop

Similar inclusions:
• Huntdale soils that have a silty loam or loam surface layer
• 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: Unsuited
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: Unsuited
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 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 is 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 be avoided.

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 in 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 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, 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 on 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.
• 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 susceptible ornamentals.
• In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

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 bouldery

Setting

Landscape: Low and intermediate mountains in the Flattop area
Elevation range: 2,200 to 4,200 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, footslopes, and toeslopes
Shape of areas: Irregular
Size of areas: As much as 112 acres

Composition

Keener soil and similar inclusions: 60 percent
Lostcove soil and similar inclusions: 30 percent
Dissimilar inclusions: 10 percent

Typical Profile

Kenner

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

Subsoil:
3 to 10 inches—dark yellowish brown loam
10 to 19 inches—strong brown loam
19 to 30 inches—yellowish brown loam
30 to 46 inches—yellowish brown and very pale brown very cobbly sandy loam

Underlying material:
46 to 79 inches—yellowish brown very cobbly sandy loam

Lostcove

Surface layer:
0 to 4 inches—black and dark brown very cobbly sandy loam

Subsoil:
4 to 13 inches—dark yellowish brown cobbly loam
13 to 52 inches—yellowish brown extremely cobbly loam
52 to 73 inches—yellowish brown extremely gravelly coarse 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: 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
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): Keener—high; Lostcove—high or very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to 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

Similar inclusions:
• Keener soils that have a surface layer of fine sandy loam or loam
• Lostcove soils that have a surface layer of fine sandy loam or 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, very bouldery surface, and the high content of rock fragments in 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 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 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, erodibility, very bouldery surface, and the high content of rock fragments in the Lostcove soil.
• 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 is 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 be avoided.

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 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: 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 so that they conform with natural slopes 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 from overland flow of storm water.
• 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 on 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 be avoided.
• 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, and frost action and differential settling in areas of the Lostcove 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 Lostcove soil is subject to uneven settling and may be unstable if not properly compacted.

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 bouldery 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 is 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 be avoided.

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

KcE—Keener-Lostcove complex, 30 to 50 percent slopes, very bouldery

Setting

Landscape: Low and intermediate mountains in the Flattop area
Elevation range: 1,800 to 4,400 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, footslopes, and toeslopes
Shape of areas: Irregular
Size of areas: As much as 178 acres

Composition

Keener soil and similar inclusions: 50 percent
Lostcove soil and similar inclusions: 45 percent
Dissimilar inclusions: 5 percent

Typical Profile

Keener

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

Subsoil:
3 to 10 inches—dark yellowish brown loam
10 to 19 inches—strong brown loam
19 to 30 inches—yellowish brown loam
30 to 46 inches—yellowish brown and very pale brown very cobbly sandy loam

Underlying material:
46 to 79 inches—yellowish brown very cobbly sandy loam

Lostcove

Surface layer:
0 to 4 inches—black and dark brown very cobbly sandy loam

Subsoil:
4 to 13 inches—dark yellowish brown cobbly loam
13 to 52 inches—yellowish brown extremely cobbly loam
52 to 73 inches—yellowish brown extremely gravelly coarse 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: 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: 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): Keener—high; Lostcove—high or very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to 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

Similar inclusions:
• Keener soils that have a surface layer of fine sandy loam or loam
• Lostcove soils that have a surface layer of fine sandy loam or loam

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, and very bouldery surface. A site on better suited soils should be selected.

Pasture and hayland

Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns:
• This map unit is not managed for pasture and hayland.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the slope, the very bouldery surface, and the skeletal subsoil of the Lostcove soil. A site on better suited soils should be selected.

Woodland Management and Productivity

Potential for commercial species: Moderate for cove 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.
• 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 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: Keener—poorly suited; Lostcove—unsuited
Management concerns:
• This map unit is not managed for dwellings.

Septic tank absorption fields

Suitability: Keener—poorly suited; Lostcove—unsuited
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 Lostcove 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 Lostcove soil is subject to uneven settling and may be unstable if not properly compacted.

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 yellow-poplar as the indicator species, 8R in areas of the Keener soil and 7R in areas of the Lostcove soil

NkA—Nikwasi sandy loam, 0 to 3 percent slopes, occasionally flooded

Setting

Landscape: Valleys of mountains and intermountain hills
Elevation range: 2,500 to 3,200 feet
Landform: Dominantly areas on the wider flood plains throughout the county
Landform position: Planar to slightly concave bottomland slopes
Shape of areas: Irregular
Size of areas: As much as 60 acres

Composition

Nikwasi soil and similar inclusions: 75 percent
Dissimilar inclusions: 25 percent

Typical Profile

Surface layer:
0 to 12 inches—black sandy loam
12 to 17 inches—very dark gray loam

Underlying material:
17 to 30 inches—dark grayish brown sandy clay loam
30 to 36 inches—dark gray sandy loam
36 to 62 inches—multicolored very gravelly sand

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Poorly drained
General texture class: Loamy in the upper part and sandy-skeletal in the lower part
Permeability: Moderately rapid
Available water capacity: Low
Depth to seasonal high water table: 1.0 foot or less 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): High or very high
Potential frost action: Moderate
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Very 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 ponding for brief duration during wet periods throughout the year

Minor Components

Dissimilar inclusions:
• 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 rarely flooded, in the center of wide map units and adjacent to toeslopes
• Somewhat poorly drained Bandana soils that have less clay in the subsoil than the Nikwasi soil, along drainageways
• Poorly drained soils that have clayey subsoils, in low-lying depressions in backwater areas

Similar inclusions:
• Nikwasi soils that have a surface layer of fine sandy loam or loam
• Nikwasi soils that have a surface layer less than 10 inches thick

Land Use

Dominant Uses: Pasture and hayland
Other Uses: Cropland, woodland, and wildlife habitat

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production

because of the wetness and flooding. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Poorly 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.
• 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: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the wetness and flooding. A site on better suited soils should be selected.

Woodland Management and Productivity

Potential for commercial species: Not used
Suitability: Unsuited
Management concerns:
• This map unit is severely limited for timber production because of the wetness and flooding. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
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: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the flooding, wetness, and poor filtering capacity. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the wetness and flooding. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the wetness and flooding. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: 6w
Woodland ordination symbol: 6W, based on yellow-poplar as the indicator species

PeD—Pigeonroost-Edneytown complex, 15 to 30 percent slopes, stony

Setting

Landscape: Low and intermediate mountains dominantly in the western and northwestern parts of the county
Elevation range: 2,200 to 3,600 feet
Landform: Ridges
Landform position: Summits and upper side slopes
Shape of areas: Long and narrow
Size of areas: As much as 49 acres

Composition

Pigeonroost soil and similar inclusions: 50 percent

Edneytown soil and similar inclusions: 45 percent
Dissimilar inclusions: 5 percent

Typical Profile

Pigeonroost

Surface layer:
0 to 2 inches—yellowish brown loam

Subsoil:
2 to 15 inches—yellowish brown clay loam

Underlying material:
15 to 27 inches—strong brown gravelly loam saprolite

Bedrock:
27 to 38 inches—weathered, highly fractured granodiorite gneiss

Edneytown

Surface layer:
0 to 4 inches—brown loam

Subsoil:
4 to 16 inches—strong brown loam
16 to 38 inches—yellowish brown loam

Underlying material:
38 to 51 inches—yellowish brown sandy loam saprolite
51 to 63 inches—pale brown 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 or mafic, 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:
• Saunook soils that have a thicker surface layer with more organic matter than 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 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
• Random areas of soils that have more mica in the subsoil than the Pigeonroost and Edneytown soils
• Random areas of Clifton soils that have a clayey subsoil and have bedrock at a depth of more than 60 inches
• Prominent ridges that are windswept
• Widely scattered areas of rock outcrop, on narrow ridges

Similar inclusions:
• Pigeonroost and Edneytown soils that have surface layers of sandy loam or fine sandy 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, and building site development

Agricultural Development

Cropland

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, tilth, 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.
• Areas of the Pigeonroost soil are difficult to manage for cultivated crops because of the low available water capacity caused by the moderately deep rooting depth.

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.
• Areas of the Pigeonroost soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

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 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 is 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 be avoided.
• Areas of the Pigeonroost soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

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 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 from 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 or 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 on 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 or 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 is 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Pigeonroost soil are difficult to manage for lawns and landscaping, 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 western and northwestern parts of the county
Elevation range: 2,200 to 3,600 feet
Landform: South- to west-facing mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 153 acres

Composition

Pigeonroost soil and similar inclusions: 60 percent
Edneytown soil and similar inclusions: 30 percent
Dissimilar inclusions: 10 percent

Typical Profile

Pigeonroost

Surface layer:
0 to 2 inches—yellowish brown loam

Subsoil:
2 to 15 inches—yellowish brown clay loam

Underlying material:
15 to 27 inches—strong brown gravelly loam saprolite

Bedrock:
27 to 38 inches—weathered, highly fractured granodiorite gneiss

Edneytown

Surface layer:
0 to 4 inches—brown loam

Subsoil:
4 to 16 inches—strong brown loam
16 to 38 inches—yellowish brown loam

Underlying material:
38 to 51 inches—yellowish brown sandy loam saprolite
51 to 63 inches—pale brown 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 or mafic, 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 the Pigeonroost and Edneytown soils, on north- to east-facing side slopes
- Saunook soils that have thicker surface layers with more organic matter than 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
- Thunder soils that have thicker surface layers with more organic matter than 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
- Random areas of soils that have more mica in the subsoil than the Pigeonroost and Edneytown soils
- Widely scattered areas of rock outcrop

Similar inclusions:
- Pigeonroost and Edneytown soils that have surface layers of sandy loam or fine sandy 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 and building site development

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
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.
• Areas of the Pigeonroost soil are difficult to manage for the production of pasture and hay crops because of the low available water caused by the moderately deep rooting depth.

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 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 is 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 be avoided.
• Areas of the Pigeonroost soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

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 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 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.
• 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 or 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 on 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 or 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 is 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Pigeonroost soil are difficult to manage for lawns and landscaping, 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

PuC—Porters-Unaka complex, 8 to 15 percent slopes, stony

Setting

Landscape: Intermediate mountains throughout the county
Elevation range: 3,000 to 4,800 feet
Landform: North- to east-facing ridges and those shaded by the higher mountains
Landform position: Summits
Shape of areas: Long and narrow
Size of areas: As much as 18 acres

Composition

Porters soil and similar inclusions: 40 percent
Unaka soil and similar inclusions: 40 percent
Dissimilar inclusions: 20 percent

Typical Profile

Porters

Surface layer:
0 to 3 inches—very dark grayish brown loam
3 to 9 inches—dark brown loam

Subsoil:
9 to 20 inches—yellowish brown loam
20 to 54 inches—yellowish brown gravelly loam

Bedrock:
54 to 65 inches—unweathered, moderately fractured granodiorite gneiss

Unaka

Surface layer:
0 to 9 inches—very dark grayish brown loam

Subsoil:
9 to 18 inches—yellowish brown loam
18 to 27 inches—dark yellowish brown gravelly loam

Bedrock:
27 to 31 inches—weathered, highly fractured granodiorite gneiss
31 to 42 inches—unweathered, moderately fractured granodiorite gneiss

Soil Properties and Qualities

Depth class: Porters—deep; Unaka—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderately rapid
Available water capacity: Porters—moderate; Unaka—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: 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: Soils subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; on prominent ridges, soils subject to rime ice in winter and high winds
Soil reaction: Porters—very strongly acid to slightly acid throughout the profile; Unaka—very strongly acid or strongly 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: Porters—40 to 60 inches to hard bedrock; Unaka—20 to 40 inches to hard bedrock
Other distinctive properties: Water movement along bedrock contacts in areas of the Unaka soil

Minor Components

Dissimilar inclusions:
• Random areas of soils that have bedrock at a depth of more than 60 inches
• Saunook soils that have more clay in the subsoil than the Porters and Unaka 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
• Chestnut and Buladean soils that have thinner surface layers with less organic matter than the Porters and Unaka soils and have soft bedrock at a depth of less than 60 inches, on shoulder slopes
• Prominent ridges that are windswept

Similar inclusions:
• Porters soils that have a surface layer of sandy loam or fine sandy loam
• Unaka soils that have a surface layer of fine sandy loam
• Porters and Unaka soils that have surface layers with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation 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, pesticide retention, soil fertility, and rooting depth and droughtiness in areas of the Unaka soil
Management measures and considerations:
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• 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.
• Areas of the Unaka soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

Orchards and ornamental crops

Suitability: Porters—suited; Unaka—poorly suited
Management concerns: Erodibility, equipment use, pesticide retention, ball and burlap harvesting, climate, soil fertility, and rooting depth and droughtiness in areas of the Unaka 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.
• 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.
• 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 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, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
• Areas of the Unaka soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods and northern hardwoods
Suitability: Well suited
Management concerns: Slope, erodibility, frost action, and depth to bedrock and windthrow hazard in areas of the Unaka 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 to the slope and the high content of organic matter in the surface layer.
• Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots from compaction.
• 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 in areas of the Unaka soil because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Suited
Management concerns: Porters—depth to bedrock, slope, erodibility, and corrosivity; Unaka—depth to bedrock, slope, and erodibility
Management measures and considerations:
• Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of these soils.
• Designing structures so that they conform with natural slopes 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.
• Using corrosion-resistant materials helps to reduce the risk of damage to concrete.

Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Depth to bedrock and slope
Management measures and considerations:
• The local Health Department should be contacted for guidance on sanitary facilities.
• Locating and using areas of the deeper Porters soil may improve the performance of filter fields.
• 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: Depth to bedrock, frost action, slope, and erodibility
Management measures and considerations:
- Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- 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.

Lawns and landscaping

Suitability: Suited
Management concerns: Slope, erodibility, pesticide retention, soil fertility, climate, and depth to bedrock and droughtiness in areas of the Unaka 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.
- 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.
- 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, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of the moderately deep rooting depth, areas of the Unaka soil are difficult to manage for lawns and landscaping, especially if the soil has been disturbed.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 7A in areas of the Porters soil and 6A in areas of the Unaka soil

PuD—Porters-Unaka complex, 15 to 30 percent slopes, stony

Setting

Landscape: Intermediate mountains throughout the county
Elevation range: 3,000 to 4,800 feet
Landform: North- to east-facing ridges and those shaded by the higher mountains
Landform position: Summits and upper side slopes
Shape of areas: Long and narrow
Size of areas: As much as 39 acres

Composition

Porters soil and similar inclusions: 60 percent
Unaka soil and similar inclusions: 30 percent
Dissimilar inclusions: 10 percent

Typical Profile

Porters

Surface layer:
0 to 3 inches—very dark grayish brown loam
3 to 9 inches—dark brown loam

Subsoil:
9 to 20 inches—yellowish brown loam
20 to 54 inches—yellowish brown gravelly loam

Bedrock:
54 to 65 inches—unweathered, moderately fractured granodiorite gneiss

Unaka

Surface layer:
0 to 9 inches—very dark grayish brown loam

Subsoil:
9 to 18 inches—yellowish brown loam
18 to 27 inches—dark yellowish brown gravelly loam

Bedrock:
27 to 31 inches—weathered, highly fractured granodiorite gneiss
31 to 42 inches—unweathered, moderately fractured granodiorite gneiss

Soil Properties and Qualities

Depth class: Porters—deep; Unaka—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderately rapid
Available water capacity: Porters—moderate; Unaka—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): High or very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; on prominent ridges and upper side slopes, soils subject to rime ice in winter and high winds
Soil reaction: Porters—very strongly acid to slightly acid throughout the profile; Unaka—very strongly acid or strongly 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: Porters—40 to 60 inches to hard bedrock; Unaka—20 to 40 inches to hard bedrock
Other distinctive properties: Water movement along bedrock contacts in areas of the Unaka soil

Minor Components

Dissimilar inclusions:
• Random areas of soils that have bedrock at a depth of more than 60 inches
• Saunook soils that have more clay in the subsoil than the Porters and Unaka 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
• Chestnut and Buladean soils that have thinner surface layers with less organic matter than the Porters and Unaka soils and have soft bedrock at a depth of less than 60 inches, on south- to west-facing shoulder slopes, nose slopes, and side slopes
• Prominent ridges and upper side slopes that are windswept
• Widely scattered areas of rock outcrop on narrow ridges

Similar inclusions:
• Porters soils that have a surface layer of sandy loam or fine sandy loam
• Unaka soils that have a surface layer of fine sandy loam
• Porters and Unaka soils that have surface layers with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation 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, soil fertility, and rooting depth and droughtiness in areas of the Unaka 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.
• 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.
• Areas of the Unaka soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

Orchards and ornamental crops

Suitability: Porter—suited; Unaka—poorly suited
Management concerns: Equipment use, erodibility, pesticide retention, ball and burlap harvesting, plant shape, climate, soil fertility, and rooting depth and droughtiness in areas of the Unaka 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.
• 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.
• 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 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 be avoided.
• Areas of the Unaka soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods and northern hardwoods
Suitability: Suited
Management concerns: Porters—erodibility, equipment use, and pesticide retention; Unaka—erodibility, equipment use, pesticide retention, 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 to the slope and the high content of organic matter in the surface layer.
• Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots from compaction.
• 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 in areas of the Unaka soil because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Poorly suited
Management concerns: Porters—slope, depth to bedrock, erodibility, and corrosivity; Unaka—slope, depth to bedrock, and erodibility
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.
• Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of these soils.
• Vegetating cleared and graded areas as soon as possible or constructing silt fences helps 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 depth to bedrock
Management measures and considerations:
• The local Health Department should be contacted for guidance on 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 Porters soil may improve the performance of filter fields.

Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, 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.
• Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
• 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, climate, and depth to bedrock and droughtiness in areas of the Unaka 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.
• 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.
• 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Unaka soil are difficult to manage for lawns and landscaping, especially if the soil has been disturbed.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 7R in areas of the Porters soil and 6R in areas of the Unaka soil

PuE—Porters-Unaka complex, 30 to 50 percent slopes, stony

Setting

Landscape: Low and intermediate mountains throughout the county
Elevation range: 2,500 to 4,800 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 irregular on side slopes
Size of areas: As much as 90 acres

Composition

Porters soil and similar inclusions: 50 percent
Unaka soil and similar inclusions: 30 percent
Dissimilar inclusions: 20 percent

Typical Profile

Porters

Surface layer:
0 to 3 inches—very dark grayish brown loam
3 to 9 inches—dark brown loam

Subsoil:
9 to 20 inches—yellowish brown loam
20 to 54 inches—yellowish brown gravelly loam

Bedrock:
54 to 65 inches—unweathered, moderately fractured granodiorite gneiss

Unaka

Surface layer:
0 to 9 inches—very dark grayish brown loam

Subsoil:
9 to 18 inches—yellowish brown loam
18 to 27 inches—dark yellowish brown gravelly loam

Bedrock:
27 to 31 inches—weathered, highly fractured granodiorite gneiss
31 to 42 inches—unweathered, moderately fractured granodiorite gneiss

Soil Properties and Qualities

Depth class: Porters—deep; Unaka—moderately deep
Drainage class: Well drained

General texture class: Loamy
Permeability: Moderately rapid
Available water capacity: Porters—moderate; Unaka—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): High or very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; on prominent ridges and upper side slopes, soils subject to rime ice in winter and high winds
Soil reaction: Porters—very strongly acid to slightly acid throughout the profile; Unaka—very strongly acid or strongly 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: Porters—40 to 60 inches to hard bedrock; Unaka—20 to 40 inches to hard bedrock
Other distinctive properties: Water movement along bedrock contacts in areas of the Unaka soil

Minor Components

Dissimilar inclusions:
- Random areas of soils that have bedrock at a depth of more than 60 inches
- Saunook and Tusquitee soils that have bedrock at a depth of more than 60 inches, in concave areas at the head of drains, on benches, and on footslopes
- Chestnut and Buladean soils that have thinner surface layers with less organic matter than the Porters and Unaka soils and have soft bedrock at a depth of less than 60 inches, on south- to west-facing spur ridges, nose slopes, and side slopes
- Thunder and Toecane soils that have more rock fragments in the subsoil than the Porters and Unaka soils and have bedrock at a depth of more than 60 inches, in drainageways
- Widely scattered areas of rock outcrop
- Prominent ridges and upper side slopes that are windswept

Similar inclusions:
- Porters soils that have a surface layer of sandy loam or fine sandy loam
- Unaka soils that have a surface layer of fine sandy loam
- Porters and Unaka soils that have surface layers with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation and building site development

Agricultural Development

Cropland

Suitability: Unsuited
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: Unsuited
Management concerns: Equipment use, erodibility, pesticide retention, soil fertility, and rooting depth and droughtiness in areas of the Unaka 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.
- 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.
- Areas of the Unaka soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

Orchards and ornamental crops

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, pesticide retention, ball and burlap harvesting, plant shape, climate, soil fertility, and rooting depth and droughtiness in areas of the Unaka soil
Management measures and considerations:
• This map unit may be difficult to manage for orchards and ornamental crops because the slope limits equipment use.
• 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.
• 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 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 be avoided.
• Areas of the Unaka soil are difficult to manage for orchards and ornamental crops because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth.

Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods and northern hardwoods
Suitability: Suited
Management concerns: Porters—equipment use, erodibility, and pesticide retention; Unaka—equipment use, erodibility, pesticide retention, 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 to the slope and the high content of organic matter in the surface layer.
• Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots from compaction.
• Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
• 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 Unaka soil because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Poorly suited
Management concerns: Porters—slope, depth to bedrock, erodibility, and corrosivity; Unaka—slope, depth to bedrock, and erodibility
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.
• Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of these soils.
• Vegetating cleared and graded areas as soon as possible or constructing silt fences helps 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: Depth to bedrock and slope
Management measures and considerations:
• The local Health Department should be contacted for guidance on sanitary facilities.
• Locating and using areas of the deeper Porters soil may improve the performance of filter fields.
• 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, depth to bedrock, frost action, and seeps and springs
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.
• Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
• 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.

Lawns and landscaping

Suitability: Poorly suited
Management concerns: Slope, erodibility, pesticide retention, soil fertility, climate, and depth to bedrock and droughtiness in areas of the Unaka 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.
• 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.
• 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Unaka soil are difficult to manage for lawns and landscaping, especially if the soil has been disturbed.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 7R in areas of the Porters soil and 6R in areas of the Unaka soil

PwF—Porters-Unaka complex, 50 to 95 percent slopes, rocky

Setting

Landscape: Low and intermediate mountains throughout the county
Elevation range: 2,500 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: As much as 198 acres

Composition

Porters soil and similar inclusions: 40 percent
Unaka soil and similar inclusions: 35 percent
Dissimilar inclusions: 25 percent

Typical Profile

Porters

Surface layer:
0 to 3 inches—very dark grayish brown loam
3 to 9 inches—dark brown loam

Subsoil:
9 to 20 inches—yellowish brown loam
20 to 54 inches—yellowish brown gravelly loam

Bedrock:
54 to 65 inches—unweathered, moderately fractured granodiorite gneiss

Unaka

Surface layer:
0 to 9 inches—very dark grayish brown loam

Subsoil:
9 to 18 inches—yellowish brown loam
18 to 27 inches—dark yellowish brown gravelly loam

Bedrock:
27 to 31 inches—weathered, highly fractured granodiorite gneiss

31 to 42 inches—unweathered, moderately fractured granodiorite gneiss

Soil Properties and Qualities

Depth class: Porters—deep; Unaka—moderately deep
Drainage class: Well drained
General texture class: Loamy
Permeability: Moderately rapid
Available water capacity: Porters—moderate; Unaka—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
Extent of rock outcrop: About 2 percent rock outcrop on the soil surface
Organic matter content (surface layer): High or very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; on prominent upper side slopes, soils subject to rime ice in winter and high winds
Soil reaction: Porters—very strongly acid to slightly acid throughout the profile; Unaka—very strongly acid or strongly 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: Porters—40 to 60 inches to hard bedrock; Unaka—20 to 40 inches to hard bedrock
Other distinctive properties: Water movement along bedrock contacts in areas of the Unaka soil

Minor Components

Dissimilar inclusions:
- Random areas of soils that have bedrock at a depth of more than 60 inches
- Saunook and Tusquitee soils that have bedrock at a depth of more than 60 inches, in concave areas at the head of drains, on benches, and on footslopes
- Chestnut and Buladean soils that have thinner surface layers with less organic matter than the Porters and Unaka soils and have soft bedrock at a depth of less 60 inches, on south- to west-facing spur ridges, nose slopes, and side slopes
- Thunder and Toecane soils that have more rock fragments in the subsoil than the Porters and Unaka soils and have bedrock at a depth of more than 60 inches, in drainageways
- Prominent upper side slopes that are windswept

Similar inclusions:
- Porters soils that have a surface layer of sandy loam or fine sandy loam
- Unaka soils that have a surface layer of fine sandy loam
- Porters and Unaka soils that have surface layers with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for crop production because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for the production of pasture and hay crops because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. 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: Porters—equipment use, erodibility, and pesticide retention; Unaka—equipment use, erodibility, pesticide retention, 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.
• These soils are best reforested by managing for natural regeneration of hardwoods.
• Productivity is limited in areas of the Unaka soil because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the slope, depth to bedrock, and extent of rock outcrops. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: Based on yellow-poplar as the indicator species, 7R in areas of the Porters soil and 6R in areas of the Unaka soil

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 2,800 feet
Landform: Flood plains dominantly along the Cane, South Toe, and North Toe Rivers
Landform position: Planar to slightly convex bottomland slopes
Shape of areas: Long and narrow or irregular on the wider flood plains
Size of areas: As much as 47 acres

Composition

Rosman soil and similar inclusions: 90 percent
Dissimilar inclusions: 10 percent

Typical Profile

Surface layer:
0 to 7 inches—very dark brown fine sandy loam
7 to 14 inches—dark brown fine sandy loam

Subsoil:
14 to 20 inches—dark yellowish brown loamy fine sand

Underlying material:
20 to 25 inches—dark brown fine sandy loam
25 to 31 inches—dark yellowish brown sand
31 to 43 inches—dark yellowish brown loamy sand
43 to 80 inches—dark yellowish brown sand

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: Soil subject to 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
• 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
• Well drained Biltmore soils that have a sandy subsoil, on streambanks and along sharp river bends
• 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
• Moderately well drained Dillard soils that have more clay in the subsoil than the Rosman soil, on low stream terraces and toeslopes
• Well drained Saunook soils that have more clay in the subsoil than the Rosman soil, on toeslopes
• Poorly drained soils that have loamy to clayey subsoils, in depressions, old stream channels, and backwater areas

Similar inclusions:
• Rosman soils that have a surface layer of sandy loam, very fine sandy loam, loam, or silt loam
• Random areas of soils that are similar to the Rosman soil but have surface layers with less organic matter

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: Unsuited
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 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.
• 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, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other susceptible 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 be avoided.

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, seedling survival, and pesticide retention
Management measures and considerations:
• The potential for flooding is a consideration in the placement of haul roads and log landings.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the flooding and the potential for a seasonal high water table. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
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: Unsuited
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 because of the flooding and is severely limited for use as lawns and landscaping 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, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other susceptible 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 be avoided.

Interpretive Groups

Land capability classification: 2w
Woodland ordination symbol: 9A, based on yellow-poplar as the indicator species

SaB—Saunook sandy loam, 2 to 8 percent slopes

Setting

Landscape: Intermountain hills and low mountains throughout the county
Elevation range: 2,000 to 3,500 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Irregular or oblong
Size of areas: As much as 40 acres

Composition

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

Typical Profile

Surface layer:
0 to 9 inches—very dark brown sandy loam

Subsoil:
9 to 49 inches—strong brown sandy clay loam
49 to 57 inches—dark yellowish brown coarse sandy loam

Underlying material:
57 to 79 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: Soil subject to 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 Unison soils that have a surface layer with less organic matter than that of the Saunook soil and have more clay in the subsoil
• Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
• 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 that are occasionally flooded for very brief duration, 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, loam, sandy clay loam, or 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, tilth, 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 is 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 be avoided.

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 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: 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 from 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 on 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 be avoided.
• 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 is 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 be avoided.

Interpretive Groups

Land capability classification: 2e
Woodland ordination symbol: 8A, based on yellow-poplar as the indicator species

ScC—Saunook sandy loam, 8 to 15 percent slopes, stony

Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,200 to 3,500 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Irregular or oblong
Size of areas: As much as 50 acres

Composition

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

Typical Profile

Surface layer:
0 to 9 inches—very dark brown sandy loam

Subsoil:
9 to 49 inches—strong brown sandy clay loam
49 to 57 inches—dark yellowish brown coarse sandy loam

Underlying material:
57 to 79 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: Soil subject to 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 Unison soils that have a surface layer with less organic matter than the Saunook soil and have more clay in the subsoil
• Thunder soils that have more rock fragments in the subsoil than the Saunook soil, in drainageways
• 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
• Areas that are rarely flooded for very brief duration, along stream channels

Similar inclusions:
• Saunook soils that have a surface layer of fine sandy loam, loam, sandy clay loam, or 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, tilth, 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 is 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 be avoided.

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 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: Suited
Management concerns: Slope, erodibility, seeps and springs, corrosivity, and large stones
Management measures and considerations:
• Designing structures so that they conform with natural slopes 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 from 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 on 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 be avoided.
• 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 is 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 be avoided.

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: 2,100 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: As much as 49 acres

Composition

Saunook soil and similar inclusions: 65 percent
Thunder soil and similar inclusions: 25 percent
Dissimilar inclusions: 10 percent

Typical Profile

Saunook

Surface layer:
0 to 9 inches—very dark brown sandy loam

Subsoil:
9 to 49 inches—strong brown sandy clay loam
49 to 57 inches—dark yellowish brown coarse sandy loam

Underlying material:
57 to 79 inches—dark yellowish brown very cobbly sandy loam

Thunder

Surface layer:
0 to 3 inches—dark brown very cobbly loam
3 to 9 inches—dark yellowish brown very cobbly loam

Subsoil:
9 to 24 inches—strong brown very cobbly sandy clay loam
24 to 39 inches—strong brown very cobbly clay loam
39 to 52 inches—strong brown very cobbly sandy loam
52 to 77 inches—yellowish brown extremely cobbly sandy loam

Underlying material:
77 to 87 inches—dark yellowish brown extremely cobbly sandy loam

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: Soils subject to 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 Unison soils that have surface layers with less organic matter than those of the Saunook and Thunder soils and have more clay in the subsoil
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Areas that are rarely flooded for very brief duration, 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, 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, tilth, 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.
• The Thunder soil is severely limited for ball and burlap harvesting because of the high amount 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 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 is 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 be avoided.

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 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: 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 from 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 on 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 be avoided.
• 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 may be a problem during excavation.
• Locating and using areas of the deeper Saunook soil may improve the performance of filter fields.

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.
• 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 is 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 be avoided.
• Using lime and fertilizer, mulching, and irrigation help to establish lawns and landscape plants.

Interpretive Groups

Land capability classification: Saunook—6e; Thunder—6s
Woodland ordination symbol: 8R, based on yellow-poplar 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: 2,500 to 4,000 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Long and narrow or irregular
Size of areas: As much as 43 acres

Composition

Thunder soil and similar inclusions: 60 percent
Saunook soil and similar inclusions: 35 percent
Dissimilar inclusions: 5 percent

Typical Profile

Thunder

Surface layer:
0 to 3 inches—dark brown very cobbly loam
3 to 9 inches—dark yellowish brown very cobbly loam

Subsoil:
9 to 24 inches—strong brown very cobbly sandy clay loam
24 to 39 inches—strong brown very cobbly clay loam
39 to 52 inches—strong brown very cobbly sandy loam
52 to 77 inches—yellowish brown extremely cobbly sandy loam

Underlying material:
77 to 87 inches—dark yellowish brown extremely cobbly sandy loam

Saunook

Surface layer:
0 to 9 inches—very dark brown sandy loam

Subsoil:
9 to 49 inches—strong brown sandy clay loam
49 to 57 inches—dark yellowish brown coarse sandy loam

Underlying material:
57 to 79 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
Organic matter content (surface layer): Moderate to very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to 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 Thunder soils where the surface fragments have been removed
• Random areas of Unison soils that have surface layers with less organic matter than those of the Thunder and Saunook soils and have more clay in the subsoil
• Areas that are rarely flooded for very brief duration, along stream channels
• 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, 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, tilth, 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 in 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: Suited
Suitability for hayland: Unsuited
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—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 very bouldery surface and the high content of rock fragments in 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 is 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 be avoided.

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 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: 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 from 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 on sanitary facilities.
- Large stones and boulders are a problem during excavation.
- Excavations may cut into seeps and springs. These areas should be avoided.
- Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
- Locating and using areas of the deeper Saunook 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: 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 is 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 be avoided.

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: 2,200 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: As much as 52 acres

Composition

Thunder soil and similar inclusions: 60 percent
Saunook soil and similar inclusions: 35 percent
Dissimilar inclusions: 5 percent

Typical Profile

Thunder

Surface layer:
0 to 3 inches—dark brown very cobbly loam
3 to 9 inches—dark yellowish brown very cobbly loam

Subsoil:
9 to 24 inches—strong brown very cobbly sandy clay loam
24 to 39 inches—strong brown very cobbly clay loam
39 to 52 inches—strong brown very cobbly sandy loam
52 to 77 inches—yellowish brown extremely cobbly sandy loam

Underlying material:
77 to 87 inches—dark yellowish brown extremely cobbly sandy loam

Saunook

Surface layer:
0 to 9 inches—very dark brown sandy loam

Subsoil:
9 to 49 inches—strong brown sandy clay loam
49 to 57 inches—dark yellowish brown coarse sandy loam

Underlying material:
57 to 79 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: Soils subject to 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 Thunder soils where the surface fragments have been removed
• Random areas of rubble land
• Random areas of Unison soils that have surface layers with less organic matter than those of the Thunder and Saunook soils and have more clay in the subsoil
• Areas that are rarely flooded for very brief duration, 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, 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, tilth, 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 in 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, 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 in 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 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 is 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 be avoided.

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 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: 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 so that they conform with natural slopes 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 from 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 on 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 be avoided.
- Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
- Locating and using areas of the deeper Saunook 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: 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 is 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 be avoided.

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 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: 2,000 to 4,500 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: As much as 126 acres

Composition

Thunder soil and similar inclusions: 60 percent
Saunook soil and similar inclusions: 35 percent
Dissimilar inclusions: 5 percent

Typical Profile

Thunder

Surface layer:
0 to 3 inches—dark brown very cobbly loam
3 to 9 inches—dark yellowish brown very cobbly loam

Subsoil:
9 to 24 inches—strong brown very cobbly sandy clay loam
24 to 39 inches—strong brown very cobbly clay loam
39 to 52 inches—strong brown very cobbly sandy loam
52 to 77 inches—yellowish brown extremely cobbly sandy loam

Underlying material:
77 to 87 inches—dark yellowish brown extremely cobbly sandy loam

Saunook

Surface layer:
0 to 9 inches—very dark brown sandy loam

Subsoil:
9 to 49 inches—strong brown sandy clay loam
49 to 57 inches—dark yellowish brown coarse sandy loam

Underlying material:
57 to 79 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: Soils subject to 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 Thunder soils where the surface fragments have been removed
• Random areas of rubble land
• Random areas of Unison soils that have surface layers with have less organic matter than those of the Thunder and Saunook soils and have more clay in the subsoil
• Areas that are rarely flooded for very brief duration, 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, 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, tilth, soil fertility, pesticide retention, and climate
Management measures and considerations:
• This map unit is severely limited for crop production because of the slope, erodibility, very bouldery surface, and the high content of rock fragments in 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, erodibility, very bouldery surface, and the high content of rock fragments in 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 is 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 be avoided.

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 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: 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 so that they conform with natural slopes 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 from 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 on 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 be avoided.
• Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
• Locating and using areas of the deeper Saunook 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: 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, frost action, 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 is 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 be avoided.

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 4,500 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: As much as 72 acres

Composition

Thunder soil and similar inclusions: 55 percent
Saunook soil and similar inclusions: 40 percent
Dissimilar inclusions: 5 percent

Typical Profile

Thunder

Surface layer:
0 to 3 inches—dark brown very cobbly loam
3 to 9 inches—dark yellowish brown very cobbly loam

Subsoil:
9 to 24 inches—strong brown very cobbly sandy clay loam
24 to 39 inches—strong brown very cobbly clay loam
39 to 52 inches—strong brown very cobbly sandy loam
52 to 77 inches—yellowish brown extremely cobbly sandy loam

Underlying material:
77 to 87 inches—dark yellowish brown extremely cobbly sandy loam

Saunook

Surface layer:
0 to 9 inches—very dark brown sandy loam

Subsoil:
9 to 49 inches—strong brown sandy clay loam
49 to 57 inches—dark yellowish brown coarse sandy loam

Underlying material:
57 to 79 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: Soils subject to 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 Unison soils that have surface layers with have less organic matter than those of the Thunder and Saunook soils and have more clay in the subsoil
- 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 Thunder soils 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, loam, sandy clay loam, or clay loam
- Random areas of soils that are similar to the Thunder and Saunook soils but have surface layers with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Pasture and building site development

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, and very bouldery surface. A site on better suited soils should be selected.

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 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: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, very bouldery surface, and the high content of rock fragments in 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 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: 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 so that they conform with natural slopes 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 from 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 on 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 be avoided.
• Measures that improve the filtering capacity should be considered; the Thunder soil readily absorbs but does not adequately filter effluent.
• Locating and using areas of the deeper Saunook 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: 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 the 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 is 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 be avoided.

Interpretive Groups

Land capability classification: Thunder—7s; Saunook—7e
Woodland ordination symbol: 8R, based on yellow-poplar as the indicator species

TuC—Toecane-Tusquitee complex, 8 to 15 percent slopes, bouldery

Setting

Landscape: Low and intermediate mountains dominantly in the western and southern parts of the county
Elevation range: 2,500 to 4,500 feet

Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Irregular or oblong
Size of areas: As much as 69 acres

Composition

Toecane soil and similar inclusions: 50 percent
Tusquitee soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Toecane

Surface layer:
0 to 3 inches—very dark brown cobbly loam
3 to 8 inches—dark brown cobbly loam

Subsoil:
8 to 12 inches—dark yellowish brown very cobbly loam
12 to 24 inches—strong brown very cobbly sandy clay loam
24 to 30 inches—strong brown very cobbly sandy loam

Underlying material:
30 to 63 inches—dark yellowish brown extremely cobbly loamy sand

Tusquitee

Surface layer:
0 to 6 inches—very dark brown loam
6 to 9 inches—dark brown fine sandy loam

Subsoil:
9 to 67 inches—dark yellowish brown fine sandy loam
67 to 88 inches—yellowish brown sandy clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Toecane—loamy with many rock fragments; Tusquitee—loamy
Permeability: Moderately rapid
Available water capacity: Toecane—low; Tusquitee—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 stones and boulders that average about 10 to 48 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential frost action: Toecane—low; Tusquitee—moderate
Special climatic conditions: Soils subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Toecane—extremely acid to moderately acid throughout the profile; Tusquitee—very strongly acid to moderately acid throughout the profile
Parent material: Colluvium derived from felsic, 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 Toecane soil

Minor Components

Dissimilar inclusions:
- Areas of rubble land in drainageways
- Areas of Toecane soils where the surface fragments have been removed
- Random areas of Thunder and Saunook soils that have more clay in the surface layer and subsoil than the Toecane and Tusquitee soils
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and drainageways
- Areas that are rarely flooded for very brief duration, 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:
- Toecane and Tusquitee soils that have surface layers of sandy loam or fine sandy loam
- Random areas of Toecane and Tusquitee soils that have surface layers with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation, building site development, and pasture

Agricultural Development

Cropland

Suitability: Toecane—unsuited; Tusquitee—suited
Management concerns: Equipment use, erodibility, soil fertility, pesticide retention, and climate

Management measures and considerations:
• This map unit is severely limited for crop production because of the bouldery surface and the high content of rock fragments in the Toecane 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.
• 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: Toecane—unsuited; Tusquitee—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 bouldery surface and the high content of rock fragments in the Toecane 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 future crops. 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 be avoided.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.

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 the high content of organic matter in the surface layer.
• Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots 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: Toecane—poorly suited; Tusquitee—suited
Management concerns: Large stones, slope, erodibility, seeps and springs, and cutbanks cave and corrosivity in areas of the Toecane soil
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 so that they conform with natural slopes 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 from 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: Toecane—unsuited; Tusquitee—suited
Management concerns: Toecane—large stones, slope, seeps and springs, and poor filtering capacity; Tusquitee—large stones, slope, and seeps and springs
Management measures and considerations:
• The local Health Department should be contacted for guidance on 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 be avoided.
• Measures that improve the filtering capacity should be considered; the Toecane soil readily absorbs but does not adequately filter effluent.
• Locating and using areas of the deeper Tusquitee soil may improve the performance of filter fields.

Local roads and streets

Suitability: Poorly suited
Management concerns: Toecane—large stones, slope, erodibility, seeps and springs, and differential settling; Tusquitee—large stones, slope, erodibility, seeps and springs, and frost action
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.
• The Toecane 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: Toecane—poorly suited; Tusquitee—suited
Management concerns: Large stones, slope, erodibility, climate, pesticide retention, and soil fertility
Management measures and considerations:
• This map unit is limited for lawns and landscaping because of the bouldery surface and the high content of rock fragments in the Toecane 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.
• Using mulch helps to reduce damage to newly established landscape plants caused by frost heaving.
• 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 be avoided.

Interpretive Groups

Land capability classification: Toecane—7s; Tusquitee—4e
Woodland ordinations symbol: 8A, based on yellow-poplar as the indicator species

TwD—Toecane-Tusquitee complex, 15 to 30 percent slopes, very bouldery

Setting

Landscape: Low and intermediate mountains dominantly in the western and southern parts of the county
Elevation range: 2,500 to 4,500 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: As much as 434 acres

Composition

Toecane soil and similar inclusions: 45 percent
Tusquitee soil and similar inclusions: 45 percent
Dissimilar inclusions: 10 percent

Typical Profile

Toecane

Surface layer:
0 to 3 inches—very dark brown cobbly loam
3 to 8 inches—dark brown cobbly loam

Subsoil:
8 to 12 inches—dark yellowish brown very cobbly loam
12 to 24 inches—strong brown very cobbly sandy clay loam
24 to 30 inches—strong brown very cobbly sandy loam

Underlying material:
30 to 63 inches—dark yellowish brown extremely cobbly loamy sand

Tusquitee

Surface layer:
0 to 6 inches—very dark brown loam
6 to 9 inches—dark brown fine sandy loam

Subsoil:
9 to 67 inches—dark yellowish brown fine sandy loam
67 to 88 inches—yellowish brown sandy clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Toecane—loamy with many rock fragments; Tusquitee—loamy
Permeability: Moderately rapid
Available water capacity: Toecane—low; Tusquitee—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 (fig. 6)
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): High or very high
Potential frost action: Toecane—low; Tusquitee—moderate
Special climatic conditions: Soils subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Toecane—extremely acid to moderately acid throughout the profile; Tusquitee—very strongly acid to moderately acid throughout the profile
Parent material: Colluvium derived from felsic, 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 Toecane soil

Minor Components

Dissimilar inclusions:
• Areas of rubble land below rock outcrops and in drainageways
• Random areas of Thunder and Saunook soils that have more clay in the surface layer and subsoil than the Toecane and Tusquitee soils

Figure 6.—Overland flow of storm water runoff is a management concern on Toecane, Tusquitee, Thunder, Saunook, and Unison soils.

- Areas of Toecane soils where the surface fragments have been removed
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and drainageways
- Soils that have bedrock at a depth of less than 6.0 feet, on the outer edge of map unit delineations
- Areas that are rarely flooded for very brief duration, along stream channels

Similar inclusions:
- Toecane and Tusquitee soils that have surface layers of sandy loam or fine sandy loam
- Random areas of Toecane and Tusquitee soils that have surface layers with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation, building site development, and pasture

Agricultural Development

Cropland

Suitability: Toecane—unsuited; Tusquitee—poorly suited
Management concerns: Equipment use, erodibility, soil fertility, pesticide retention, and climate
Management measures and considerations:
- This map unit is severely limited for crop production

because of the slope, erodibility, very bouldery surface, and the high content of rock fragments in the Toecane 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.
• 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: Toecane—unsuited; Tusquitee—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, erodibility, very bouldery surface, and the high content of rock fragments in the Toecane 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.
• In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
• Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.

Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods and northern hardwoods
Suitability: Suited
Management concerns: Equipment use, erodibility, and pesticide retention
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 and the high content of organic matter in the surface layer.
• Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots 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: Toecane—poorly suited; Tusquitee—suited
Management concerns: Slope, large stones, erodibility, seeps and springs, and cutbanks cave and corrosivity in areas of the Toecane 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 so that they conform with natural slopes 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 from 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: Toecane—unsuited; Tusquitee—suited
Management concerns: Toecane—slope, large stones, seeps and springs, and poor filtering capacity; Tusquitee—slope, large stones, and seeps and springs
Management measures and considerations:
• The local Health Department should be contacted for guidance on sanitary facilities.
• Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
• Large stones and boulders are a problem during excavation.
• Excavations may cut into seeps and springs. These areas should be avoided.
• Measures that improve the filtering capacity should be considered; the Toecane soil readily absorbs but does not adequately filter effluent.
• Locating and using areas of the deeper Tusquitee soil may improve the performance of filter fields.

Local roads and streets

Suitability: Poorly suited
Management concerns: Toecane—slope, erodibility, large stones, seeps and springs, and differential settling; Tusquitee—slope, erodibility, large stones, seeps and springs, 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.
• The Toecane 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, climate, pesticide retention, and soil fertility
Management measures and considerations:
• This map unit is limited for lawns and landscaping because of the slope, the very bouldery surface, and the high content of rock fragments in the Toecane 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.

• In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

Interpretive Groups

Land capability classification: Toecane—7s; Tusquitee—6e
Woodland ordination symbol: 8R, based on yellow-poplar as the indicator species

TwE—Toecane-Tusquitee complex, 30 to 50 percent slopes, very bouldery

Setting

Landscape: Low and intermediate mountains dominantly in the western and southern parts of the county
Elevation range: 2,100 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: As much as 155 acres

Composition

Toecane soil and similar inclusions: 55 percent
Tusquitee soil and similar inclusions: 35 percent
Dissimilar inclusions: 10 percent

Typical Profile

Toecane

Surface layer:
0 to 3 inches—very dark brown cobbly loam
3 to 8 inches—dark brown cobbly loam

Subsoil:
8 to 12 inches—dark yellowish brown very cobbly loam
12 to 24 inches—strong brown very cobbly sandy clay loam
24 to 30 inches—strong brown very cobbly sandy loam

Underlying material:
30 to 63 inches—dark yellowish brown extremely cobbly loamy sand

Tusquitee

Surface layer:
0 to 6 inches—very dark brown loam
6 to 9 inches—dark brown fine sandy loam

Subsoil:
9 to 67 inches—dark yellowish brown fine sandy loam
67 to 88 inches—yellowish brown sandy clay loam

Soil Properties and Qualities

Depth class: Very deep
Drainage class: Well drained
General texture class: Toecane—loamy with many rock fragments; Tusquitee—loamy
Permeability: Moderately rapid
Available water capacity: Toecane—low; Tusquitee—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): High or very high
Potential frost action: Toecane—low; Tusquitee—moderate
Special climatic conditions: Soils subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Toecane—extremely acid to moderately acid throughout the profile; Tusquitee—very strongly acid to moderately acid throughout the profile
Parent material: Colluvium derived from felsic, 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 Toecane soil

Minor Components

Dissimilar inclusions:
• Areas of rubble land below rock outcrops and in drainageways
• Random areas of Thunder and Saunook soils that have more clay in the surface layer and subsoil than the Toecane and Tusquitee soils
• Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and drainageways
• 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:
• Toecane and Tusquitee soils that have surface layers of sandy loam or fine sandy loam
• Random areas of Toecane and Tusquitee soils that have surface layers with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation, building site development, and pasture

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, and very bouldery surface. A site on better suited soils should be selected.

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 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: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the slope, erodibility, very bouldery surface, and the high content of rock fragments in the Toecane 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 and the high content of organic matter in the surface layer.
• Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots 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: Toecane—unsuited; Tusquitee—poorly suited
Management concerns: Slope, large stones, erodibility, seeps and springs, and cutbanks cave and corrosivity in areas of the Toecane soil
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 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 from 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: Toecane—unsuited; Tusquitee—poorly suited
Management concerns: Toecane—large stones, slope, seeps and springs, and poor filtering capacity; Tusquitee—large stones, slope, and seeps and springs
Management measures and considerations:
• The local Health Department should be contacted for guidance on 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 be avoided.
• Measures that improve the filtering capacity should be considered; the Toecane soil readily absorbs but does not adequately filter effluent.
• Locating and using areas of the deeper Tusquitee soil may improve the performance of filter fields.

Local roads and streets

Suitability: Poorly suited
Management concerns: Toecane—slope, erodibility, large stones, seeps and springs, and differential settling; Tusquitee—slope, erodibility, large stones, seeps and springs, 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.
• The Toecane 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, climate, pesticide retention, and soil fertility
Management measures and considerations:
• This map unit is severely limited for lawns and landscaping because of the slope, the very bouldery surface, and the high content of rock fragments in the Toecane 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.
• In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: 8R, based on yellow-poplar as the indicator species

Uc—Udifluvents, sandy-skeletal, frequently flooded

Setting

Landscape: Mountain valleys
Elevation range: 1,800 to 3,200 feet

Landform: Flood plains dominantly along the Cane, South Toe, North Toe, and Nolichucky Rivers
Landform position: Planar to slightly convex bottomland slopes
Shape of areas: Irregular
Size of areas: As much as 43 acres

Composition

Udifluvents and similar inclusions: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Udifluvents, sandy-skeletal, frequently flooded, consists of very low-lying, riverwash areas that have 0 to 3 percent slopes. Flooding has removed all of the overlying soil material. Areas include small islands and the inside river bends of the Cane, South Toe, North Toe, and Nolichucky Rivers. 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 extent of disturbance by flooding.

Depth class: Very deep
Drainage class: Excessively drained to somewhat poorly drained
General texture class: Sandy with many rock fragments
Permeability: Very rapid
Available water capacity: Very low
Depth to seasonal high water table: Variable, commonly less than 4 feet from January through December
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
Hazard of water erosion: Very severe
Rock fragments on the surface: About 15 percent cobbles and stones that average about 10 to 24 inches in diameter and 1.5 to 3.5 feet apart
Organic matter content (surface layer): Very low
Potential frost action: Low
Soil reaction: Extremely acid to moderately acid throughout the profile
Parent material: Recent alluvium derived from felsic or mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Soils subject to scouring and deposition during flooding

Minor Components

Dissimilar inclusions:
• Random areas of 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
• Well drained Biltmore soils that have a sandy subsoil, in the higher areas
• Random areas of soils that have bedrock at a depth of less than 60 inches
• 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 depressions
• Moderately well drained to poorly drained soils that have a loamy subsoil, on low stream terraces, in depressions, and in backwater areas

Similar inclusions:
• Soils that are similar to Udifluvents but have loamy or clayey underlying material

Land Use

Dominant Uses: Woodland and wildlife habitat
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the frequent flooding. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for the production of pasture and hay crops because of the frequent flooding. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
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: Not used
Suitability: Unsuited
Management concerns:
• This map unit is severely limited for timber production because of the frequent flooding and very low woodland productivity. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the frequent flooding. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the frequent flooding and poor filtering capacity. The local Health Department should be contacted for additional guidance.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the frequent flooding. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the frequent flooding. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: 7w
Woodland ordination symbol: None assigned

Ud—Udorthents, loamy, stony

Setting

Landscape: Intermountain hills and low and intermediate mountains dominantly in the western, 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, and toeslopes
Shape of areas: Irregular
Size of areas: As much as 308 acres

Composition

Udorthents and similar inclusions: 85 percent
Dissimilar inclusions: 15 percent

Typical Profile

Udorthents, loamy, stony, consists of gravel pits, mines, and cut and fill areas where the soil and underlying material have been removed and placed on an adjacent site. Areas include mica and feldspar mines, highway right-of-way corridors, and building sites. Other areas included in the map unit are landfills, borrow pits, and recreational areas such as ball fields. 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 and 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 can be very steep to 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 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 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: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of 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: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of 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 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: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of 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 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 highly variable soil properties.
• An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: None assigned

UrF—Unaka-Rock outcrop complex, 50 to 95 percent slopes, very bouldery

Setting

Landscape: Low and intermediate mountains

dominantly in the northern and southern parts of the county
Elevation range: 1,800 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: As much as 116 acres

Composition

Unaka soil and similar inclusions: 40 percent
Rock outcrop: 35 percent
Dissimilar inclusions: 25 percent

Typical Profile

Unaka

Surface layer:
0 to 9 inches—very dark grayish brown loam

Subsoil:
9 to 18 inches—yellowish brown loam
18 to 27 inches—dark yellowish brown gravelly loam

Bedrock:
27 to 31 inches—weathered, highly fractured granodiorite gneiss
31 to 42 inches—unweathered, moderately fractured granodioritic gneiss

Rock outcrop

Composition: Dominantly gneiss bedrock

Properties and Qualities of the Unaka Soil

Depth class: Moderately 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 stones and boulders that average about 10 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: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; higher soil moisture content due to north- to east-facing aspects and shading by the higher mountains; on upper side slopes, soil subject to rime ice in winter and high winds
Soil reaction: Very strongly acid or strongly 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: 20 to 40 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 Porters soils that have hard bedrock at a depth of 40 to 60 inches
- Toecane soils that have more rock fragments in the subsoil than the Unaka soil and have bedrock at a depth of more than 60 inches, in drainageways
- Tusquitee soils that have bedrock at a depth of more than 60 inches, on head slopes and benches
- Chestnut and Buladean soils that have thinner surface layers with less organic matter than the Unaka soil and have soft bedrock at a depth of less than 60 inches, on shoulder slopes and spur ridges
- Prominent upper side slopes that are windswept

Similar inclusions:
- Unaka soils that have a surface layer of fine sandy loam
- Unaka soils that have a surface layer with less organic matter

Land Use

Dominant Uses: Woodland and wildlife habitat

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for crop production 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.

Pasture and hayland

Suitability: Unsuited
Management concerns:
- This map unit is severely limited for the production of pasture and hay crops 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.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops 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.

Woodland Management and Productivity

Potential for commercial species: Not used
Suitability: Unsuited
Management concerns:
• This map unit is severely limited for timber production because of the slope, erodibility, low productivity, low volume, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the slope, erodibility, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
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: Unsuited
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: Unsuited
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 very bouldery surface. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: Unaka—7e; Rock outcrop—8s
Woodland ordination symbol: Unaka—6R, based on yellow-poplar as the indicator species; Rock outcrop—none assigned

UsB—Unison loam, 2 to 8 percent slopes

Setting

Landscape: Intermountain hills in the Jacks Creek, Green Mountain, and central areas of the county
Elevation range: 2,000 to 3,200 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: As much as 50 acres

Composition

Unison soil and similar inclusions: 90 percent
Dissimilar inclusions: 10 percent

Typical Profile

Surface layer:
0 to 10 inches—dark yellowish brown loam

Subsoil:
10 to 36 inches—yellowish brown clay loam
36 to 61 inches—yellowish brown sandy clay loam
61 to 88 inches—mixed yellowish brown, brownish yellow, and brown 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: 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: Soil subject to 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 more organic matter in the surface layer and less clay in the subsoil than the Unaka soil
- Moderately well drained to poorly drained soils, in depressions and on toeslopes
- 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
- Urban land in and around the town of Burnsville
- Udorthents, loamy, stony, in and around the town of Burnsville

Similar inclusions:

- Unison soils that have a surface layer of fine sandy loam, silt loam, sandy clay loam, or clay loam
- Unison soils that have more 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, tilth, 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 and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 and other pesticides due to the high clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 ornamentals: 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 be avoided.

• 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 clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 from 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 on sanitary facilities.

• Installing septic system distribution lines during periods when the soil is not wet helps to prevent 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 be avoided.

• 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 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: 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 be avoided.
• 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.
• 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: 2e
Woodland ordination symbol: 7A, based on yellow-poplar as the indicator species

UsC—Unison loam, 8 to 15 percent slopes

Setting

Landscape: Intermountain hills and low mountains in the Jacks Creek, Green Mountain, and central areas of the county
Elevation range: 2,400 to 3,200 feet
Landform: Coves, colluvial fans, high stream terraces, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Irregular
Size of areas: As much as 28 acres

Composition

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

Typical Profile

Surface layer:
0 to 10 inches—dark yellowish brown loam

Subsoil:
10 to 36 inches—yellowish brown clay loam
36 to 61 inches—yellowish brown sandy clay loam
61 to 88 inches—mixed yellowish brown, brownish yellow, and brown 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: 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: Soil subject to 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 more organic matter in the surface layer and less clay in the subsoil than the Unison soil
• Moderately well drained to poorly drained soils, in depressions and on toeslopes
• 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
• Urban land in and around the town of Burnsville
• Udorthents, loamy, stony, in and around the town of Burnsville

Similar inclusions:
• Unison soils that have a surface layer of fine sandy loam, silt loam, sandy clay loam, or clay loam
• Unison soils that have more 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, tilth, 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 clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 increases 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 clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 ornamentals: 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 be avoided.
• 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 clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 yellow-poplar 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, shrink-swell potential, high clay content, corrosivity, seeps and springs, and large stones
Management measures and considerations:
• Designing structures so that they conform with natural slopes 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.
• 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 from 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 on sanitary facilities.
• Installing septic system distribution lines during periods when the soil is not wet helps to prevent 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 be avoided.
• 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 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: 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 be avoided.
• 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.
• 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: 7A, based on yellow-poplar as the indicator species

UsD—Unison loam, 15 to 30 percent slopes

Setting

Landscape: Intermountain hills and low mountains in the Jacks Creek, Green Mountain, and central areas of the county
Elevation range: 2,100 to 3,200 feet
Landform: Coves, colluvial fans, high stream terraces, and benches
Landform position: Head slopes, footslopes, and toeslopes
Shape of areas: Irregular
Size of areas: As much as 28 acres

Composition

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

Typical Profile

Surface layer:
0 to 10 inches—dark yellowish brown loam

Subsoil:
10 to 36 inches—yellowish brown clay loam
36 to 61 inches—yellowish brown sandy clay loam
61 to 88 inches—mixed yellowish brown, brownish yellow, and brown 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
Organic matter content (surface layer): Moderate or high
Potential frost action: Moderate
Special climatic conditions: Soil subject to 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:
• Unison soils that are moderately eroded, in cropped fields
• Thunder soils that have more organic matter in the surface layer and less clay and more rock fragments in the subsoil than the Unison soil, in drainageways
• Random areas of Saunook soils that have more organic matter in the surface layer and less clay in the subsoil than the Unison soil
• Moderately well drained to poorly drained soils, in depressions and on toeslopes
• Urban land in and around the town of Burnsville
• Udorthents, loamy, stony, in and around the town of Burnsville

Similar inclusions:
• Unison soils that have a surface layer of fine sandy loam, silt loam, sandy clay loam, or clay loam
• Unison soils that have more organic matter in the surface layer

Land Use

Dominant Uses: Cropland
Other Uses: Pasture, hayland, and building site development

Agricultural Development

Cropland

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, tilth, 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 clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 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 clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 be avoided.
• 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 clay content. The concentration of pesticides may be damaging to future crops. Using plant-applied pesticides instead of soil-applied pesticides, which are tied up by the high clay content, 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 yellow-poplar 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, shrink-swell potential, high clay content, corrosivity, seeps and springs, and large stones
Management measures and considerations:
• Designing structures so that they conform with natural slopes 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.
• 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 from 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 on 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 prevent 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 be avoided.

• 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, frost action, 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 be avoided.
• 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.
• Slow air drainage and frost pockets may allow late spring frost to damage new growth in some years.
• Using mulch helps to reduce damage to newly established landscape plants caused by frost heaving.
• 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: 7R, based on yellow-poplar as the indicator species

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.

WbD—Wayah-Burton complex, 15 to 30 percent slopes, bouldery

Setting

Landscape: High mountains of the Black Mountain Range
Elevation range: 4,600 to 6,000 feet
Landform: Ridges
Landform position: Summits and upper side slopes
Shape of areas: Long and narrow or irregular
Size of areas: As much as 19 acres

Composition

Wayah soil and similar inclusions: 50 percent
Burton soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Wayah

Surface layer:
0 to 4 inches—black loam
4 to 11 inches—very dark brown loam
11 to 14 inches—dark yellowish brown loam

Subsoil:
14 to 33 inches—dark yellowish brown fine sandy loam
33 to 48 inches—yellowish brown sandy loam

Underlying material:
48 to 60 inches—brown gravelly sandy loam saprolite
60 to 79 inches—brown and gray gravelly sandy loam saprolite

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

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 stones and boulders that average about 10 to 48 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high rainfall, and a 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, high-grade metamorphic 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:
- Random areas of soils that have a high mica content in the subsoil and underlying material
- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas adjacent to rock outcrops
- Widely scattered areas of rock outcrop
- 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
- Exposed areas that are windswept or ice damaged

Similar inclusions:
- Wayah soils that have a surface layer of sandy loam or fine sandy 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: Watershed 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: Poorly suited
Management concerns:
- This map unit is not managed for pasture and hayland.

Orchards and ornamental crops

Suitability: Poorly suited for Christmas trees and unsuited for all other crops
Management concerns:
• This map unit is not managed for orchards and ornamental crops.

Woodland Management and Productivity

Potential for commercial species: Moderately high for red spruce and moderate for northern hardwoods
Suitability: Poorly suited
Management concerns:
• This map unit is not managed for timber production.

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:
• This map unit is not managed for local roads and streets.

Lawns and landscaping

Suitability: Poorly suited
Management concerns:
• This map unit is not managed for lawns and landscaping.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: Based on northern red oak as the indicator species, 4R in areas of the Wayah soil and 3R in areas of the Burton soil

WbE—Wayah-Burton complex, 30 to 50 percent slopes, bouldery

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,600 to 6,000 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 44 acres

Composition

Wayah soil and similar inclusions: 50 percent
Burton soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Wayah

Surface layer:
0 to 4 inches—black loam
4 to 11 inches—very dark brown loam
11 to 14 inches—dark yellowish brown loam

Subsoil:
14 to 33 inches—dark yellowish brown fine sandy loam
33 to 48 inches—yellowish brown gravelly sandy loam

Underlying material:
48 to 60 inches—brown gravelly sandy loam saprolite
60 to 79 inches—brown and gray gravelly sandy loam saprolite

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

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: Widely scattered stones and boulders that average about 10 to 48 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high rainfall, and a 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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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:
• Random areas of soils that have a high mica content in the subsoil and underlying material
• 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
• Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas adjacent to rock outcrops
• Widely scattered areas of rock outcrop
• 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
• Exposed areas that are windswept or ice damaged

Similar inclusions:
• Wayah soils that have a surface layer of fine sandy loam or sandy 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
Other Uses: Recreation

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, short growing season, and bouldery surface. A site on better suited soils should be selected.

Pasture and hayland

Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns:
• This map unit is not managed for pasture and hayland.

Orchards and ornamental crops

Suitability: Poorly suited for Christmas trees and unsuited for all other crops
Management concerns:
• This map unit is not managed for orchards and ornamental crops.

Woodland Management and Productivity

Potential for commercial species: Moderately high for red spruce and moderate for northern hardwoods
Suitability: Poorly suited
Management concerns: Wayah—climate, equipment use, and erodibility; Burton—climate, equipment use, erodibility, and windthrow hazard
Management measures and considerations:
• Productivity is limited because of the short growing season and other climatic conditions associated with the higher elevations.
• 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 content of organic matter in the surface layer.
• Avoiding logging operations during periods when the soils are saturated helps to prevent rutting of the soil surface and damage to tree roots from compaction.
• Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
• 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.
• These soils are best reforested by managing for natural regeneration of northern hardwoods and, above 5,300 feet in elevation, red spruce.
• Productivity is limited in areas of the Burton soil because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Poorly suited
Management concerns: Wayah—slope, erodibility, climate, and corrosivity; Burton—slope, erodibility, climate, 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.
• Design modifications are needed to overcome the limitation of extreme freezing.
• 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, extreme freezing, and seeps and springs; Burton—slope, extreme freezing, seeps and springs, and depth to bedrock
Management measures and considerations:
• The local Health Department should be contacted for guidance on 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.
• Excavations may cut into seeps and springs. These areas should be avoided.
• 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 the short growing season, the use of native, winter-hardy landscape plants is recommended.
• 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Burton soil are difficult to manage for lawns and landscaping, especially if the soil has been disturbed.

Interpretive Groups

Land capability classification: 7e

Woodland ordination symbol: Based on northern red oak as the indicator species, 4R in areas of the Wayah soil and 3R in areas of the Burton soil

WcF—Wayah-Burton complex, 50 to 95 percent slopes, very rocky

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,600 to 6,000 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 44 acres

Composition

Wayah soil and similar inclusions: 50 percent
Burton soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Wayah

Surface layer:
0 to 4 inches—black loam
4 to 11 inches—very dark brown loam
11 to 14 inches—dark yellowish brown loam

Subsoil:
14 to 33 inches—dark yellowish brown fine sandy loam
33 to 48 inches—yellowish brown sandy loam

Underlying material:
48 to 60 inches—brown gravelly sandy loam saprolite
60 to 79 inches—brown and gray gravelly sandy loam saprolite

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

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: Widely scattered stones and boulders that average about 10 to 48 inches in diameter and 25 to 75 feet apart
Extent of rock outcrop: About 10 percent rock outcrop on the soil surface
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high rainfall, and a 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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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:
• Random areas of soils that have a high mica content in the subsoil and underlying material
• 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, in drainageways, and below 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
• Exposed areas that are windswept or ice damaged

Similar inclusions:
• Wayah soils that have a surface layer of fine sandy loam or sandy 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: Wildlife habitat and woodland

Agricultural Development

Cropland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, short growing season, and extent of rock outcrops. A site on better suited soils should be selected.

Pasture and hayland

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for the production of pasture and hay crops because of the slope, erodibility, short growing season, and extent of rock outcrops. A site on better suited soils should be selected.

Orchards and ornamental crops

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for orchards and ornamental crops because of the slope, short growing season, erodibility, and extent of rock outcrops. A site on better suited soils should be selected.

Woodland Management and Productivity

Potential for commercial species: Moderately high for red spruce and moderate for northern hardwoods
Suitability: Poorly suited
Management concerns: Wayah—climate, equipment use, and erodibility; Burton—climate, equipment use, erodibility, and windthrow hazard
Management measures and considerations:
• Productivity is limited because of the short growing season and other climatic conditions associated with the higher elevations.
• 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.
• These soils are best reforested by managing for natural regeneration of northern hardwoods and, above 5,300 feet in elevation, red spruce.
• Productivity is limited in areas of the Burton soil because of the limited rooting depth.

Urban Development

Dwellings

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for dwellings because of the slope, erodibility, extreme freezing, the depth to bedrock in the Burton soil, and the extent of rock outcrops. A site on better suited soils should be selected.

Septic tank absorption fields

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for septic tank absorption fields because of the slope, extreme freezing, the depth to bedrock in the Burton soil, and the extent of rock outcrops. A site on better suited soils should be selected.

Local roads and streets

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for roads and streets because of the slope, erodibility, the depth to bedrock in the Burton soil, and the extent of rock outcrops. A site on better suited soils should be selected.

Lawns and landscaping

Suitability: Unsuited
Management concerns:
• This map unit is severely limited for lawns and landscaping because of the slope, erodibility, short growing season, the depth to bedrock in the Burton soil, and the extent of rock outcrops. A site on better suited soils should be selected.

Interpretive Groups

Land capability classification: 7e
Woodland ordination symbol: Based on northern red oak as the indicator species, 4R in areas of the Wayah soil and 3R in areas of the Burton soil

WhC—Wayah-Burton complex, windswept, 8 to 15 percent slopes, bouldery

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,600 to 6,000 feet
Landform: Ridges
Landform position: Summits
Shape of areas: Long and narrow or irregular
Size of areas: As much as 13 acres

Composition

Wayah soil and similar inclusions: 50 percent
Burton soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Wayah

Surface layer:
0 to 4 inches—black loam
4 to 11 inches—very dark brown loam
11 to 14 inches—dark yellowish brown loam

Subsoil:
14 to 33 inches—dark yellowish brown fine sandy loam
33 to 48 inches—yellowish brown sandy loam

Underlying material:
48 to 60 inches—brown gravelly sandy loam saprolite
60 to 79 inches—brown and gray gravelly sandy loam saprolite

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

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: 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 stones and boulders that average about 10 to 48 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a 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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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:
- Random areas of soils that have a high mica content in the subsoil and underlying material
- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas adjacent to rock outcrops
- Widely scattered areas of rock outcrop
- 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

Similar inclusions:
- Wayah soils that have a surface layer of fine sandy loam or sandy 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: Unsuited
Management concerns:
• This map unit is severely limited for crop production because of the slope, erodibility, 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, bouldery surface, damaging high winds, and short growing season.
• The slope may limit equipment use in the steeper areas when harvesting hay crops.
• 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.
• Areas of the Burton soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

Orchards and ornamental crops

Suitability: Unsuited
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: Unsuited (fig. 7)
Management concerns:
• This map unit is severely limited for timber production because of the damaging high winds, short growing season, 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: Wayah—slope, erodibility, climate, and corrosivity; Burton—slope, erodibility, climate, corrosivity, and depth to bedrock
Management measures and considerations:
• Designing structures so that they conform with natural slopes 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 damaging 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 on 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.

Figure 7.—Windswept hardwoods are twisted, stunted, and gnarled by exposure to high winds and frequent ice storms. This is common on high mountains and prominent ridgetops of intermediate mountains.

• 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 the 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, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
• Because of the moderately deep rooting depth, areas of the Burton soil are difficult to manage for lawns and landscaping, especially if the soil has been disturbed.

Interpretive Groups

Land capability classification: 4e
Woodland ordination symbol: Based on northern red oak as the indicator species, 2A in areas of the Wayah soil and 2D in areas of the Burton soil

WhD—Wayah-Burton complex, windswept, 15 to 30 percent slopes, bouldery

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains

Elevation range: 4,600 to 6,000 feet
Landform: Ridges
Landform position: Summits and upper side slopes
Shape of areas: Long and narrow or irregular
Size of areas: As much as 65 acres

Composition

Wayah soil and similar inclusions: 50 percent
Burton soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Wayah

Surface layer:
0 to 4 inches—black loam
4 to 11 inches—very dark brown loam
11 to 14 inches—dark yellowish brown loam

Subsoil:
14 to 33 inches—dark yellowish brown fine sandy loam
33 to 48 inches—yellowish brown sandy loam

Underlying material:
48 to 60 inches—brown gravelly sandy loam saprolite
60 to 79 inches—brown and gray gravelly sandy loam saprolite

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

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 stones and boulders that average about 10 to 48 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a 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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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:
- Random areas of soils that have a high mica content in the subsoil and underlying material
- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas adjacent to rock outcrops
- Widely scattered areas of rock outcrop
- 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 bedrock at a depth of more than 60 inches, in concave areas at the head of drains and in saddles and gaps
- Nonwindswept areas on protected east- and north-facing slopes

Similar inclusions:
- Wayah soils that have a surface layer of fine sandy loam or sandy 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: Unsuited
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, bouldery surface, 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.
• Areas of the Burton soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

Orchards and ornamental crops

Suitability: Unsuited
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: Unsuited
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 in 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 limitation of extreme freezing.
• 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 on 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 the 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 be avoided.
• Because of the moderately deep rooting depth, areas of the Burton soil are difficult to manage for lawns and landscaping, especially if the soil has been disturbed.

Interpretive Groups

Land capability classification: 6e
Woodland ordination symbol: 2R, based on northern red oak as the indicator species

WhE—Wayah-Burton complex, windswept, 30 to 50 percent slopes, bouldery

Setting

Landscape: High mountains of the Black Mountain Range and Bald Mountains
Elevation range: 4,600 to 6,000 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: As much as 92 acres

Composition

Wayah soil and similar inclusions: 50 percent
Burton soil and similar inclusions: 40 percent
Dissimilar inclusions: 10 percent

Typical Profile

Wayah

Surface layer:
0 to 4 inches—black loam
4 to 11 inches—very dark brown loam
11 to 14 inches—dark yellowish brown loam

Subsoil:
14 to 33 inches—dark yellowish brown fine sandy loam
33 to 48 inches—yellowish brown sandy loam

Underlying material:
48 to 60 inches—brown gravelly sandy loam saprolite
60 to 79 inches—brown and gray gravelly sandy loam saprolite

Burton

Surface layer:
0 to 7 inches—black cobbly sandy loam
7 to 11 inches—very dark grayish brown cobbly loam

Subsoil:
11 to 20 inches—strong brown cobbly sandy loam
20 to 25 inches—dark yellowish brown gravelly sandy loam

Bedrock:
25 to 31 inches—weathered, moderately fractured metagraywacke
31 to 41 inches—unweathered, moderately fractured metagraywacke

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: Widely scattered stones and boulders that average about 10 to 48 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Very high
Potential frost action: Moderate
Special climatic conditions: Soils subject to extreme freezing and rime ice in winter, high winds, high rainfall, and a 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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
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:
• Random areas of soils that have a high mica content in the subsoil and underlying material
• 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 drainageways
• 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
• Widely scattered areas of rock outcrop
• Nonwindswept areas on protected east- and north-facing slopes

Similar inclusions:
• Wayah soils that have a surface layer of fine sandy loam or sandy 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: Unsuited
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: Unsuited
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, bouldery 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.

• Areas of the Burton soil are difficult to manage for the production of pasture and hay crops because of the low available water capacity caused by the moderately deep rooting depth.

Orchards and ornamental crops

Suitability: Unsuited
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: Unsuited
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 in 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, extreme freezing; Burton—slope, extreme freezing, and depth to bedrock
Management measures and considerations:
• The local Health Department should be contacted for guidance on 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 the 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 be avoided.

• Because of the moderately deep rooting depth, areas of the Burton soil are difficult to manage for lawns and landscaping, especially if the soil has been disturbed.

Interpretive Groups

Land capability classification: 7e

Woodland ordination symbol: 2R, based on northern red oak as the indicator species

Use and Management of the Soils

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

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

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

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

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

Crops and Pasture

Cliff Vinson, District Conservationist, Natural Resources Conservation Service; Johnny Hensley, Yancey County 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, the Cooperative Extension Service, or the Yancey Soil and Water Conservation District.

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.

Cropland

In 1999, according to the North Carolina Cooperative Extension Service of Yancey County, the county had approximately 1,915 acres of cropland.

The major crops grown in Yancey County include burley tobacco, silage corn, vegetables, landscaping ornamentals, berries, and apples. Cultivated lands occur on nearly level bottomland soils and gently sloping to strongly sloping terrace soils along the major tributaries of the Cane, South Toe, and North Toe Rivers. Soils managed include Rosman, Bandana, Dellwood, Reddies, Dillard, and Unison. Gently sloping to strongly sloping soils on intermountain hills and low mountains (such as Evard, Clifton, and Fannin soils) and on terraces and in coves (such as

Unison and Saunook soils) are farmed in the Jacks Creek, Green Mountain, Brush Creek, Bald Creek, and Bee Log communities. Other areas of cultivated land are scattered throughout the county.

The following paragraphs discuss several points relative 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 Yancey 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 Yancey County. It is a hazard on soils that have slopes of more than 2 percent. Saunook and Clifton soils are examples. As the slope increases, the hazard of erosion and the difficulty in controlling erosion also increase. Loss of the surface layer through erosion is damaging. Soil productivity is reduced as the surface layer is lost and part of the subsoil is incorporated into the plow layer. Loss of the surface layer is especially damaging on soils that have a clayey subsoil, such as Clifton and Unison soils, and on soils that have a layer in or below the subsoil that limits the depth of the root zone, such as Cowee soils.

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. Yancey County's trout streams are especially sensitive to damage caused by runoff and sediment.

Erosion-control practices provide a protective surface cover, reduce runoff, and increase the rate of water infiltration. A cropping system that keeps a vegetative cover on the soil for extended periods helps to minimize soil loss and maintains the productive capacity of the soil. In sloping areas, including forage crops of grasses and legumes in the cropping system helps to control erosion. The forage crops also add nitrogen to the soil and improve tilth. Minimizing tillage and leaving crop residue on the surface increases the rate of water infiltration, reduces runoff, and helps to control erosion. These practices can be effective on most of the soils in the survey area.

Other practices include terraces and diversions, which shorten the length of slopes and thus minimize erosion caused by runoff. Contour farming and stripcropping can also be effective components of a resource management system. Stripcropping offers the use of crop rotation, crop residue management, contouring, and cover crops. These methods are practical as they can be adapted to a wide range of slope patterns. Information about erosion-control measures for each kind of soil is available at the local office of the Natural Resources Conservation Service.

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 Dillard 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 artificial drainage. Subsurface drainage tile is used to control the water table in these soils. Wet areas resulting from seeps and springs occur in Dillard, Unison, Thunder, Saunook, Toecane, Tusquitee, Keener, and Lostcove soils. These soils 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 soils. Nikwasi soils are poorly drained and are not recommended for cropland use.

Surface water management is important on cropland. Overland flow and runoff from adjacent land onto cultivated lands must be controlled. Surface water movement across plowed fields needs control as well. Grassed waterways and diversions are examples of measures that help to reduce surface water problems, such as soil erosion, and help to maintain water quality in adjacent waterways. Onsite investigations are essential to determine the proper method of control.

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 textures and a moderate or high content of organic matter in the surface layer. Soils in Yancey County on slopes of less than 3 percent commonly have better tilth than those on slopes of more than 4 percent. The steeper areas are more susceptible to erosion. Erosion results in surface layers with higher clay contents and lower organic matter contents, thus degrading tilth and overall soil quality.

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. Periods of heavy rainfall 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.

Resource management systems, such as contour farming, conservation tillage, crop residue management, stripcropping, winter cover crops, and crop rotations which include grasses and legumes, help to minimize soil erosion, clodding, and crusting. These practices also help to increase rainfall infiltration and the availability of water to plants and improve soil fertility and soil tilth.

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 pebbles affect the use of tillage implements. Stones and boulders are common in many of the colluvial soils in the survey area, especially in Thunder, Toecane, and Lostcove soils. In some places the rock fragments prevent tillage. In other places they can be removed.

Soil fertility.—The soils in Yancey 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.

Liming requirements are a major concern because the acidity level in the soil affects the availability of many plant nutrients, 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.

A soil test is used as a guide to indicate how much and what kind of lime and fertilizer should be used. For example, in soils that have sandy surface layers, magnesium and available calcium levels may be low. Depending on the soil properties and the crop to be grown, the desired pH levels may differ. Soil tests are needed to determine proper application rates.

Soil tests also indicate the need for phosphorus and potassium fertilizer. These tests are important because, while naturally occurring phosphorus and potassium levels are commonly very low, land in long-term agricultural use often has higher than expected levels of these nutrients. Phosphorous and potassium have a tendency to build up in the soil.

Nitrogen fertilizer is required for most crops. It is not, however, required for clover, in some rotations of soybeans, or for alfalfa that is established. Appropriate rates depend on the crop and the potential productivity of the soil. For example, nitrogen rates for corn on soils that have a yield potential of 125 to 150 bushels per acre should be about 140 to 160 pounds per acre. Where the yield potential is only 100 bushels per acre, rates of about 100 to 120 pounds of nitrogen per acre should be used. Application of nitrogen in excess of potential yields is not a recommended practice. The excess fertilizer not utilized by the crop creates an unnecessary expense and can result in the pollution of surface water and ground water.

Nitrogen can be readily leached from the more sandy soils, such as Rosman, Reddies, and Dellwood. As a result, split applications of nitrogen may be needed on these soils during the growing season.

Nitrogen rates can be reduced on fields using a continuous no-till system, provided that organic matter levels have been increased substantially. These increases can be achieved with a minimum of 2 tons per acre of organic matter left on the surface annually in the absence of tillage. Both experience by farmers and research have shown sustained yields with reduced nitrogen rates.

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 16. Table 17 shows the general ranges of clay content and 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 17. 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 (through pasture conversion) may have a higher content of organic matter in the surface layer than similar soils that have been cultivated (through cropland conversion). 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 Cashiers, Porters, Saunook, Dellwood, 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. Refer to the label of the pesticide container for further instructions. Eroded soils, such as Clifton and Fannin, may have enough clay in the surface layer to bind pesticides.

The wet conditions of Nikwasi and 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 low clay content. Table 18 shows depth to the 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 that 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. 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 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 Yancey 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 more individual microbes, bacteria, fungi, protozoa, beneficial nematodes, micro-arthropods, and larger animals, such as earthworms, than there are people on the earth. 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, reductions 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.

Pasture and Hayland

In 1999, according to the North Carolina Cooperative Extension Service of Yancey County, the county had approximately 10,400 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 Yancey County, renovation, brush control, and measures that prevent overgrazing are needed. The soils in the survey area vary widely in their ability to

Figure 8.—Differences in soil properties can occur within short distances and in the same field. Pictured are somewhat poorly drained Bandana soils and well drained Unison soils under hayland management.

produce grasses and legumes due to differences in properties such as depth to bedrock or strata of sand and 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, well drained terrace and upland soils, such as Unison and Clifton (fig. 8).

Some pastures on steep side slopes are in areas of eroded Fannin and Clifton soils. These areas have cow paths on the contour which support very little forage. The rooting depth and available water-holding capacity are limited in these areas due to overgrazing, compaction, and erosion. These areas are easily susceptible to drought and further erosion.

Pastures on high mountain ridges and steep side slopes above 4,000 feet in elevation are subject to extreme winter conditions, especially on north-facing slopes. Pastures on these landscapes can be damaged by frost heave and late fall grazing, which does not allow forage plants time to recover before winter dormancy. They also have a shorter growing season and receive more rainfall than those at the lower elevations. These weather conditions make pasture establishment and maintenance more difficult.

Pastures tend to be more productive on uneroded side slopes and ridgetops where slopes are less than 30 percent, such as in areas of Clifton, Edneytown, Huntdale, Evard, Buladean, Fannin, and Porters soils. Clifton soils, although eroded, can support good pastures in areas that do not have compacted cow trails because of their relatively higher natural soil fertility. Cove soils, such as Saunook and Unison, support good pastures because of the high content of organic matter in the surface layer and the high available water-holding capacity of the subsoil.

Soil fertility.—In Yancey County, the soils do not have natural fertility sufficient enough to produce hay and forage crops without soil amendments. This is due to naturally low levels of nutrients in the soils and an acidic soil environment. By decreasing soil acidity with applications of lime, the availability of nutrients and the activity of beneficial bacteria are increased. Lime also neutralizes exchangeable aluminum, thus reducing aluminum toxicity to crops. Incorporating lime into the soil before planting is important due to its slow movement into the root zone when applied to the surface. Both organic and chemical fertilizers increase nutrient levels in the soil. Soils in the survey area are naturally low in nitrogen and phosphorus. A soil test is recommended, however, 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 early 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 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 Porters, Wayah, Balsam, Tanasee, Chestoa, Cashiers, Saunook, Thunder, Toecane, Tusquitee, Dellwood, Reddies, and Rosman 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.

The wet conditions of Nikwasi and 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 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 low clay content. Table 18 shows depth to the water table and flooding frequencies 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 Yancey 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. They should be grown to the maximum extent possible. 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.

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. Sod-forming grasses, such as tall fescue and orchardgrass, minimize erosion in the steeper areas. Alfalfa should be seeded with cool-season grasses in areas where soils are at least 2 feet deep and are well drained. Evard, Edneytown, Clifton, Unison, Fannin, Saunook, and Huntdale soils are examples. Alfalfa does poorly on wet soils, such as Bandana and Nikwasi. 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. Legumes can be established through renovation in areas that support sod-forming grasses.

Tall fescue is an important cool-season grass and thrives on soils well suited to both pasture and hay. It can also be established and performs very well on soils with high water tables or clayey subsoils and in eroded areas. Fescue is an excellent companion crop for legumes in pasture mixtures such as with ladino or red clover. It is a good management practice to seed a legume with fescue in Yancey County. In many pastures there is an abundant supply of native White Dutch clover seed in the soil, and additional seeding is not necessary. The legume adds to the palatability and nutritive value of the grass and decreases the need for nitrogen fertilizers. For maximum production, nitrogen fertilizer should be applied during the period when the grass is accumulating. Care must be taken to minimize the effects of fescue toxicity caused by the fungus *Acremonium coenophilum*, which occurs on fescue plants. This fungus severely affects animal weight gain.

Warm-season grasses that are planted during the period from early April through late May help to supplement cool-season grasses, such as tall fescue. They grow well during warm periods, especially from mid June through September, when the growth of cool-season grasses is slow. Examples of warm-season grasses are switchgrass, big bluestem, eastern gamagrass, indiangrass, 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.

Pastures of native bluegrass are on most soils in the county. This is a preferred species for horses and sheep. Bluegrass pastures could be improved by the use of high-analysis phosphate fertilizers, which encourage the growth of native White Dutch clover and increase the nutrition and quality of forage.

Orchardgrass, another important species, can grow anywhere that fescue thrives, except in wet areas, such as on Bandana and Nikwasi 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.

Erosion control.—The majority of pasture and hayland in Yancey 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 springs and wells help to prevent overgrazing.

Pastures on slopes of more than 30 percent are generally too steep for farm equipment. Lime and fertilizer must be applied by hand, or access roads must be built for farm equipment. Hand application of fertilizer and lime is usually uneven and results in poor stands of pasture which support few cattle. Poor vegetative cover encourages erosion, growth of unwanted weeds, and the encroachment of shrubs and trees into field borders. Where access roads are not economically feasible or hand applications of lime and fertilizer are not practiced regularly, timber production may bring a greater economic return.

Pasture establishment and rejuvenation may create erosion problems where slopes are more than 2 percent. Using proper planting dates helps to ensure a good stand in a timely manner. Alfalfa and cool-season forages, such as fescue, orchardgrass, clovers, and bluegrass, should be planted between mid March and mid April for best results. Warm-season forages such as sudangrass should be planted in the spring when the danger of frost is past.

Maintenance of pasture and hayland.—Using rotational grazing, implementing a well planned clipping and harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy helps 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 a rain, resulting in a high seedling mortality rate. In addition, 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 production and transfer nitrogen from the air into the soil.

Additional information about pasture and hayland can be obtained from the local office of the North Carolina Cooperative Extension Service, the Yancey Soil and Water Conservation District, or the Natural Resources Conservation Service.

Orchards and Ornamental Crops

Jeffrey H. Owen, Area Extension Forestry Specialist, North Carolina State University, helped prepare this section.

In 1999, according to the North Carolina Cooperative Extension Service of Yancey County, the county had approximately 20 acres of commercial orchards and 675 acres of ornamental crops.

A variety of soils in Yancey County have been managed very successfully for orchards and

Figure 9.—Fraser fir grown for Christmas trees in an area of Evard-Cowee complex, 15 to 30 percent slopes, stony.

ornamental crops, including some which have been flagged as potential problems soils (fig. 9). Orchards in Yancey County are grown for the “u-pick”, fresh, and juice markets and require intensive management and high maintenance. Ornamental crops are grown throughout the county on intermediate and low mountains and intermountain hills (in areas of Porters, Huntdale, Evard, and Chandler soils), in coves and on terraces (in areas of Unison and Saunook soils), and on flood plains (in areas of Rosman, Bandana, Dellwood, and Reddies soils). The mountains and coves of the South Toe River valley are major areas for growing ornamental crops.

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. In the table, *well suited, suited, poorly suited,* and *unsuited* are used to indicate the degree of the major soil limitations to be considered in the production of orchards and ornamental crops. *Well suited* indicates that no limitations affect production although inclusions of limiting, dissimilar soils or site features may be present. *Suited* indicates that one or two limitations affect production. *Poorly suited* indicates that two or more limitations affect production. Some of these limitations may be overcome by higher levels of management, which in turn increase the cost of production. *Unsuited* indicates the occurrence of limitations that cannot be overcome.

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 16. Table 17 shows the general ranges of clay content and organic matter content. Tables 18 and 19 show depth to bedrock, water table, and flooding frequency for soils in the survey area. These figures represent what is typical across the county. Conditions of individual map units may vary.

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 local office of the North Carolina Cooperative Extension Service, the Natural Resources Conservation Service, or the Yancey 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. Slope is considered a limitation affecting safe equipment use. Ratings are based on land that is presently cleared. The cost of land clearing and the impact on the soil resource lower the suitability. 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. Soil limitations may be overcome with increased management, but this in turn increases the cost of production. The cost of doing business varies from site to site and depends on short- and long-term management goals and the unique set of soil, plant, landscape, and climatic relationships in the area. An onsite investigation is recommended to determine site-specific conditions, especially on flood plains, in drainageways, in map units with slopes of more than 30 percent, and on sites at elevations above about 4,000 feet.

Technical assistance may be obtained from the local office of the North Carolina Cooperative Extension Service, the Yancey Soil and Water Conservation District, or the Natural Resources Conservation Service.

Soil-Plant-Landscape-Climate Relationships

Orchards and ornamental crops are grown throughout Yancey County and include apple trees, 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 is dependent on a variety of 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 coves, for map units with slopes greater than 30 percent, and for sites with elevations above 4,000 feet.

Elevation and aspect.—Naturally occurring site factors are important to consider due to their influence on site productivity and a wide variety of management decisions. In general, the most productive sites are generally below 4,000 feet in elevation. At the higher elevations, growing seasons are shorter and climates are comparatively harsher. 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. Huntdale and Porters soils occur on cool side slopes. Saunook and Unison soils occur in coves and on footslopes. Rosman, Reddies, and Dellwood soils occur on flood plains. Soils on flood plains are not suited to orchards because of soil wetness, flooding, and the high potential for frost damage.

Rainfall and droughtiness.—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 rainfall generally increases as elevation increases, productivity gains may be offset by the shorter growing season and climatic conditions. For orchards, the most productive sites are generally below about 3,800 feet in elevation. Growth on soils that are shallow or moderately deep to bedrock, such as Cleveland, Unicoi, Ashe, Burton, Chestnut, Cowee, Unaka, and Ditney 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 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 be established and spread.

Orchards should be established near an adequate supply of water. Uniform and sloping topography allows good air drainage and minimizes the occurrence of frost pockets. Sites that are gullied or have ravines or abrupt slope changes should be avoided. Trees planted in wet soils, in soils subject to flooding, in areas affected by seeps and springs, or in natural drainageways produce low yields and are more susceptible to disease. Good sites for orchards are in areas of very deep, well drained soils. Examples are Huntdale, Fannin, Chandler, Evard, Edneytown, Clifton, Saunook, and Unison soils.

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 are 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. Also, soils that have a high clay content can only be dug within in a narrow range of soil moisture to prevent damage to the root ball. Access with machinery is limited when the soil is wet. Periods of desired moisture conditions, however, may not coincide with harvesting schedules.

Upland soils, such as Evard, Edneytown, Fannin, Cashiers, Chandler, Huntdale, and Porters soils, and the colluvial Saunook soils are suitable for adapted ornamental crops. Flood plain soils, such as Rosman, Dellwood, and Reddies, are also used to grow 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, maintains water quality, and protects the beneficial 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 and harvesting equipment. Sites should be selected in areas that have an adequate supply of clear water for irrigation.

Layout.—The layout of an orchard should include outlets for water flowing from higher areas and for water flowing out of the orchard. Field borders and diversions which empty into grassed waterways dispose of flowing water without causing erosion. A healthy ground cover controls runoff, allows for greater infiltration into the soil, and reduces evaporation losses. Sod should be established between rows of trees and on all roads and erosion-control structures. It should be established as construction proceeds. Rows of trees should be laid out on the contour or across the slope and as nearly parallel to each other as possible. This arrangement helps to control erosion and allows easy access.

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 and graded areas and cut and fill slopes as construction proceeds and using erosion-control structures, such as silt fences and catch basins, helps 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 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 are greater than 30 percent, 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 of the roots can result during harvesting. These 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, Porters, 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 Yancey County are acidic and generally low in natural fertility, orchards and 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. A soil’s physical, chemical, and biological properties must be at optimal levels for production levels to be maintained on a sustainable basis.

Both organic and chemical fertilizers increase nutrient levels in the soil. Application rates are plant specific and should be based on soil tests and plant tissue analysis. Lime and fertilizer should also be applied to access roads and erosion-control structures. This 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 the fertilizers and lime or allow the contamination of surface water and ground water. The contamination of surface water and ground water is also a concern for Dellwood and Reddies soils due to a high leaching rate and depth to a seasonal high water table. Table 18 shows depth to the 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, their levels 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 recommended. 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 the 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 a 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 to 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 Yancey County. The thickness and texture of the soil layers is shown in the USDA texture column in table 16. Table 17 shows the general range of clay content and 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 17. 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, Porters, 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 of the pesticide container for specific instructions and application rates.

The wet conditions of Bandana and Nikwasi 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 18 shows depth to the water table and flooding frequencies 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 it does not conflict with pesticide use help 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 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 from the local office of the North Carolina Cooperative Extension Service, the Natural Resources Conservation Service, or the Yancey 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 and 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 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 due to variations in rainfall and other climatic factors. Soil quality and the effects of past management decisions affect present-day yields. The land capability classification of each map unit is also shown in the table.

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

The high level of management needed to realize the estimated yields depends on the kind of soil and the crop. Management can include erosion control; protection from flooding; proper planting and seeding rates; planting high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

A high level of management also includes maintaining proper soil reaction and fertility levels as indicated by soil tests. Favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements are critical. 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 can result in the pollution of surface and ground water. 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 as the acreage of such crops is presently small. The local office of the Natural Resources Conservation Service or the North Carolina Cooperative Extension

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

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops *(7)*. 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 I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

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

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

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

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

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

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

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

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless 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 I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The capability classification of each map unit is given in the section “Detailed Soil Map Units” and in the yields table.

Prime Farmland and Other 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 4,475 acres of Yancey County, or 2 percent of the total acreage, meets the soil requirements for prime farmland. About 6,122 acres, or 3 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 7. Those that are considered of statewide importance are listed in table 8. The lists do 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, or droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit 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. 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. 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. 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” *(8)* and in the “Soil Survey Manual” *(9)*.

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 Yancey County are specified in “Field Indicators of Hydric Soils in the United States”.

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.

Table 9, part A, lists the map units that meet the requirements for hydric soils and also have at least one of the hydric soil indicators. This list can help to plan land uses, but onsite investigation is needed to determine the occurrence of hydric soils on a specific site.

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.

Table 9, part B, lists the map units that 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.

Forestland Management and Productivity

Albert Coffey, Forester, Natural Resources Conservation Service; Bacchus Hensley, Yancey County Ranger, North Carolina Forest Service; and Dan Manning, Soil Scientist, U.S. Forest Service, helped prepare this section.

Owners of forestland in Yancey 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 valued crop as quickly as possible while maintaining the integrity of the ecosystem.

Forestland covers about 161,640 acres, or 80 percent of the land area of Yancey County. Of this, timberland or commercial forest covers about 157,117 acres, or 78 percent 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 Yancey County are as described in the following paragraphs:

Spruce-fir. This forest type covers 4,381 acres. It is predominantly red spruce or Fraser fir, or both. Commonly included trees are sugar maple and yellow birch.

White pine-hemlock. This forest type covers 5,253 acres. It is predominantly eastern white pine. Commonly included trees are hemlock, red maple, and sweet birch.

Oak-pine. This forest type covers 19,201 acres. It is predominantly hardwoods, typically upland oaks. Pine species 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 25,257 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 103,025 acres. It is predominantly upland oaks or hickory, or both. Commonly included trees are yellow-poplar, red maple, and black locust.

For purposes of management, forest types are generally grouped as follows: yellow pine, eastern white pine, upland hardwoods, cove hardwoods, northern hardwoods, and spruce-fir. 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 Ditney, Unicoi, 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 Yancey 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 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, Ditney, Unicoi, Shinbone, and Harmiller. Major soils on cool aspects are Huntdale, Porters, Unaka, Cashiers, and Chestoa.

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, Unison, Toecane, Tusquitee, 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 shaded 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 Porters, Unaka, Huntdale, and Cashiers on side slopes and Saunook, Thunder, Toecane, and Tusquitee in coves. In areas underlain by metasedimentary rock, major soils are Chestoa. Above about 5,000 feet in elevation, major soils include Burton, Craggey, and Wayah soils on side slopes and ridges and Tanasee and Balsam soils in coves.

Spruce-fir (SAF Red Spruce-Fraser Fir). This forest type is limited to landscapes above about 5,000 feet in elevation on the Black Mountain Range and Bald Mountains. The present acreage is limited due to past fires, insect infestation, and management. Red spruce is now 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 soils on side slopes and ridges and Tanasee and Balsam soils 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 Yancey County depends on physiography, soil properties, climate, and the effects of past management. Specific soil properties and site characteristics, including soil depth, texture, structure, and depth to the water table, affect forest productivity primarily by influencing the available water-holding capacity, aeration, and root development. The net effects of the interaction of these soil properties and site characteristics determine the potential site productivity.

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 the 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 (fig. 10), 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. Huntdale and Porters soils are examples of soils on cool side slopes. Saunook and Tusquitee soils are examples of soils on footslopes.

Map units of 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. Map units of 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

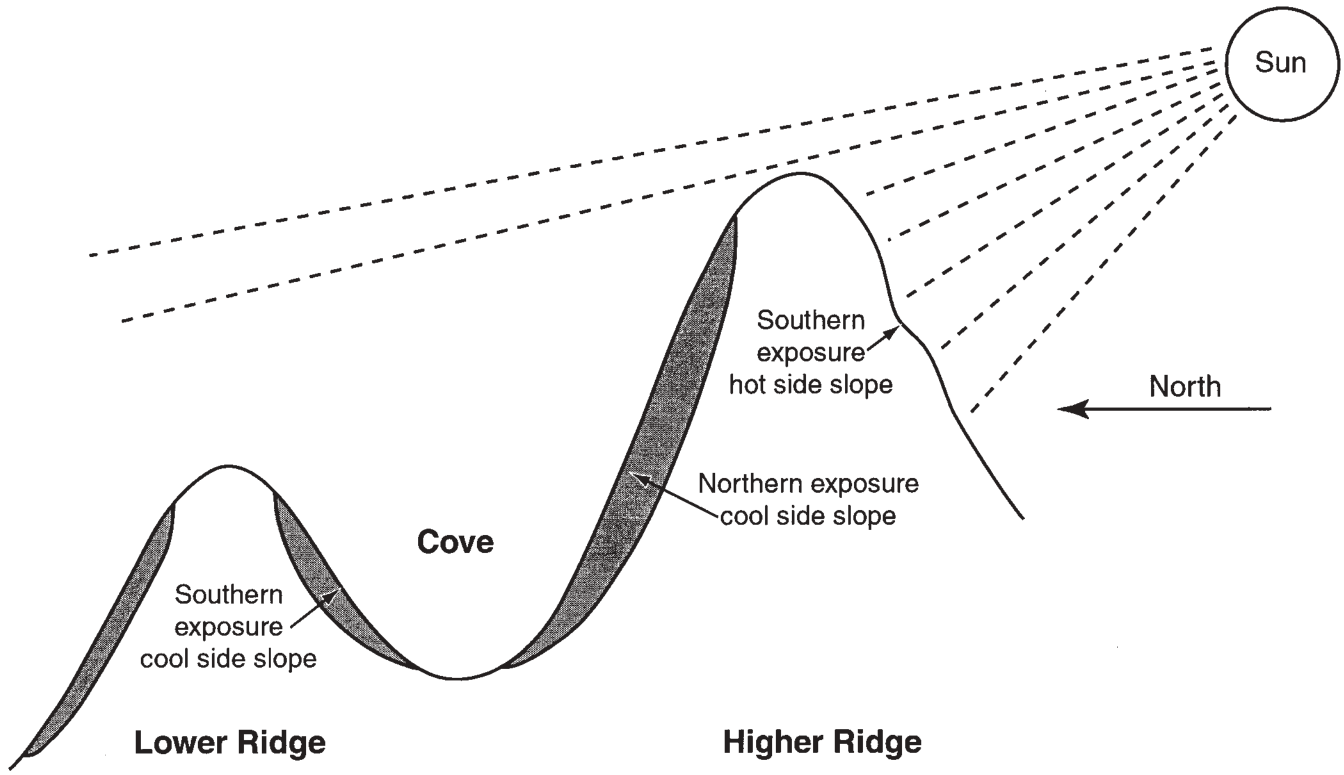

Figure 10.—Cool slopes include north- to east-facing slopes, those shaded by the higher mountains, and commonly coves. These areas are more productive but are susceptible to late spring and early fall frosts.

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-holding 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-holding capacity is a limitation affecting tree growth only on shallow and moderately deep soils, such as Cleveland, Ashe, Burton, Chestnut, Cowee, Unaka, and Ditney soils. Chandler and Micaville soils 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, Cleveland, Cowee, Craggey, and Unicoi.

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 Yancey 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 soils) in the South Toe River area and soils that formed over quartzite and metasandstone (Ditney, Unicoi, Harmiller, and Shinbone soils) in the Flattop area. 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 and sustain 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 the survey area and its suitability for timber includes information about productivity, limitations in harvesting timber, and management concerns in producing timber. Table 10 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 10 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 overriding 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. In table 10, slight, moderate, and severe indicate the degree of the major soil limitation to be considered in management.

Ratings of *erosion hazard* indicate the probability that damage will occur when 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, a fragipan, bedrock, or 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 (fig. 11).

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 of the selected species. Managers should plan site preparation and maintenance measures to ensure timely reforestation.

The *potential productivity* of *common trees* on a soil is expressed as a *site index* and a *volume* number. The common trees are listed in table 10. 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.

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* 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, landform position of a site (cool versus warm aspect), and market value are some of the many factors that can influence the choice of trees for use in reforestation.

Recreation

Will Orr, National Park Service, Blue Ridge Parkway, and the Yancey County Chamber of Commerce helped prepare this section.

The soils in Yancey County play an important role in determining the suitability for recreational uses, such as picnic and camping areas and golf fairways. Knowledge of the soils is valuable for managing areas that have the potential for recreational development.

Figure 11.—Windthrow, or the uprooting of trees by the wind, on soils with a restricted rooting depth, such as Burton, Ashe, Ditney, and Cowee soils, is a concern for woodland managers.

Yancey County offers diverse recreational opportunities. Movie theaters, restaurants, craft shops, shopping plazas, motels, bed and breakfast inns, country clubs, and other public attractions are in the town of Burnsville and elsewhere. Golf courses are on flood plains in upper watersheds, in areas of Dellwood and Reddies soils. Rural communities often have recreational areas developed on flood plains, in areas where Bandana soils are common. Public festivals include the Annual Crafts Fair and the Fourth of July celebration.

Pisgah National Forest makes up 35,051 acres in the Flattop Mountain and Upper South Toe River areas of the county. The most intensively used areas are the Flattop game lands, Black Mountain Campground, and the Carolina Hemlocks Recreation Area. 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.

Pisgah National Forest lands in Yancey County are also used for hunting, fishing, and camping. 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-county camping throughout the National forest.

Soils in the National forest vary in their ability to support recreational development. Soils on the intermediate and high mountains, such as Porters, Cashiers, Chestoa, and 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, Toecane, Thunder, and Lostcove, have a large amount of stones and boulders that limit recreational development. Because 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 Flattop Mountain have inherited unstable characteristics from the parent rock. Unstable soils, such as Chestoa, Ditney, Unicoi, Harmiller, and Shinbone, slump and slide when lateral support is removed. Chandler, Micaville, and Cashiers soils also have stability problems due to a high mica content in the subsoil. 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 Yancey County for about 21 miles and makes up approximately 880 acres of the county. The highest elevation is 5,676 feet. The Parkway offers opportunities for hiking, picnicking, and sightseeing and access to Mount Mitchell State Park and Pisgah National Forest. Several trails originate from scenic overlooks along the Parkway. Crabtree Meadows is a developed recreation area along the Parkway and offers seasonal camping, interpretative programs, and picnic areas. The Blue Ridge Parkway is managed by the National Park Service of the U.S. Department of the Interior.

The Parkway provides access to coves, intermediate and high mountain ridgetops, and side slopes where the most common soils are Toecane, Tusquitee, Porters, Unaka, Buladean, Chestnut, Cashiers, Chandler, Micaville, Burton, and Wayah. All of these soils have unique properties that affect use and management for recreation.

Mount Mitchell State Park, North Carolina's first State Park, is located on the crest of the Black Mountain Range in Yancey County. It is home to Mount Mitchell, which at 6,684 feet in elevation is the highest peak in the eastern United States. Wayah, Burton, Craggey, Clingman, Balsam, and Tanasee soils occur in this park. Camping, picnicking, hiking, and nature study attract thousands of people each year to the park.

The soils of the survey area are rated in table 11 according to 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 also are important. Soils that are 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 11, 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.

The information in table 11 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 13 and interpretations for dwellings without basements and for local roads and streets in table 12.

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 mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

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

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

Paths and trails for hiking 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 many soils of Yancey County help to form a diversity of wildlife habitat that can support many wildlife species. Soils affect the kind and amount of vegetation available to wildlife as food and cover. They also affect the construction of water impoundments and the occurrence of seeps and springs.

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 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, Porters, Cashiers, and Huntdale soils support a plant community consisting of 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 Toecane, 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 at 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, Craggey, and Clingman 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 good potential for providing wildlife habitat do not necessarily support a viable wildlife population. For example, Rosman, Saunook, Evard, and Clifton soils have good potential as habitat for woodland wildlife. However, these soils are intensively used for farming and housing, forcing woodland wildlife elsewhere. Other soils, such as Buladean, Huntdale, and Pigeonroost, also have good potential as habitat for woodland wildlife, and most of the acreage of these soils is in woodland. However, cattle are often given access to this woodland and then outcompete wildlife for food.

Wildlife habitat can be created or improved by planting vegetation, maintaining existing plant cover, or 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 a 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 must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 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-holding capacity, and other behavioral characteristics affecting engineering uses.

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

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

In order to effectively evaluate soils for engineering or construction purposes, the factors which limit a soil's use must be considered. In Yancey 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 cycle, hydrology, and organic matter content.

Slope.—In Yancey 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 the 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 constuction 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 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. 12).

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 to 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 strength, or both, more quickly on micaceous soils and 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

Figure 12.—Sediment basins should be installed before land disturbing activities begin. They keep eroding soil on site and help to maintain water quality.

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, 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 Toecane, contain seeps and springs.

Landscapes in northwestern Yancey County are unstable because of their metasedimentary geologic origin. These areas include Ditney, Unicoi, Shinbone, Harmiller, and Chestoa 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 South Toe, North Toe, and Cane Rivers. 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.—Unison soils on terraces and in coves in Yancey 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 as 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, Toecane, and Thunder are skeletal. Other cove soils, such as Unison, 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 Yancey County, such as Buladean, Huntdale, 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 homogenous 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, Unaka, Burton, and Craggey soils. Hard bedrock is indicated in the pedon descriptions of these soils by the horizon designation “R.” Chestnut, Cowee, Pigeonroost, and Harmiller soils have weathered bedrock between depths of 20 and 40 inches. Buladean, Micaville, 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 cycle.—Soils in Yancey County located on south-and west-facing slopes are exposed to continual freezing and thawing from November to March. Soils such as Evard, Cowee, 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 those on south-facing slopes but do not cycle as often. Frost penetration may exceed 24 inches in some years at the higher elevations in the 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 the rest flood occasionally. Dillard soils are on low terraces that flood rarely. Any structure may be damaged in a flood. Areas of these soils should not be used for urban development, except possibly for ball fields and playgrounds.

Thunder, Toecane, Saunook, Lostcove, Keener, and Unison soils in coves and Dillard soils on low terraces 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, Porters, Unaka, Cashiers, Chestoa, Huntdale, Saunook, Thunder, Toecane, Rosman, Dellwood, and Reddies soils have a high content of organic matter 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 allowing 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 12 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, or other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, slope, 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 or to a cemented pan, 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, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials 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.

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 survey area. 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 to provide 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. 13).

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:

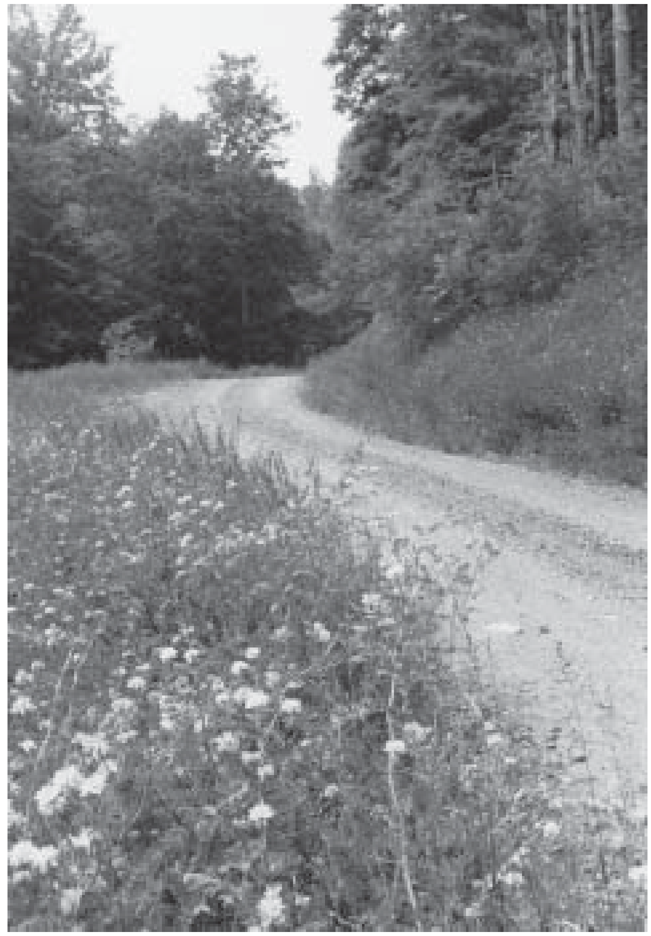

Figure 13.—A well designed access road minimizes soil erosion and allows year-round use.

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 heavy year-round traffic require that the road be upgraded and receive scheduled maintenance.

The road design developed and tested at 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 in the section “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 Yancey Soil and Water Conservation District.

Sanitary Facilities

Table 13 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 13 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 13 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 13 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 14 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 14, 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 15 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 for each soil the restrictive features that affect drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

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

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

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

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

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

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

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in the 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 16 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 ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

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

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 and Chemical Properties

Table 17 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 17, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are clay, silt, and sand, ranging from the smaller to the larger.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

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

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $^{1}/_{3}$-bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term “permeability” has traditionally been used in soil surveys to indicate saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate the rate of movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

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

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 shrink-swell potential is rated moderate to very high, 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 17, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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

Erosion factors are shown in table 17 as the K factor (Kw and Kf) 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) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (as much as 4 percent) 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 Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf 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.

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

Water Features

Table 18 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.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

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 18 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.

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 19 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.

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

The system of soil classification used by the National Cooperative Soil Survey has six categories *(8, 10)*. 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 20 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” *(9)*. Many of the technical terms used in the descriptions are defined in “Soil Taxonomy” *(8)* and in “Keys to Soil Taxonomy” *(10)*. 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 gravelly loam in an area of Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, very bouldery; from Burnsville 0.3 mile north on Secondary Road 1369, about 0.4 mile north on Secondary Road 1373, about 0.8 mile north on Secondary Road 1443, about 0.7 mile north on Fire Tower Road, 15 feet above the road, in woodland; Burnsville USGS topographic quadrangle; lat. 35 degrees 56 minutes 11 seconds N. and long. 82 degrees 17 minutes 59 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A1—0 to 4 inches; very dark grayish brown (10YR 3/2) gravelly loam, dark yellowish brown (10YR 4/4) dry; weak medium granular structure; very friable; many very fine and fine and few medium roots; few very fine and fine pores; few fine flakes of mica; 20 percent by volume gravel; strongly acid; clear wavy boundary.
A2—4 to 6 inches; 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; common very fine and fine flakes of mica; 20 percent by volume gravel; very strongly acid; clear wavy boundary.
Bw1—6 to 26 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; friable; few fine and medium and common coarse roots; few very fine, fine, and medium pores; common very fine and fine flakes of mica; 10 percent by volume gravel; very strongly acid; gradual wavy boundary.
Bw2—26 to 34 inches; dark yellowish brown (10YR 4/6) gravelly loam; weak medium subangular blocky structure; friable; few medium and coarse roots; few very fine tubular pores; common fine flakes of mica; 30 percent by volume gravel; very strongly acid; gradual wavy boundary.
R—34 to 45 inches; unweathered, slightly fractured biotite 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 by volume; mostly gravel but including cobbles or stones
Soil reaction: Extremely acid to moderately acid throughout the profile

A1 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, the 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 2 to 6
Texture (fine-earth fraction)—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 4 to 8
Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

C horizon (if it occurs):
Color—multicolored or 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
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
Landscape: High mountains of the Black Mountain Range and Bald Mountains
Landform: Coves, drainageways, and colluvial fans
Landform position: Head slopes, side slopes, and footslopes
Slope range: 15 to 95 percent
Taxonomic class: Loamy-skeletal, mixed, frigid Typic Haplumbrepts

Typical Pedon

Balsam cobbly loam in an area of Balsam-Tanasee complex, 15 to 30 percent slopes, extremely bouldery; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 14.2 miles south on North Carolina Highway 80S, 11.4 miles south on Blue Ridge Parkway, 2.2 miles north on North Carolina Highway 128, about 1.1 miles northeast on an unmarked gravel road, 0.2 mile north on the road, 100 feet south of a water tank, in woodland; Mt. Mitchell USGS topographic quadrangle; lat. 35 degrees 45 minutes 32 seconds N. and long. 82 degrees 16 minutes 03 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A1—0 to 5 inches; black (10YR 2/1) cobbly 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 very fine and fine flakes of mica; 5 percent by volume gravel and 15 percent cobbles; extremely acid; abrupt smooth boundary.
A2—5 to 11 inches; very dark brown (10YR 2/2) cobbly loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many very fine to medium roots; many very fine and fine and common medium and coarse tubular pores; few very fine and fine flakes of mica; 10 percent by volume gravel and 20 percent cobbles; very strongly acid; clear wavy boundary.
BA—11 to 20 inches; dark brown (7.5YR 3/4) very cobbly fine sandy loam; weak fine granular structure; very friable; common very fine and fine and few medium and coarse roots; common very fine to medium tubular pores; few very fine and fine flakes of mica; 10 percent by volume gravel, 35 percent cobbles, and 1 percent stones; very strongly acid; clear wavy boundary.
Bw1—20 to 34 inches; dark yellowish brown (10YR 4/6) very cobbly loam; weak medium subangular blocky structure; firm; common very fine and fine and few medium pores; common very fine and fine flakes of mica; 10 percent by volume gravel, 40 percent cobbles, and 1 percent stones; very strongly acid; clear wavy boundary.
Bw2—34 to 42 inches; dark yellowish brown (10YR 4/6) very cobbly loam; weak medium subangular blocky structure; firm; few very fine tubular pores; common very fine and fine flakes of mica; 10 percent by volume gravel, 45 percent cobbles, and 1 percent stones; very strongly acid; clear wavy boundary.
C—42 to 62 inches; 55 percent strong brown (7.5YR 4/6) and 45 percent dark yellowish brown (10YR 4/6) very cobbly sandy loam; massive; firm; few fine flakes of mica; 5 percent by volume gravel, 50 percent cobbles, and 1 percent stones; very strongly 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 by volume; ranging from gravel to boulders; size typically increasing 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
Texture (fine-earth fraction)—loam
Thickness—10 to 20 inches

BA horizon:
Color—hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 4 to 8
Mottles—in 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 of the profile 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: Valleys of mountains and intermountain hills
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 Burnsville 2.9 miles west on U.S. Highway 19E, 4.2 miles north on Secondary Road 1336, about 0.2 mile west on Secondary Road 1335, about 250 feet north in a cropped field; Burnsville USGS topographic quadrangle; lat. 35 degrees 57 minutes 25 seconds N. and long. 82 degrees 19 minutes 13 seconds W.

Ap—0 to 9 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; 3 percent by volume gravel; slightly acid; clear smooth boundary.
Bw—9 to 19 inches; dark yellowish brown (10YR 4/6) 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; 3 percent by volume gravel; moderately acid; clear smooth boundary.
Cg1—19 to 31 inches; grayish brown (10YR 5/2) sandy loam; massive; very friable; few very fine and fine roots; few medium tubular pores; common fine distinct brown (7.5YR 4/4) irregularly shaped masses of iron accumulation with clear boundaries in the matrix; common fine flakes of mica; 10 percent by volume gravel; moderately acid; clear smooth boundary.
Cg2—31 to 37 inches; gray (N 5/0) very gravelly sandy loam; massive; very friable; few very fine and fine roots; few medium tubular pores; common fine flakes of mica; 40 percent by volume gravel; slightly acid; abrupt wavy boundary.
C—37 to 62 inches; 40 percent brown (10YR 4/3), 30 percent grayish brown (10YR 5/2), and 30 percent strong brown (7.5YR 4/6) very gravelly sand; single grain; loose; areas with strong brown color are iron accumulations and areas with grayish brown color are iron depletions; few strata of sand 1 to 3 inches thick; common fine flakes of mica; 45 percent by volume 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 that are 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 by volume to a depth of 20 to 40 inches and more than 35 percent in the lower part; mostly gravel or 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, the 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
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in 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

Cg horizon:
Color—hue of 7.5YR to 5Y, value of 4 to 7, and chroma of 1 or 2 or neutral in hue and value of 3 to 8

Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in 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

C horizon:
Color—multicolored or hue of 7.5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Mottles or streaks (if they occur)—in 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

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 Cane, South Toe, and North Toe 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 Burnsville 1.3 miles east on U.S. Highway 19E, 9.4 miles north on North Carolina Highway 197, about 200 feet north, in woodland; Bakersville USGS topographic quadrangle; lat. 36 degrees 00 minutes 21 seconds N. and long. 82 degrees 14 minutes 31 seconds W.

A—0 to 8 inches; dark brown (10YR 4/3)) sand, pale brown (10YR 6/3) dry; weak fine granular structure; very friable; many very fine and fine, common medium, and few coarse roots; common fine to coarse tubular pores; common very fine and fine flakes of mica; very strongly acid; clear smooth boundary.
C—8 to 20 inches; yellowish brown (10YR 5/4) loamy fine sand; single grain; loose; many very fine, common fine and medium, and few coarse roots; few fine and medium tubular pores; many fine and fine flakes of mica; slightly acid; gradual wavy boundary.
Ab—20 to 23 inches; dark yellowish brown (10YR 4/4) loamy sand; weak fine granular structure; very friable; common very fine to medium and few coarse roots; common fine to coarse tubular pores; many very fine and fine flakes of mica; very strongly acid; clear wavy boundary.
C´1—23 to 41 inches; light brownish gray (10YR 6/2) loamy sand; single grain; very friable; few fine and medium pores; many very fine and fine flakes of mica; strongly acid; clear wavy boundary.
C´2—41 to 63 inches; light gray (10YR 7/2) loamy sand; common medium and coarse prominent yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) mottles; single grain; very friable; slightly acid.

Range in Characteristics

Depth to contrasting material: 40 to more than 60 inches to deposits of cobbles and gravel that are 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 by volume to a depth of 40 inches and variable below a depth of 40 inches; mostly gravel or 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, the 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 (above 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
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
Texture—sand, loamy sand, and loamy fine sand

or stratified layers of cobbles, gravel, or loamy sediments

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 western and southern parts 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, 50 to 95 percent slopes, stony; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 8.6 miles west on U.S. Highway 19W, 1.2 miles west on Secondary Road 1411, about 0.4 mile south on Secondary Road 1410, about 0.3 mile west on an unmarked gravel road, 700 feet north, in woodland; Chestoa USGS topographic quadrangle; lat. 36 degrees 00 minutes 05 seconds N. and long. 82 degrees 24 minutes 55 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; medium 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; 3 percent by volume gravel; strongly acid; clear wavy boundary.
Bw—5 to 19 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; very friable; common very fine to medium and few coarse roots; common very fine to medium and few coarse tubular pores; few very fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual wavy boundary.
BC—19 to 32 inches; strong brown (7.5YR 5/8) sandy loam; weak medium subangular blocky structure; very friable; common very fine to coarse roots; common very fine to coarse tubular pores; few very fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual wavy boundary.
C—32 to 47 inches; yellowish brown (10YR 5/4) gravelly sandy loam saprolite; massive; very friable; few medium roots; few very fine to coarse tubular pores; few very fine flakes of mica; 20 percent by volume gravel; very strongly acid; gradual wavy boundary.
Cr—47 to 58 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: 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 by volume; 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, the horizon is less than 7 inches thick
Texture (fine-earth fraction)—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

BC horizon:
Color—horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 8 or 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; pockets of loamy sand or sandy loam saprolite in some pedons

C horizon:
Color—horizon is multicolored, has hue of 5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8, or 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)—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

Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

Burton Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
Landscape: High mountains of the Black Mountain Range and Bald Mountains
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 cobbly sandy loam in an area of Burton-Craggey complex, windswept, 15 to 30 percent slopes, rocky; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 14.2 miles south on North Carolina Highway 80S, 11.4 miles south on the Blue Ridge Parkway, 3.5 miles north on North Carolina Highway 128 to a restaurant parking lot, 300 feet northwest on the Old Mitchell foot trail, 90 feet west of the trail in a stand of dead Fraser fir; Mt. Mitchell USGS topographic quadrangle; lat. 35 degrees 45 minutes 15 seconds N. and long. 82 degrees 16 minutes 24 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A1—0 to 7 inches; black (5YR 2.5/1) cobbly sandy loam, dark brown (10YR 3/3) dry; moderate medium granular structure; very friable; many very fine and medium roots matted at the top of the horizon; common fine tubular pores; common fine flakes of mica; 12 percent by volume gravel and 10 percent cobbles; extremely acid; clear wavy boundary.

A2—7 to 11 inches; 70 percent very dark grayish brown (10YR 3/2) and 30 percent dark brown (7.5YR 3/2) cobbly fine sandy loam, dark grayish brown (10YR 4/2) dry; weak medium granular structure; friable; common very fine roots; common very fine and medium tubular pores; common fine flakes of mica; 7 percent by volume gravel and 10 percent cobbles; extremely acid; clear wavy boundary.

Bw1—11 to 20 inches; strong brown (7.5YR 4/6) cobbly sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; common very fine and medium tubular pores; common discontinuous silt flows on faces of peds and fragments; few distinct dark brown (7.5YR 3/2) discontinuous organic coats in root channels and pores; 14 percent by volume gravel and 10 percent cobbles; extremely acid; clear wavy boundary.

Bw2—20 to 25 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; friable; common very fine roots; common very fine tubular pores; common fine mica flakes; 16 percent by volume gravel; very strongly acid; abrupt irregular boundary.

Cr—25 to 31 inches; weathered, moderately fractured metagraywacke that can be dug with difficulty with hand tools; few fine and medium roots in cracks that are spaced more than 4 inches apart; clear wavy boundary.

R—31 to 41 inches; unweathered, moderately fractured metagraywacke.

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 throughout the profile
Content and size of rock fragments: Less than 35 percent by volume 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—hue of 5YR to 2.5Y, value of 2 or 3, and chroma of 1 to 3 or neutral in hue and value of 2 or 3

Texture (fine-earth fraction)—sandy loam

Thickness—10 to 20 inches

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—multicolored or 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:
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
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

R layer:
Type of bedrock—unweathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock

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: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts of the county
Landform: Ridges, north- to east-facing mountain slopes, and slopes shaded by the higher mountains
Landform position: Summits and side slopes
Slope range: 2 to 95 percent
Taxonomic class: Fine-loamy, micaceous, mesic Umbric Dystrochrepts

Typical Pedon

Cashiers fine sandy loam, 50 to 95 percent slopes, stony; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 7.2 miles south on North Carolina Highway 80S, 2.1 miles west on U.S. Forest Service Road 239, in a northeast-facing road cut; Celo USGS topographic quadrangle; lat. 35 degrees 48 minutes 54 seconds N. and long. 82 degrees 13 minutes 18 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 8 inches; dark brown (7.5YR 3/2) fine sandy loam, reddish brown (5YR 5/3) dry; moderate medium granular structure; very friable; common very fine and fine roots; many medium and coarse tubular pores; common fine flakes of mica; 5 percent by volume gravel; very strongly acid; abrupt wavy boundary.
BA—8 to 13 inches; 80 percent dark yellowish brown (10YR 3/4) and 20 percent dark yellowish brown (10YR 4/4) fine sandy loam; moderate medium granular structure; very friable; common fine roots; many fine and medium interstitial pores; common distinct dark brown (10YR 3/3) discontinuous organic coats throughout; many fine flakes of mica; 4 percent by volume gravel; very strongly acid; clear wavy boundary.
Bw1—13 to 29 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; friable; few fine roots; common fine and medium interstitial and few tubular pores; many fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual smooth boundary.
Bw2—29 to 50 inches; dark yellowish brown (10YR 4/6) sandy loam; weak medium subangular blocky structure; friable; few fine roots; many fine flakes of mica; common medium interstitial pores; 5 percent by volume gravel; very strongly acid; clear wavy boundary.
C1—50 to 57 inches; 60 percent light yellowish brown (10YR 6/4), 20 percent dark yellowish brown (10YR 4/6), and 20 percent yellowish brown (10YR 5/4) loamy sand saprolite; massive; friable; many fine flakes of mica; few fine interstitial pores; 6 percent by volume gravel; common irregular soft masses of iron-manganese; strongly acid; clear wavy boundary.
C2—57 to 78 inches; 50 percent light brownish gray (10YR 6/2), 25 percent brownish yellow (10YR 6/6), and 25 percent very pale brown (10YR 7/3) loamy sand saprolite; massive with platy relict rock structure; firm; common fine flakes of mica; few fine interstitial pores; 9 percent by volume gravel; common irregular soft masses of iron-manganese; strongly 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 by volume; 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
Texture (fine-earth fraction)—fine sandy loam
Thickness—7 to 10 inches

BA horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6
Mottles—in 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—multicolored or 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: Low and intermediate mountains dominantly in the central, southeastern, and southwestern 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 95 percent
Taxonomic class: Coarse-loamy, micaceous, mesic Typic Dystrochrepts

Typical Pedon

Chandler fine sandy loam in an area of Chandler-Micaville complex, 30 to 50 percent slopes, stony (fig. 14); from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 4.3 miles south on North Carolina Highway 80S, 1.4 miles east on Secondary Road 1154, in a south-facing road cut; Celo USGS topographic quadrangle; lat. 35 degrees 51 minutes 28 seconds N. and long. 82 degrees 10 minutes 50 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 4 inches; dark yellowish brown (10YR 4/4) fine sandy loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; very friable; many fine and medium and common coarse roots; common fine tubular pores; common very fine and fine flakes of mica; 3 percent by volume gravel; very strongly acid; clear wavy boundary.
Bw1—4 to 28 inches; strong brown (7.5YR 5/6) loam; moderate medium subangular blocky structure; friable; few medium and coarse and common very fine and fine roots; common fine tubular pores; many very fine and fine flakes of mica; 3 percent by volume gravel; moderately acid; gradual wavy boundary.
Bw2—28 to 37 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; few very fine and fine and few medium and coarse roots; few fine tubular pores; many very fine and fine flakes of mica; 10 percent by volume gravel; very strongly acid; gradual wavy boundary.
C1—37 to 45 inches; yellowish brown (10YR 5/6) sandy loam saprolite; massive; few very fine and fine roots; few fine tubular pores; many fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear smooth boundary.
C2—45 to 69 inches; multicolored sandy loam saprolite in shades of brown, yellow, and gray; massive with weak platy relict rock structure; few very fine and fine roots; few fine tubular pores; few distinct black (10YR 2/1) iron-manganese streaks; few medium prominent yellowish red (5YR 5/8) pockets of silt loam and loam; many coarse and very coarse flakes of mica; very 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 by volume; 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, the horizon is less than 7 inches thick
Texture (fine-earth fraction)—fine 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—multicolored or 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

The Chandler soils in Yancey County are considered taxadjuncts to the series because the mica content in the mineralogy control section is slightly less than the minimum value required by series classification. This difference, however, does not significantly affect the use and management of the soils. These soils are coarse-loamy, paramicaceous, mesic Typic Dystrochrepts.

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 western and southern parts 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, 50 to 95 percent slopes, stony; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 8.6 miles west on U.S. Highway 19W, 1.2 miles west on Secondary Road 1411, about 0.4 mile south on Secondary Road 1410, about 0.3 mile west on an unmarked gravel road, 700 feet north in woodland; Chestoa USGS topographic quadrangle; lat. 36 degrees 00 minutes 05 seconds N. and long. 82 degrees 24 minutes 55 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 3 inches; very dark brown (10YR 2/2) loam, brown (10YR 4/3) dry; weak medium 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 very fine flakes of mica; 5 percent by volume gravel; moderately acid; clear wavy boundary.
Bw1—3 to 13 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; friable; common fine and medium roots; common very fine to coarse tubular pores; few very fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear wavy boundary.
Bw2—13 to 24 inches; yellowish brown (10YR 5/8) sandy loam; weak medium subangular blocky structure; very friable; common medium roots; common very fine to coarse tubular pores; few very fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear wavy boundary.
BC—24 to 32 inches; brown (7.5YR 5/4) gravelly sandy loam; weak medium subangular blocky structure; very friable; few coarse roots; few very fine to medium tubular pores; few very fine flakes of mica; 20 percent by volume gravel; strongly acid; gradual wavy boundary.
Cr—32 to 43 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 by volume; mostly gravel or 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, the 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—multicolored or 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
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

Chestoa 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 low-grade metasedimentary rock
Landscape: Low and intermediate mountains in the Flattop area
Landform: Ridges, north- to east-facing mountain slopes, and slopes shaded by the higher mountains
Landform position: Summits and side slopes
Slope range: 30 to 95 percent
Taxonomic class: Coarse-loamy, siliceous, mesic Umbric Dystrochrepts

Typical Pedon

Chestoa sandy loam in an area of Chestoa-Ditney-Rock outcrop complex, 30 to 95 percent slopes, very bouldery (fig. 15); from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.3 miles west on U.S. Highway 19W, 2.2 miles north on U.S. Forest Service Road 278, north on U.S. Forest Service Road 5506 to the end of the road, 0.4 mile east at the edge of a wildlife field on Bentwoods Trail to a site 10 feet above the trail; Chestoa USGS topographic quadrangle; lat. 36 degrees 03 minutes 26 seconds N. and long. 82 degrees 24 minutes 51 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; common very fine and fine roots; 10 percent by volume quartzite channers; extremely acid; clear smooth boundary.
A2—3 to 8 inches; very dark brown (10YR 2/2) sandy loam, dark brown (10YR 3/3) dry; weak fine granular structure; very friable; common very fine and fine roots; 10 percent by volume quartzite channers; extremely acid; abrupt smooth boundary.
E—8 to 10 inches; grayish brown (10YR 5/2) sandy loam; weak fine granular structure; very friable; few medium and coarse roots; 5 percent by volume quartzite channers; extremely acid; abrupt smooth boundary.
Bs—10 to 13 inches; strong brown (7.5YR 4/6) sandy loam; common medium distinct dark yellowish brown (10YR 3/4) and strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm; very weakly cemented; few medium and coarse roots; 10 percent by volume quartzite channers; extremely acid; clear irregular boundary.
Bw1—13 to 18 inches; light yellowish brown (10YR 6/4) channery sandy loam; weak medium subangular blocky structure; firm; few medium and coarse roots; 20 percent by volume quartzite channers; very strongly acid; clear wavy boundary.
Bw2—18 to 26 inches; yellowish brown (10YR 5/4) channery sandy loam; common medium distinct light olive brown (2.5Y 5/6) mottles; weak medium subangular blocky structure; friable; few medium and coarse roots; 20 percent by volume quartzite channers and 5 percent flagstones; very strongly acid; abrupt wavy boundary.
R—26 to 32 inches; unweathered, slightly fractured low-grade quartzite.

Range in Characteristics

Solum thickness: 15 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: Less than 35 percent by volume; mostly gravel, channers, or flagstones

Soil reaction: Extremely acid to strongly acid throughout the profile

A 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
Thickness—7 to 10 inches

E horizon:
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4
Mottles—in shades of red, yellow, brown, or olive
Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

Bs horizon:
Color—hue of 7.5YR or 10YR, value of 2 to 5, and chroma of 1 to 6
Mottles—in shades of red, yellow, brown, or olive
Texture (fine-earth fraction)—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
Mottles—in shades of red, yellow, brown, or olive
Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, or loam

C horizon (if it occurs):
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8
Mottles—in shades of red, yellow, brown, or olive
Texture (fine-earth fraction)—loamy coarse sand, loamy sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

R layer:
Type of bedrock—unweathered, slightly fractured to highly fractured, low-grade metasedimentary rock

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 loam in an area of Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, very bouldery; from Burnsville 0.3 mile north on Secondary Road 1369, about 0.4 mile north on Secondary Road 1373, about 0.8 mile north on Secondary Road 1443, about 0.7 mile north on Fire Tower Road, 15 feet above the road in woodland; Burnsville USGS topographic quadrangle; lat. 35 degrees 56 minutes 11 seconds N. and long. 82 degrees 17 minutes 59 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A1—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, dark yellowish brown (10YR 4/4) dry; weak medium granular structure; very friable; many very fine and fine and few medium roots; common very fine and fine tubular pores; few very fine flakes of mica; 3 percent by volume gravel; extremely acid; clear smooth boundary.
A2—5 to 7 inches; dark yellowish brown (10YR 3/4) loam, dark yellowish brown (10YR 4/6) dry; weak medium granular structure; very friable; many very fine and fine and few medium roots; few very fine and fine tubular pores; few very fine flakes of mica; 3 percent by volume gravel; very strongly acid; clear smooth boundary.
Bw—7 to 15 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; very friable; few very fine to medium roots; few very fine to medium tubular pores; common very fine flakes of mica; 3 percent by volume gravel; very strongly acid; abrupt wavy boundary.
R—15 to 26 inches; unweathered, moderately fractured biotite 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 by volume; mostly gravel or 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, the horizon is less than 7 inches thick
Texture (fine-earth fraction)—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—multicolored or 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

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 mountains dominantly in the Jacks Creek, Green Mountain, and central 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: Clayey, mixed, mesic Typic Hapludults

Typical Pedon

Clifton clay loam, 15 to 30 percent slopes, eroded; from Burnsville 6.0 miles west on U.S. Highway 19E, 0.1 mile northwest on Secondary Road 1453, about 0.3 mile north on a farm road, 200 feet east to ridgetop pasture; Bald Mountain USGS topographic quadrangle; lat. 35 degrees 55 minutes 15 seconds N. and long. 82 degrees 25 minutes 45 seconds W.

Ap—0 to 8 inches; strong brown (7.5YR 4/6) clay loam, dark yellowish brown (10YR 4/6) dry; weak coarse subangular blocky structure; friable; common very fine and fine roots; common very fine and tubular pores; few fine flakes of mica; neutral; abrupt wavy boundary.

Bt1—8 to 17 inches; yellowish red (5YR 5/8) clay; moderate medium subangular blocky structure; firm; common very fine and medium roots; common very fine and fine tubular pores; few discontinuous faint yellowish red (5YR 4/6) clay films on faces of peds; few fine flakes of mica; moderately acid; clear wavy boundary.

Bt2—17 to 30 inches; yellowish red (5YR 5/6) clay; moderate medium subangular blocky structure; friable; common very fine and few medium roots; common very fine and medium tubular pores; common discontinuous faint yellowish red (5YR 4/6) clay films on faces of peds; few fine rounded soft masses of black (5YR 2.5/1) iron-manganese concretions; few very fine flakes of mica; strongly acid; gradual wavy boundary.

Bt3—30 to 40 inches; yellowish red (5YR 5/8) clay loam; many medium distinct strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) mottles throughout; moderate medium subangular blocky structure; friable; common very fine and few fine roots; common very fine and few medium tubular pores; common fine and medium continuous faint yellowish red (5YR 4/6) clay films on faces of peds; common fine and medium rounded soft masses of black (5YR 2.5/1) iron-manganese concretions; few very fine flakes of mica; strongly acid; clear wavy boundary.

BC—40 to 50 inches; yellowish red (5YR 5/8) loam; many medium distinct strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6) mottles throughout; weak coarse subangular blocky structure; few very fine and fine roots; common very fine and few fine tubular pores; common discontinuous faint yellowish red (5YR 4/6) clay films on faces of peds; many fine and common medium rounded soft masses of black (5YR 2.5/1) iron-manganese concretions throughout; common very fine flakes of mica; strongly acid; clear wavy boundary.

C—50 to 79 inches; multicolored fine sandy loam saprolite in shades of red, brown, and yellow; massive; friable; few very fine roots; few very fine tubular pores; many fine rounded soft masses of black (5YR 2.5/1) iron-manganese concretions throughout; 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: Few or common throughout the profile
Content and size of rock fragments: Less than 35

percent by volume in the A horizon and less than 15 percent in the B and C horizons; mostly gravel or 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, the 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, clay loam, or clay

BC horizon:
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—multicolored or hue of 10R to 5YR, value of 4 to 6, and chroma of 6 to 8
Mottles—in shades of red, brown, yellow, gray, or white
Texture—fine sandy loam or loam

Clingman Series

Depth class: Very shallow or shallow
Drainage class: Somewhat excessively drained
Depth to seasonal high water table: More than 6.0 feet
Permeability: Moderately rapid in the organic layers and moderate or moderately rapid in the mineral horizon
Parent material: Organic deposits underlain by mineral layers, weathered from felsic, high-grade metamorphic rock
Landscape: High mountains of the Black Mountain Range
Landform: Ridges and mountain slopes
Landform position: Summits and side slopes
Slope range: 30 to 95 percent
Taxonomic class: Dysic Lithic Borofolists

Typical Pedon

Clingman peat in an area of Craggey-Rock outcrop-Clingman complex, windswept, 30 to 50 percent slopes, rubbly (fig. 16); from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 14.2 miles south on North Carolina Highway 80S, 11.4 miles south on the Blue Ridge Parkway, 2.2 miles north on North Carolina Highway 128, about 1.5 miles northeast on an unmarked gravel road, 50 feet above the road, in woodland; Mt. Mitchell USGS topographic quadrangle; lat. 35 degrees 42 minutes 32 seconds N. and long. 82 degrees 15 minutes 02 seconds W.

Oi—0 to 7 inches; black (N 2/0) broken face peat, very dark brown (7.5YR 2/2) crushed and rubbed (fibric material); about 80 percent fiber, 50 percent rubbed; massive; loose; many very fine to medium roots; 5 percent twigs; extremely acid; clear smooth boundary.
Oe—7 to 15 inches; very dark brown (10YR 2/2) broken face mucky peat, dark grayish brown (10YR 3/2) crushed and rubbed (hemic material); about 60 percent fiber, 20 percent rubbed; massive; friable; many fine to medium roots; extremely acid; clear smooth boundary.
AE—15 to 19 inches; dark grayish brown (10YR 4/2) loamy sand; weak fine granular structure; very friable; common fine roots; 5 percent by volume gravel; extremely acid; abrupt smooth boundary.
R—19 to 30 inches; unweathered, slightly fractured metagraywacke.

Range in Characteristics

Solum thickness: 3 to 20 inches
Depth to bedrock: 3 to 20 inches to hard bedrock
Content of mica flakes: None to many
Content and size of rock fragments: Less than 15 percent by volume in the mineral layer; mostly gravel or cobbles
Soil reaction: Organic material—ultra acid or extremely acid; mineral layer—extremely acid to strongly acid

Oi horizon:
Color—hue of 2.5YR to 10YR, value of 2 or 3, and chroma of 1 to 3 or neutral in hue and value of 2 or 3
Texture—slightly decomposed leaves, needles, twigs, and moss (fibric material)

Oe horizon:
Color—hue of 2.5YR to 10YR, value of 2 or 3, and chroma of 1 to 3 or neutral in hue and value of 2 or 3
Texture—partially decomposed organic material (hemic material)

Oa horizon (if it occurs):
Color—hue of 2.5YR to 10YR, value of 2 or 4, and chroma of 1 to 3 or neutral in hue and value of 2 or 4

Texture—highly decomposed organic material (sapric material)

A or AE horizon:
Color—horizon is multicolored, has hue of 5YR to 5B, value of 2 to 7, and chroma of 1 to 6, or is mixed or mottled in shades of these colors
Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, very fine sandy loam, or loam

E, EB, Bw, Bs, Bhs, and C horizons (if they occur):
Color—horizon is multicolored, has hue of 5YR to 5B, value of 2 to 7, and chroma of 1 to 6, or is mixed or mottled in shades of these colors
Texture—loamy sand, loamy fine sand, sandy loam, fine sandy loam, very fine sandy loam, or loam

R layer:
Type of bedrock—unweathered, slightly fractured to highly fractured, felsic, high-grade metamorphic rock

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 dominantly in the northern, eastern, and central 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, mixed, mesic Typic Hapludults

Typical Pedon

Cowee gravelly loam in an area of Evard-Cowee complex, 15 to 30 percent slopes, stony; from Burnsville 8.5 miles east on U.S. Highway 19E, 0.7 mile north on State Road 1300, in a southeast-facing road cut; Micaville USGS topographic quadrangle; lat. 35 degrees 54 minutes 76 seconds N. and long. 82 degrees 09 minutes 47 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 4 inches; dark reddish brown (5YR 3/4) gravelly loam, brown (7.5YR 4/4) dry; weak medium granular structure; very friable; common very fine and fine and few medium and coarse roots; few very fine to medium tubular pores; few very fine flakes of mica; 20 percent by volume gravel; extremely acid; clear wavy boundary.
Bt1—4 to 19 inches; red (2.5YR 4/6) clay 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 surfaces of peds; 10 percent by volume gravel; very strongly acid; gradual wavy boundary.
Bt2—19 to 31 inches; yellowish red (5YR 4/8) 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 surfaces of peds; common fine and medium black (N 2.5/0) iron-manganese concretions throughout; few fine flakes of mica; 10 percent by volume gravel; very strongly acid; gradual irregular boundary.
Cr—31 to 42 inches; weathered, highly 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 by volume; 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, the horizon is less than 6 inches thick
Texture (fine-earth fraction)—loam

Bt horizon:
Color—hue of 2.5YR to 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—multicolored or 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, 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
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
Landscape: High mountains of the Black Mountain Range and Bald Mountains
Landform: Ridges and mountain slopes
Landform position: Summits and side slopes
Slope range: 15 to 95 percent
Taxonomic class: Loamy, mixed, frigid Lithic Haplumbrepts

Typical Pedon

Craggey gravelly loam in an area of Burton-Craggey complex, windswept, 15 to 30 percent slopes, rocky; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 14.2 miles south on North Carolina Highway 80S, 11.4 miles south on the Blue Ridge Parkway, 1.1 miles north on North Carolina Highway 128, about 50 feet above the road in a stand of red spruce; Mt. Mitchell USGS topographic quadrangle; lat. 35 degrees 43 minutes 48 seconds N. and long. 82 degrees 16 minutes 48 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 11 inches; black (10YR 2/1) gravelly loam, very dark grayish brown (10YR 3/2) dry; weak medium granular structure; very friable; many coarse, common medium, and few fine roots; common medium and few fine tubular pores; 10 percent by volume gravel; extremely acid; clear wavy boundary.
Bw—11 to 16 inches; dark yellowish brown (10YR 4/6) cobbly loam; weak medium subangular blocky structure; friable; common medium and coarse and few fine roots; few fine and medium tubular pores; 10 percent by volume gravel and 10 percent cobbles; very strongly acid; gradual wavy boundary.
R—16 to 27 inches; unweathered, slightly fractured metagraywacke.

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 by volume; mostly gravel, cobbles, or 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
Texture (fine-earth fraction)—loam
Thickness—10 to 19 inches

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

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: Mountain valleys
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 loamy fine sand in an area of Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 11.7 miles south on North Carolina Highway 80S, 1.2 miles south on Secondary Road 1205, about 100 feet west on an unmarked logging road, 150 feet north in woodland; Celo USGS topographic quadrangle; lat. 35 degrees 45 minutes 30 seconds N. and long. 82 degrees 12 minutes 31 seconds W.

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) loamy fine sand, dark brown (10YR 3/3) dry; medium fine granular structure; very friable; many very fine roots; many very fine and fine tubular pores; common fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear wavy boundary.

A2—4 to 15 inches; dark brown (10YR 3/3) loamy fine sand, dark brown (10YR 3/3) dry; weak medium granular structure; very friable; many very fine and medium roots; many very fine and fine tubular pores; common fine flakes of mica; 5 percent by volume gravel; very strongly acid; abrupt wavy boundary.

C1—15 to 46 inches; multicolored very gravelly coarse sand in shades of brown, yellow, and gray; single grain; loose; few coarse roots; many fine and medium flakes of mica; 35 percent by volume gravel and 10 percent cobbles; moderately acid; clear smooth boundary.

C2—46 to 67 inches; multicolored very gravelly coarse sand in shades of brown, yellow, and gray; single grain; loose; common very fine and medium roots; few fine distinct dark gray (10YR 4/1) and light brownish gray (10YR 6/2) irregularly shaped iron depletions with clear boundaries throughout; many fine and medium flakes of mica; 40 percent by volume gravel and 15 percent cobbles; strongly acid.

Range in Characteristics

Solum thickness: 8 to 20 inches
Depth to contrasting material: 8 to 20 inches to deposits of cobbles and gravel that are 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 by volume in the A and B horizons and more than 35 percent in the C horizon; mostly gravel or cobbles but including stones
Soil reaction: Very strongly acid to neutral throughout the profile

A or Ap horizon:
Color—hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3
Texture—loamy fine sand
Thickness—10 to 20 inches

AC horizon (if it occurs):
Color—hue of 7.5YR or 10YR, value of 3, and chroma of 2 to 4
Texture—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—multicolored or hue of 7.5YR to 2.5Y, value of 3 to 6, and chroma of 3 to 8
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—coarse sand, sand, loamy coarse sand, or loamy sand

Dillard Series

Depth class: Very deep
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 3.0 feet from December through May
Permeability: Moderately slow
Parent material: Old alluvium
Landscape: Mountains
Landform: Low stream terraces throughout the county
Landform position: Concave to planar toeslopes
Slope range: 2 to 8 percent
Taxonomic class: Fine-loamy, mixed, mesic Aquic Hapludults

Typical Pedon

Dillard loam, 2 to 8 percent slopes, rarely flooded; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 6.3 miles south on North Carolina Highway 80S, about 400 feet west, in a pasture; Celo USGS topographic quadrangle; lat. 35 degrees 49 minutes 52 seconds N. and long. 82 degrees 11 minutes 11 seconds W.

Ap—0 to 8 inches; brown (10YR 5/3) loam, pale brown

(10YR 6/3) dry; weak medium subangular blocky structure; friable; few very fine mica flakes; strongly acid; abrupt smooth boundary.

Bt1—8 to 17 inches; brownish yellow (10YR 6/6) sandy clay loam; moderate medium subangular blocky structure; friable; few faint clay films on faces of peds; few very fine mica flakes; very strongly acid; gradual wavy boundary.

Bt2—17 to 23 inches; pale brown (10YR 6/4) clay loam; moderate medium subangular blocky structure; friable; many medium prominent strong brown (7.5YR 5/8) and brownish yellow (10YR 6/8) irregularly shaped masses of iron accumulation with clear boundaries in the matrix; few faint clay films on faces of peds; few very fine mica flakes; very strongly acid; gradual wavy boundary.

Bt3—23 to 27 inches; brown (10YR 5/3) clay loam; moderate medium subangular blocky structure; friable; many medium faint grayish brown (10YR 5/2) irregularly shaped iron depletions with clear boundaries throughout; common distinct clay films on faces of peds; common very fine mica flakes; very strongly acid; gradual smooth boundary.

C—27 to 32 inches; yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) clay loam; massive; friable; many medium prominent light gray (10YR 7/1) irregularly shaped iron depletions with clear boundaries throughout; few very fine mica flakes; strongly acid; gradual wavy boundary.

Cg—32 to 63 inches; light gray (10YR 7/1) sandy clay loam; massive; friable; common medium prominent dark gray (N 4/0) irregularly shaped iron depletions with clear boundaries throughout; few very fine mica flakes; 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: Few or common throughout the profile
Content of rock fragments: Less than 15 percent by volume in the A or Ap horizon and the Bt horizon and less than 35 percent in the C horizon
Soil reaction: Strongly acid to moderately acid in the A horizon, except in limed areas, and very strongly acid to moderately acid in the B and C horizons

Ap or A horizon:
Color—hue of 10YR, value of 3 to 5, and chroma of 1 to 4; where value is 3 or less, the horizon is less than 10 inches thick
Texture (fine-earth fraction)—loam

Bt horizon (upper part):
Color—hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 4 to 8
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—sandy clay loam or clay loam

Bt horizon (lower part):
Color—hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 to 8
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—loam, sandy clay loam, or clay loam

Btg, 2Btg, BCg, and 2BCg horizons (if they occur):
Color—hue of 10YR, value of 5 to 7, and chroma of 1 or 2
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—loam, sandy clay loam, clay loam, or clay

C horizon:
Color—hue of 10YR to 5Y, value of 5 to 7, and chroma of 3 to 8
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—variable; commonly sandy clay loam, loam, or clay loam

Cg horizon:
Color—hue of 10YR to 5Y, value of 5 to 7, and chroma of 1 or 2
Mottles—in shades of red, yellow, brown, olive, or gray
Texture (fine-earth fraction)—variable; commonly sandy clay loam, loam, or clay loam

Ditney 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 Flattop area
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

Ditney fine sandy loam in an area of Ditney-Unicoi complex, 30 to 50 percent slopes, very stony; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.3 miles west on U.S. Highway 19W, 0.3 mile north on U.S. Forest Service Road 278, in a south-facing road cut; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 10 seconds N. and long. 82 degrees 25 minutes 42 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 3 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; common very fine and fine and few medium roots; common very fine to coarse tubular pores; 5 percent by volume gravel; extremely acid; clear smooth boundary.
Bw1—3 to 10 inches; yellowish brown (10YR 5/8) sandy loam; moderate medium subangular blocky structure; friable; many fine and medium roots; few very fine to coarse tubular pores; 5 percent by volume gravel; very strongly acid; clear wavy boundary.
Bw2—10 to 17 inches; yellowish brown (10YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine and medium tubular pores; 10 percent by volume gravel; very strongly acid; gradual wavy boundary.
BC—17 to 25 inches; yellowish brown (10YR 5/6) very gravelly sandy loam; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine and medium pores; 30 percent by volume gravel and 10 percent cobbles; extremely acid; gradual irregular boundary.
R—25 to 36 inches; unweathered, moderately fractured, low-grade arkosic 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: 5 to 35 percent by volume in the A and Bw horizons and 10 to 40 percent in the BC horizon; mostly gravel or channers but including cobbles, flagstones, and stones
Soil reaction: Extremely acid to strongly acid throughout the profile

A horizon:
Color—hue of 10YR, value of 2 to 5, and chroma of 1 to 4; where value is 3 or less, the horizon is less than 7 inches thick
Texture (fine-earth fraction)—fine sandy loam

BE horizon (if it occurs):
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

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

BC 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

R layer:
Type of bedrock—unweathered, slightly fractured to highly fractured, low-grade metasedimentary rock

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 dominantly in the western and northwestern parts 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, mixed, mesic Typic Hapludults

Typical Pedon

Edneytown loam in an area of Pigeonroost-Edneytown complex, 30 to 50 percent slopes, stony (fig. 17); from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 17.4 miles west on U.S. Highway 19W, 0.7 mile west on U.S. Forest Service Road 5502, in a southwest-facing road cut; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 07 seconds N. and long. 82 degrees 23 minutes 14 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 4 inches; brown (10YR 4/3) loam; weak medium granular structure; very friable; few coarse and many fine and medium roots; many very fine and fine tubular pores; few very fine and fine flakes of mica; 5 percent by volume gravel; extremely acid; gradual wavy boundary.

Bt1—4 to 16 inches; strong brown (7.5YR 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 yellowish red (5YR 4/6) clay films on faces of peds; few very fine and fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual wavy boundary.

Bt2—16 to 38 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 yellowish red (5YR 4/6) clay films on faces of peds; few very fine and fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual wavy boundary.

C1—38 to 51 inches; yellowish brown (10YR 5/6) sandy loam; many fine distinct strong brown (7.5YR 5/6) and many fine distinct light yellowish brown (10YR 6/4) mottles; massive; friable; few very fine to coarse roots; few very fine or fine tubular pores; few fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear wavy boundary.

C2—51 to 63 inches; pale brown (10YR 6/3) sandy loam; moderate medium prominent strong brown (7.5YR 5/6) mottles; massive with relict rock structure; friable; few very fine to coarse roots; few very fine or fine tubular pores; few fine flakes of mica; 10 percent by volume gravel; very 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 by volume 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, the horizon is less than 6 inches thick
Texture (fine-earth fraction)—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—in 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 dominantly in the northern, eastern, and central 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, oxidic, mesic Typic Hapludults

Typical Pedon

Evard loam in an area of Evard-Cowee complex, 15 to 30 percent slopes, stony; from Burnsville 8.5 miles east on U.S. Highway 19E, 0.7 mile north on State Road 1300, about 200 feet west in woodland; Micaville USGS topographic quadrangle; lat. 35 degrees 54 minutes 75 seconds N. and long. 82 degrees 09 minutes 45 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 4 inches; dark reddish brown (5YR 3/4) loam, brown (7.5YR 4/4) dry; weak medium granular structure; very friable; many very fine, common fine and medium, and few coarse roots; common very fine to medium tubular pores; few very fine flakes of mica; 3 percent by volume gravel; extremely acid; clear wavy boundary.

Bt1—4 to 12 inches; yellowish red (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; few faint red (2.5YR 4/8) clay films on faces of peds; few very fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual wavy boundary.

Bt2—12 to 32 inches; red (2.5YR 4/6) clay loam; weak medium subangular blocky structure; friable; few very fine to medium roots; few very fine to medium tubular pores; few faint red (2.5YR 4/8) clay films on faces of peds; common fine and medium black (N 2.5/0) iron-manganese concretions; few very fine flakes of mica; 5 percent by volume gravel; very strongly acid; gradual wavy boundary.

BC—32 to 49 inches; red (2.5YR 4/6) loam; weak medium subangular blocky structure; friable; few very fine to coarse roots; few very fine and fine tubular pores; few faint red (2.5YR 4/8) clay films in cracks; many fine, medium, and coarse black (N 2.5/0) iron-manganese concretions; few fine flakes of mica; 10 percent by volume gravel; very strongly acid; gradual wavy boundary.

C—49 to 63 inches; yellowish red (5YR 4/6) loam saprolite; massive; friable; few very fine and medium roots; few very fine and fine tubular pores; many fine, medium, and coarse black (N 2.5/0) iron-manganese concretions; few fine flakes of mica; 10 percent by volume gravel; very strongly 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 by volume 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 Ap horizon:
Color—hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6; where value is 3 or less, the horizon is less than 6 inches thick
Texture (fine-earth fraction)—loam

Bt horizon:
Color—hue of 2.5YR to 10YR, value of 4 or 5, 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 to 7.5YR, value of 4 to 6, and chroma of 6 to 8 or 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, has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 6 to 8, or 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

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 mountains in the western, 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

Fannin sandy clay loam, 15 to 30 percent slopes, eroded (fig. 18); from Burnsville 0.3 mile north on

Secondary Road 1369, about 0.4 mile north on Secondary Road 1373, about 0.3 mile north on Secondary Road 1443, about 150 feet south in woodland; Burnsville USGS topographic quadrangle; lat. 35 degrees 55 minutes 46 seconds N. and long. 82 degrees 17 minutes 55 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A—0 to 3 inches; brown (7.5YR 4/4) sandy clay loam, strong brown (7.5YR 5/6) dry; weak fine granular structure; very friable; common very fine and fine roots; common very fine and fine vesicular pores; many very fine and fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear smooth boundary.

Bt1—3 to 18 inches; red (2.5YR 4/8) sandy clay loam; moderate medium subangular blocky structure; firm; few fine roots; common very fine and fine and few coarse tubular pores; common distinct yellowish red (5YR 4/6) clay films on faces of peds; many very fine flakes of mica; 5 percent by volume gravel; very strongly acid; gradual wavy boundary.

Bt2—18 to 27 inches; red (2.5YR 4/8) clay loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm; few fine roots; few fine tubular pores; many very fine mica flakes; 5 percent by volume gravel; strongly acid; clear smooth boundary.

BC—27 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 by volume gravel; strongly acid; clear smooth boundary.

C—31 to 80 inches; multicolored fine sandy loam saprolite in shades of red, yellow, and brown; massive; few medium and coarse roots; few very fine tubular pores; many fine flakes of mica; 5 percent by volume gravel; strongly acid.

Range in Characteristics

Solum thickness: 20 to 45 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: Common to 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 by volume in the A and C horizons and 0 to 25 percent in the B horizon; mostly gravel or 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, the 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—in 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—in 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, has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4 to 8, or may be mixed or mottled in shades of these colors
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 Flattop area
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 loam in an area of Harmiller-Shinbone complex, 15 to 30 percent slopes, stony (fig. 19); from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.3 miles west on U.S. Highway 19W, 1.5 miles north on U.S. Forest Service Road 278, about 0.3 mile east on an

Figure 14.—Typical profile of Chandler fine sandy loam. Chandler soils have a high mica content in the subsoil and are very deep to soft bedrock. They occur on low and intermediate mountains predominantly in the southern half of Yancey County.

Figure 15.—Typical profile of Chestoa sandy loam. Chestoa soils have thick, dark surface layers and are moderately deep to hard bedrock. They occur on cool slopes of intermediate mountains in the Flattop area.

Figure 16.—Typical profile of Clingman peat. Clingman soils have thin organic deposits over hard bedrock. They occur on the high mountains of the Black Mountain Range.

Figure 17.—Typical profile of Edneytown loam. Edneytown soils are very deep to soft bedrock. They occur on low and intermediate mountains predominantly in the western and northwestern parts of Yancey County.

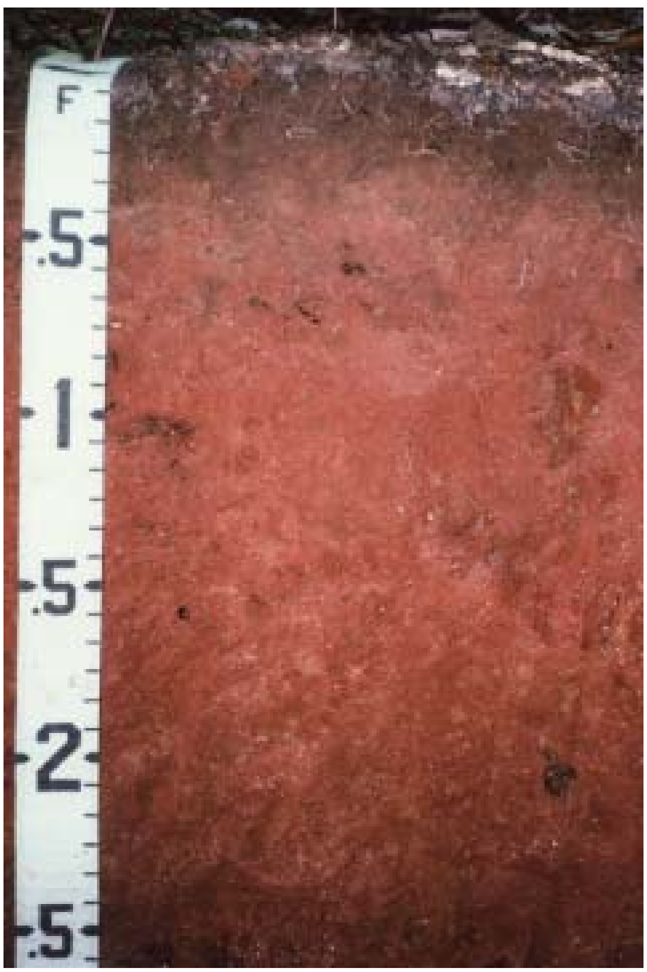

Figure 18.—Typical profile of Fannin sandy clay loam. Fannin soils have a high mica content in the subsoil and are very deep to soft bedrock. They occur on intermountain hills and low mountains.

Figure 19.—Typical profile of Harmiller loam. Harmiller soils are moderately deep to soft bedrock. They occur on low and intermediate mountains in the Flattop area.

Figure 20.—Typical profile of Porters loam. Porters soils have thick, dark surface layers and are deep to hard bedrock. They occur on low and intermediate mountains throughout Yancey County.

Figure 21.—Typical profile of Toecane cobbly loam. Toecane soils have thick, dark surface layers and many rock fragments in the subsoil. They occur in coves predominantly in the southern part of Yancey County.

unmarked gravel road, 0.3 mile east on an unmarked logging road, 10 feet north in woodland; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 14 seconds N. and long. 82 degrees 25 minutes 21 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; very friable; common fine and medium roots; 6 percent by volume gravel; extremely acid; abrupt smooth boundary.
Bt1—3 to 17 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine roots; few faint discontinuous clay films on faces of peds; distinct continuous clay bridges between sand grains; 6 percent by volume gravel; very strongly acid; clear smooth boundary.
Bt2—17 to 23 inches; brownish yellow (10YR 6/6) gravelly loam; moderate medium subangular blocky structure; friable; few very fine roots; few faint discontinuous clay films on faces of peds; distinct continuous clay bridges between sand grains; 20 percent by volume gravel and 5 percent cobbles; very strongly acid; clear smooth boundary.
BC—23 to 33 inches; brownish yellow (10YR 6/6) gravelly coarse sandy loam; moderate medium subangular blocky structure; friable; few very fine roots; very few distinct patchy clay films on rock fragments; very few faint clay bridges between sand grains; 20 percent by volume gravel and 10 percent cobbles; very strongly acid; clear smooth boundary.
Cr—33 to 44 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 by volume in the A and B horizons and less than 60 percent in the C horizon; mostly gravel, channers, or flagstones
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 6, and chroma of 2 to 8; where value is 3 or less, the horizon is less than 6 inches thick
Texture—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, 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 (if it occurs):
Color—horizon is multicolored, has hue of 5YR to 2.5Y and value and chroma of 3 to 8, or 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

Cr layer:
Type of bedrock—weathered, slightly fractured to highly fractured, low-grade metasedimentary rock that can be dug with difficulty with hand tools
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

The Harmiller soils in Yancey County are considered taxadjuncts to the series because the weighted average clay content in the particle-size control section is slightly less than the minimum value required by series classification. This difference, however, does not signficantly affect the use and management of the soils. These soils are coarse-loamy, siliceous, mesic Typic Hapludults.

Huntdale 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 throughout the county
Landform: Ridges, north- to east-facing hillslopes and mountain slopes, and slopes shaded by the higher mountains
Landform position: Summits and side slopes

Slope range: 15 to 50 percent
Taxonomic class: Fine-loamy, mixed, mesic Umbric Dystrochrepts

Typical Pedon

Huntdale clay loam, 30 to 50 percent slopes, stony; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 3.5 miles south on North Carolina Highway 80S, 150 feet west in woodland; Celo USGS topographic quadrangle; lat. 35 degrees 51 minutes 51 seconds N. and long. 82 degrees 12 minutes 12 seconds W.

Oi—1 inch to 0; slightly decomposed leaves and twigs.
A—0 to 9 inches; dark brown (10YR 3/3) clay loam, brown (10YR 5/3) dry; weak medium subangular blocky structure; very friable; many fine and common medium roots; few fine tubular pores; few very fine and fine roots; 5 percent by volume gravel; strongly acid; clear smooth boundary.
Bw1—9 to 21 inches; strong brown (7.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; few fine roots; few fine tubular pores; few very fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear smooth boundary.
Bw2—21 to 28 inches; strong brown (7.5YR 5/8) clay loam; moderate medium subangular blocky structure; friable; few very fine and fine roots; few fine tubular pores; few very fine and fine flakes of mica; 10 percent by volume gravel; very strongly acid; clear smooth boundary.
Bw3—28 to 34 inches; strong brown (7.5YR 5/8) loam; moderate medium subangular blocky structure; friable; few very fine and fine flakes of mica; common distinct iron-manganese streaks; 10 percent by volume gravel; very strongly acid; gradual wavy boundary.
C—34 to 63 inches; yellowish red (5YR 5/8) fine sandy loam saprolite; massive; few very fine flakes of mica; 12 percent by volume gravel; common distinct iron-manganese streaks; 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 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
Texture (fine-earth fraction)—clay loam
Thickness—7 to 10 inches

Bw 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, silty 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 4 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, silt loam, sandy clay loam, silty clay loam, or clay loam

C horizon:
Color—horizon is multicolored, has hue of 5YR to 2.5Y and value and chroma of 3 to 8, or may be mixed or mottled in shades of these colors
Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt 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 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 Flattop area
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, footslopes, and toeslopes
Slope range: 15 to 50 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 bouldery; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.3 miles west on U.S. Highway 19W, 1.5 miles north on U.S. Forest Service Road 278, about 0.6 mile north on U.S. Forest Service Road 5506, about 100 feet east in a stand of hemlock trees; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 56 seconds N. and long. 82 degrees 25 minutes 37 seconds W.

Oi—2 inches to 0; slightly decomposed leaf litter.
A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, yellowish brown (10YR 5/4) dry; weak medium granular structure; very friable; many very fine roots in mat at top of horizon and many medium roots throughout; many very fine and fine tubular pores; 3 percent by volume channers; extremely acid; abrupt wavy boundary.
Bt1—3 to 10 inches; 60 percent dark yellowish brown (10YR 4/4) and 40 percent dark yellowish brown (10YR 4/6) loam; weak medium subangular blocky structure; very friable; common fine and medium roots; many fine and medium tubular pores; 3 percent by volume channers; few faint discontinuous clay bridges between sand grains; distinct organic coats on faces of peds; very strongly acid; clear wavy boundary.
Bt2—10 to 19 inches; strong brown (7.5YR 4/6) loam; moderate medium subangular blocky structure; friable; common fine and coarse roots; many fine and common medium tubular pores; few faint clay films on faces of peds; distinct clay bridges between sand grains; very few discontinuous organic coats in root channels and pores; 3 percent by volume channers; very strongly acid; gradual wavy boundary.
Bt3—19 to 30 inches; 70 percent yellowish brown (10YR 5/8) and 30 percent strong brown (7.5YR 5/8) loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; common fine and coarse tubular pores; few faint continuous clay films on surfaces of peds; distinct clay bridges between sand grains; very few discontinuous organic coats in root channels and pores; 1 percent by volume gravel; strongly acid; clear wavy boundary.
2BC—30 to 46 inches; 45 percent yellowish brown (10YR 5/4), 35 percent very pale brown (10YR 7/3), and 20 percent yellowish brown (10YR 5/6) very cobbly sandy loam; weak medium subangular blocky structure; firm; common very fine and fine tubular pores; few distinct discontinuous clay bridges between sand grains; 15 percent by volume channers and 20 percent cobbles; very strongly acid; clear wavy boundary.
2C1—46 to 67 inches; 45 percent yellowish brown (10YR 5/6), 35 percent yellowish brown (10YR 5/8), and 20 percent very pale brown (10YR 7/3) very cobbly sandy loam; common fine prominent yellowish red (5YR 4/6) mottles; massive; firm; common very fine and few fine tubular pores; few distinct continuous clay bridges between sand grains; discontinuous clay films on faces of peds; 15 percent by volume channers; 25 percent cobbles; strongly acid; gradual wavy boundary.
2C2—67 to 79 inches; 45 percent yellowish brown (10YR 5/6), 35 percent yellowish brown (10YR 5/8), and 20 percent very pale brown (10YR 7/3) very cobbly sandy loam; massive; firm; few distinct continuous clay bridges between sand grains; 15 percent by volume channers; 35 percent cobbles; very strongly 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 by volume 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, or flagstones
Soil reaction: Extremely acid to moderately acid throughout the profile

A or Ap horizon:
Color—hue of 10YR, value of 3 or 4, and chroma of 2 to 4; where value is 3 or less, the 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 or 2BC 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

2C 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, fine sandy loam, or loam saprolite

Lostcove Series

Depth class: Very deep
Drainage class: Well drained
Depth to seasonal high water table: 5.0 to 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 low-grade metasedimentary rock
Landscape: Low and intermediate mountains in the Flattop area
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, footslopes, and toeslopes
Slope range: 15 to 50 percent
Taxonomic class: Loamy-skeletal, siliceous, mesic Typic Hapludults

Typical Pedon

Lostcove very cobbly sandy loam in an area of Keener-Lostcove complex, 15 to 30 percent slopes, very bouldery; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.3 miles west on U.S. Highway 19W, 2.0 miles north on U.S. Forest Service Road 278 to Flattop Mountain Branch, above the road adjacent to the stream channel; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 42 seconds N. and long. 82 degrees 25 minutes 24 seconds W.

Oi—2 inches to 0; slightly decomposed leaf litter.
A—0 to 4 inches; dark brown (10YR 3/3) very cobbly sandy loam, brown (10YR 4/3) dry; moderate medium granular structure; very friable; many very fine and coarse roots; many very fine and fine tubular pores; 10 percent by volume gravel, 20 percent cobbles, and 10 percent stones; extremely acid; clear wavy boundary.
BA—4 to 13 inches; dark yellowish brown (10YR 4/4) cobbly loam; moderate medium subangular blocky structure parting to moderate medium granular; friable; common very fine and medium roots; many very fine and common medium tubular pores; 10 percent by volume gravel and 10 percent cobbles; very strongly acid; clear wavy boundary.
Bt—13 to 52 inches; yellowish brown (10YR 5/6) extremely cobbly loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common very fine and medium tubular pores; common faint yellowish brown (10YR 5/6) clay films on faces of peds; 40 percent by volume gravel and 35 percent cobbles; very strongly acid; gradual wavy boundary.
BC—52 to 73 inches; yellowish brown (10YR 5/8) extremely gravelly coarse sandy loam; common fine distinct strong brown (7.5YR 5/6) and few fine prominent yellowish red (5YR 5/6) mottles; weak medium subangular blocky structure; firm; common very fine and fine roots; common very fine and fine tubular pores; few distinct yellowish brown (10YR 5/6) continuous clay films on lower surfaces of peds and rock fragments; few prominent black (10YR 2/1) iron stains on rock fragments; 60 percent by volume gravel and 5 percent cobbles; 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 by volume 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; size typically increasing 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, the horizon is less than 6 inches thick
Texture (fine-earth fraction)—sandy loam

BA horizon:
Color—hue of 10YR to 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

BC horizon:
Color—hue of 5YR to 2.5Y, value of 4 to 7, and chroma of 2 to 8
Texture (fine-earth fraction)—coarse sandy loam, sandy loam, fine sandy loam, loam, or sandy clay loam

C horizon (if it occurs):
Color—horizon is multicolored, has hue of 5YR to 2.5Y, value of 3 to 8, and chroma of 1 to 8, or is 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: Low and intermediate mountains dominantly in the central, southeastern, and southwestern parts 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 sandy loam in an area of Chandler-Micaville complex, 30 to 50 percent slopes, stony; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 4.3 miles south on North Carolina Highway 80S, 1.4 miles east on Secondary Road 1154, in a south-facing road cut; Celo USGS topographic quadrangle; lat. 35 degrees 51 minutes 28 seconds N. and long. 82 degrees 10 minutes 50 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 3 inches; dark yellowish brown (10YR 4/4) sandy loam, very pale brown (10YR 7/4) dry; weak fine granular structure; very friable; many fine to coarse roots; many fine and medium and few coarse tubular pores; common very fine and fine flakes of mica; 3 percent by volume gravel; very strongly acid; clear wavy boundary.
Bw1—3 to 18 inches; strong brown (7.5YR 5/6) sandy loam; moderate medium subangular blocky structure; friable; common fine to coarse roots; common fine and few medium and coarse tubular pores; many very fine flakes of mica; 5 percent by volume gravel; very strongly acid; gradual wavy boundary.
Bw2—18 to 25 inches; strong brown (7.5YR 5/6) gravelly sandy loam; moderate medium subangular blocky structure; friable; common fine to coarse roots; common fine and few medium and coarse tubular pores; many fine and medium flakes of mica; 20 percent by volume gravel; very strongly acid; gradual wavy boundary.
C—25 to 54 inches; multicolored sandy loam saprolite in shades of yellow, brown, and gray; massive with platy relict rock structure; very friable; few fine to coarse roots; few very fine tubular and vesicular pores; common fine flakes of mica and many medium and coarse flakes of mica; 10 percent by volume gravel; very strongly acid; gradual wavy boundary.
Cr—54 to 65 inches; weathered, slightly 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 by volume; 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, the 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 4 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 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:
Color—horizon is multicolored, has hue of 5YR to 10YR, value of 3 to 8, and chroma of 2 to 8, or 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 that can be dug with difficulty with hand tools
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

The Micaville soils in Yancey County are considered taxadjuncts to the series because the mica content in the mineralogy control section is slightly less than the minimum value required by series classification and the clay content in the particle-size control section is slightly more than the maximum allowed by series classification. These differences, however, do not signficantly affect the use and management of the soils. These soils are fine-loamy, paramicaceous, mesic Typic Hapludults.

Nikwasi Series

Depth class: Very deep
Drainage class: Poorly drained
Depth to seasonal high water table: 1.0 foot or less from December through May
Permeability: Moderately rapid
Parent material: Recent alluvium that is loamy in the upper part and sandy-skeletal in the lower part
Landscape: Mountains
Landform: Dominantly areas on the wider flood plains throughout the county
Landform position: Planar to slightly concave slopes
Slope range: 0 to 3 percent
Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Cumulic Humaquepts

Typical Pedon

Nikwasi sandy loam, 0 to 3 percent slopes, occasionally flooded; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 6.5 miles south on North Carolina Highway 80S, 200 feet west in a hay field; Celo USGS topographic quadrangle; lat. 35 degrees 49 minutes 42 seconds N. and long. 82 degrees 11 minutes 18 seconds W.

A1—0 to 12 inches; black (10YR 2/1) sandy loam, dark gray (10YR 4/1) dry; moderate medium granular structure; very friable; common very fine to medium roots; common very fine flakes of mica; 3 percent by volume gravel; moderately acid; clear smooth boundary.

A2—12 to 17 inches; very dark gray (10YR 3/1) and dark gray (10YR 4/1) loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; common very fine to medium roots; common fine and few medium pores; few fine faint black (10YR 2/1) irregularly shaped iron depletions with clear boundaries throughout; common very fine flakes of mica; 3 percent by volume gravel; very strongly acid; clear smooth boundary.

Cg1—17 to 26 inches; dark grayish brown (10YR 4/2) sandy clay loam; massive; very friable; few fine faint black (10YR 2/1) irregularly shaped iron depletions with clear boundaries throughout; common very fine and fine flakes of mica; 3 percent by volume gravel; very strongly acid; clear wavy boundary.

Cg2—26 to 30 inches; very dark grayish brown (10YR 4/2) sandy clay loam; massive; very friable; few medium prominent light brownish gray (10YR 6/2) irregularly shaped iron depletions with clear boundaries throughout; common medium distinct strong brown (7.5YR 5/6) irregularly shaped masses of iron accumulation with clear boundaries in the matrix; common very fine and fine flakes of mica; 3 percent by volume gravel; very strongly acid; clear wavy boundary.

Cg3—30 to 36 inches; dark gray (N 4/0) sandy loam; massive; very friable; common medium prominent dark reddish brown (2.5YR 4/2) irregularly shaped iron depletions with clear boundaries throughout; common very fine and fine flakes of mica; 5 percent by volume gravel; moderately acid; clear wavy boundary.

Cg4—36 to 62 inches; 40 percent dark grayish brown (10YR 4/2), 30 percent light brownish gray (2.5Y 6/2), and 30 percent dark gray (N 4/0) very gravelly sand; single grain; loose; common very fine and fine and many medium flakes of mica; 45 percent by volume gravel and 10 percent cobbles; moderately acid.

Range in Characteristics

Depth to contrasting material: 24 to 40 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: Few to many
Content and size of rock fragments: Less than 35 percent in the A and Ap horizons and the upper part of the Cg horizon and more than 35 percent in the lower part of the Cg horizon; mostly gravel or cobbles
Soil reaction: Very strongly acid to slightly acid throughout the profile

A or Ap horizon:
Color—hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 to 3 or neutral in hue and value of 2 or 3
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—sandy loam in the

upper part and loam or sandy loam in the lower part
Thickness—15 to 22 inches

AC horizon (if it occurs):
Color—hue of 10YR or 2.5Y, value of 2 or 3, and chroma of 1 to 3 or neutral in hue and value of 2 or 3
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture—coarse sand, sand, loamy coarse sand, loamy fine sand, or loamy sand

Cg horizon (upper part):
Color—hue of 10YR or 2.5Y, value of 3 to 7, and chroma of 1 to 2 or neutral in hue and value of 4 to 7
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—sandy loam, loam, or sandy clay loam

Cg horizon (lower part):
Color—hue of 10YR or 2.5Y, value of 3 to 7, and chroma of 1 to 2 or neutral in hue and value of 4 to 7
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—coarse sandy, sand, loamy coarse sand, or loamy sand

The Nikwasi soils in Yancey County are considered taxadjuncts to the series because the weighted average clay content in the upper part of the particle-size control section is more than the maximum value allowed by series classification and the thickness of the epipedon is less than required by series classification. These differences, however, do not signficantly affect the use and management of the soils. These soils are fine-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Fluvaquentic Humaquepts.

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 dominantly in the western and northwestern parts 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, mixed, mesic Typic Hapludults

Typical Pedon

Pigeonroost loam in an area of Pigeonroost-Edneytown complex, 30 to 50 percent slopes, stony; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 17.4 miles west on U.S. Highway 19W, 0.7 mile west on U.S. Forest Service Road 5502, about 250 feet north along an old skid trail; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 07 seconds N. and long. 82 degrees 23 minutes 14 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 5/4) dry; moderate medium granular structure; very friable; common very fine and fine and few medium and coarse roots; common fine and medium tubular pores; few very fine and fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear smooth boundary.
Bt—2 to 15 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; few medium coarse and many very fine and fine roots; few fine and medium and few medium and coarse tubular pores; common faint strong brown (7.5YR 5/6) clay films on faces of peds; few very fine and fine flakes of mica; 5 percent by volume gravel; very strongly acid; gradual wavy boundary.
C—15 to 27 inches; strong brown (7.5YR 5/6) gravelly loam; massive; very friable; few very fine to coarse roots; common very fine and fine and few medium and coarse tubular pores; 20 percent by volume gravel; very strongly acid; gradual wavy boundary.
Cr—27 to 38 inches; weathered, highly fractured granodiorite 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 by volume 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, the 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 (if it occurs):
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:
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
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

Porters 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 throughout the county
Landform: Ridges, north- to east-facing mountain slopes, and slopes shaded by the higher mountains
Landform position: Summits and side slopes
Slope range: 8 to 95 percent
Taxonomic class: Fine-loamy, mixed, mesic Umbric Dystrochrepts

Typical Pedon

Porters loam in an area of Porters-Unaka complex, 50 to 95 percent slopes, rocky (fig. 20); from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.7 miles west on U.S. Highway 19W, 0.6 mile south on U.S. Forest Service Road 5508, about 50 feet south in woodland; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 52 seconds N. and long. 82 degrees 26 minutes 03 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A1—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) and brown (10YR 5/3) dry; weak fine granular structure; very friable; many very fine and fine roots; common very fine and fine tubular pores; few very fine flakes of mica; 3 percent by volume gravel; very strongly acid; clear smooth boundary.
A2—3 to 9 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; many very fine and fine roots; common very fine and fine tubular pores; few very fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual wavy boundary.
Bw1—9 to 20 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; common very fine and few medium roots; few fine tubular pores; few very fine flakes of mica; 5 percent by volume gravel; very strongly acid; gradual wavy boundary.
Bw2—20 to 39 inches; yellowish brown (10YR 5/6) gravelly loam; moderate medium subangular blocky structure; friable; few very fine flakes of mica; 15 percent by volume gravel; very strongly acid; gradual wavy boundary.
BC—39 to 54 inches; yellowish brown (10YR 5/4) gravelly loam; weak medium subangular blocky structure; friable; few very fine flakes of mica; 15 percent by volume gravel; very strongly acid; gradual wavy boundary.
R—54 to 65 inches; unweathered, moderately fractured granodiorite gneiss.

Range in Characteristics

Solum thickness: 20 to 50 inches
Depth to bedrock: 40 to 60 inches to hard bedrock
Content of mica flakes: Few or common throughout the profile
Content and size of rock fragments: Less than 15 percent by volume in the A horizon and the upper part of the Bw horizon and less than 35 percent in the lower part of the Bw horizon; ranging from gravel to stones
Soil reaction: Very strongly acid to slightly acid throughout the profile

A or Ap horizon:
Color—hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3
Texture (fine-earth fraction)—loam
Thickness—7 to 10 inches

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

BC 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—multicolored in shades of brown, yellow, black, and gray
Texture (fine-earth fraction)—loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

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
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

R layer:
Type of bedrock—unweathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock

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 Bw 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: Mountain valleys
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 Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 11.7 miles south on North Carolina Highway 80S, 1.2 miles south on Secondary Road 1205, about 300 feet west on an unmarked logging road, in woodland; Celo USGS topographic quadrangle; lat. 35 degrees 45 minutes 28 seconds N. and long. 82 degrees 20 minutes 38 seconds W.

A1—0 to 2 inches; very dark grayish brown (10YR 3/2) fine sandy loam, dark brown (10YR 3/3) dry; weak fine granular structure; very friable; many very fine roots in mat at top of horizon and many fine roots throughout; many very fine and fine tubular pores; common fine flakes of mica; 3 percent by volume gravel; strongly acid; clear smooth boundary.
A2—2 to 13 inches; dark brown (10YR 3/3) fine sandy loam, dark yellowish brown (10YR 4/4) dry; weak medium granular structure; very friable; many fine and coarse roots throughout; many very fine and fine tubular pores; common fine flakes of mica; 5 percent by volume gravel; very strongly acid; clear wavy boundary.
Bw—13 to 23 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; common fine and coarse roots throughout; common very fine and fine tubular pores; common fine flakes of mica; 8 percent by volume gravel and 3 percent cobbles; strongly acid; clear wavy boundary.
C1—23 to 30 inches; dark yellowish brown (10YR 4/6) very gravelly fine sandy loam; massive; very friable; few very fine and medium roots at top of horizon; few very fine and medium tubular pores;

many fine and common medium flakes of mica; 25 percent by volume gravel and 10 percent cobbles; moderately acid; clear irregular boundary.

C2—30 to 62 inches; multicolored extremely cobbly loamy coarse sand in shades of yellow, brown, and gray; single grain; loose; few very fine and medium roots at top of horizon; few very fine and medium tubular pores; many fine and common medium flakes of mica; 15 percent by volume gravel, 50 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 that are 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 by volume in the A and B horizons and 35 percent or more in the C horizon; mostly gravel or cobbles but including stones
Soil reaction: Very strongly acid to neutral throughout the profile

A or Ap horizon:
Color—hue of 7.5YR or 10YR and value and chroma of 2 or 3
Texture (fine-earth fraction)—fine sandy loam
Thickness—10 to 20 inches

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—multicolored or hue of 7.5YR to 2.5Y, value of 2 to 6, and chroma of 4 to 8
Redoximorphic features—iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive
Texture (fine-earth fraction)—sand, coarse sand, loamy sand, or loamy fine sand

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 the Cane, South Toe, and North Toe Rivers
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 Burnsville 0.6 mile east on U.S. Highway 19E, 4.6 miles south on North Carolina Highway 197S, 300 feet west in a cropped field; Mt. Mitchell USGS topographic quadrangle; lat. 35 degrees 52 minutes 16 seconds N. and long. 82 degrees 19 minutes 09 seconds W.

Ap—0 to 7 inches; very dark brown (10YR 2/2) fine sandy loam, brown (10YR 4/3) dry; moderate medium granular structure; very friable; many very fine and common medium roots; many very fine and common medium tubular pores; common fine flakes of mica; strongly acid; abrupt smooth boundary.

A—7 to 14 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; moderate medium granular structure; very friable; common very fine and fine roots; many very fine and common medium tubular pores; common fine flakes of mica; moderately acid; abrupt smooth boundary.

Bw—14 to 20 inches; dark yellowish brown (10YR 4/4) loamy fine sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; common medium tubular pores; many fine flakes of mica; slightly acid; clear smooth boundary.

Ab—20 to 25 inches; dark brown (10YR 3/3) fine sandy loam; weak medium subangular blocky structure; very friable; common very fine roots; common very fine and medium pores; many fine flakes of mica; moderately acid; abrupt smooth boundary.

C1—25 to 31 inches; dark yellowish brown (10YR 4/4) sand; massive; very friable; common very fine roots; common very fine and fine tubular pores; many fine flakes of mica; moderately acid; clear smooth boundary.

C2—31 to 43 inches; dark yellowish brown (10YR 3/4) loamy sand; single grain; loose; few very fine roots; common fine and fine tubular pores; many fine flakes of mica; slightly acid; clear smooth boundary.

C3—43 to 62 inches; dark yellowish brown (10YR 3/4) sand; single grain; loose; few very fine roots; common fine and fine tubular pores; many fine flakes of mica; slightly acid; gradual smooth boundary.

C4—62 to 80 inches; dark yellowish brown (10YR 3/4) sand; single grain; loose; few very fine roots; common fine and fine tubular pores; many fine flakes of mica; slightly 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 that are 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 by volume to 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
Texture (fine-earth fraction)—fine sandy loam
Thickness—10 to 20 inches

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 5, and chroma of 2 to 8
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
Texture (fine-earth fraction)—coarse sand, sand, fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

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 sandy loam, 8 to 15 percent slopes, stony; from Burnsville 2.9 miles west on U.S. Highway 19E, 1.9 miles south on Secondary Road 1115, about 0.2 mile west on an unmarked gravel road, across a bridge and 1,200 feet southwest, in a cultivated field; Burnsville USGS topographic quadrangle; lat. 35 degrees 53 minutes 34 seconds N. and long. 82 degrees 20 minutes 38 seconds W.

Ap—0 to 9 inches; very dark brown (10YR 2/2) sandy loam, dark yellowish brown (10YR 4/4) dry; weak medium subangular blocky structure; very friable; many very fine and fine roots; many very fine and medium tubular pores; common fine flakes of mica; 4 percent by volume gravel; strongly acid; abrupt smooth boundary.

Bt1—9 to 20 inches; strong brown (7.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; common very fine and many fine roots; many fine and medium tubular pores; discontinuous faint dark yellowish brown (10YR 4/6) clay films on faces of peds and surfaces of rock fragments; common fine flakes of mica; 3 percent by volume gravel; moderately acid; gradual wavy boundary.

Bt2—20 to 30 inches; strong brown (7.5YR 4/6) sandy clay loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common fine and medium tubular pores; discontinuous faint brown (7.5YR 4/4) clay films on faces of peds; common fine flakes of mica; 3 percent by volume gravel; moderately acid; gradual wavy boundary.

Bt3—30 to 39 inches; strong brown (7.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; common very fine and fine roots; common very fine and fine tubular pores; discontinuous faint strong brown (7.5YR 4/6) clay films on faces of peds; discontinuous faint clay bridges between sand grains; common fine and medium flakes of mica; 3 percent by volume gravel; moderately acid; gradual wavy boundary.

Bt4—39 to 49 inches; dark yellowish brown (10YR 4/6) sandy clay loam; moderate medium angular blocky structure; friable; common very fine and fine roots; common fine and medium tubular pores; patchy faint strong brown (7.5YR 4/6) clay films on faces of peds; patchy faint clay bridges between sand grains; common fine and medium and few coarse flakes of mica; 6 percent by volume gravel and 3 percent cobbles; strongly acid; gradual wavy boundary.

BC—49 to 57 inches; dark yellowish brown (10YR 4/4) coarse sandy loam; weak medium subangular blocky structure; friable; common very fine and fine roots; few fine and medium tubular pores; discontinuous faint clay bridges between sand grains; common fine, medium, and coarse flakes of mica; 6 percent by volume gravel and 5 percent cobbles; moderately acid; clear wavy boundary.

2C—57 to 79 inches; dark yellowish brown (10YR 3/6) very cobbly sandy loam; massive; friable; common very fine and fine roots; few fine and medium tubular pores; many fine, medium, and coarse flakes of mica; 30 percent by volume 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 by volume in the A 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 and C horizons

Ap or A horizon:
Color—hue of 10YR, value of 2 or 3, and chroma of 2 to 4
Texture (fine-earth fraction)—sandy loam
Thickness—6 to 15 inches

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)—coarse sandy loam, sandy loam, fine sandy loam, loam, or sandy clay loam

2C or C 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 saprolite

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 Flattop area
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

Shinbone loam in an area of Harmiller-Shinbone complex, 15 to 30 percent slopes, stony; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.3 miles west on U.S. Highway 19W, 1.5 miles north on U.S. Forest Service Road 278, about 0.3 mile east on an unmarked gravel road, 0.3 mile east on an unmarked logging road, 10 feet north in woodland; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 14 seconds N. and long. 82 degrees 25 minutes 24 seconds W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; very friable; common fine and few medium roots; many very fine and fine tubular pores; 6 percent by volume channers; extremely acid; clear smooth boundary.

BA—4 to 7 inches; brown (10YR 5/3) loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common very fine to medium tubular pores; 5 percent by volume channers; very strongly acid; clear wavy boundary.

Bt1—7 to 16 inches; light yellowish brown (10YR 6/4) channery loam; moderate medium subangular blocky structure; friable; common fine and medium roots; common fine and medium tubular pores; 20 percent by volume channers; very strongly acid; diffuse wavy boundary.

Bt2—16 to 32 inches; brownish yellow (10YR 6/6) channery loam; moderate medium subangular blocky structure; friable; few fine roots; few fine and medium tubular pores; common faint clay films on faces of peds; common distinct clay bridges between sand grains; 18 percent by volume channers; very strongly acid; diffuse wavy boundary.

C—32 to 45 inches; brownish yellow (10YR 6/6) channery fine sandy loam; many prominent distinct white (10YR 8/2) mottles; massive; friable; few very fine roots; few very fine to medium tubular pores; few distinct dark yellowish brown (10YR 4/4) clay films on surfaces of rock fragments; 19 percent by volume gravel; very strongly acid; diffuse irregular boundary.

Cr—45 to 81 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 48 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 by volume; mostly gravel or 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, the horizon is less than 6 inches thick
Texture (fine-earth fraction)—loam

BA horizon:
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 (if it occurs):
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 or is 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
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
Landscape: High mountains of the Black Mountain Range and Bald Mountains
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, footslopes, and toeslopes
Slope range: 15 to 50 percent
Taxonomic class: Fine-loamy, mixed, frigid Typic Haplumbrepts

Typical Pedon

Tanasee loam in an area of Balsam-Tanasee complex, 15 to 30 percent slopes, extremely bouldery; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 14.2 miles south on North Carolina Highway 80S, 15.8 miles south on the Blue Ridge Parkway, 200 feet south-southwest of the Balsam Gap parking lot, in woodland; Montreat USGS topographic quadrangle; lat. 35 degrees 44 minutes 58 seconds N. and long. 82 degrees 20 minutes 02 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.

A1—0 to 7 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 very fine and fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual wavy boundary.

A2—7 to 15 inches; dark brown (10YR 3/3) 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 very fine and fine flakes of mica; 3 percent by volume gravel; very strongly acid; gradual wavy boundary.

Bw1—15 to 28 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few very fine to medium roots; common very fine and few fine and medium tubular pores; few very fine and fine flakes of mica; 10 percent by volume gravel; very strongly acid; gradual wavy boundary.

Bw2—28 to 44 inches; brownish yellow (10YR 6/6) gravelly sandy loam; weak medium subangular blocky structure; friable; few very fine and fine roots; few very fine to medium tubular pores; few very fine and fine flakes of mica; 20 percent by volume gravel and 5 percent cobbles; strongly acid; gradual wavy boundary.

BC—44 to 62 inches; yellowish brown (10YR 5/4) gravelly 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 by volume gravel and 10 percent cobbles; 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 in the upper 40 inches of the profile and few to many below a depth of 40 inches
Content and size of rock fragments: Less than 35 percent by volume to 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
Texture (fine-earth fraction)—loam
Thickness—10 to 20 inches

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, or loam

C 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)—coarse sand, sand, fine sand, loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, or fine sandy loam saprolite

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 very cobbly loam in an area of Thunder-Saunook complex, 15 to 30 percent slopes, very bouldery; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 8.2 miles west on U.S. Highway 19W, 3.1 miles west on Secondary Road 1395, about 1.3 miles south on Secondary Road 1406, about 50 feet west in woodland; Bald Creek USGS topographic quadrangle; lat. 36 degrees 58 minutes 01 second N. and long. 82 degrees 26 minutes 06 seconds W.

A1—0 to 3 inches; dark brown (10YR 3/3) very cobbly loam, dark yellowish brown (10YR 4/4) dry; weak fine granular structure; very friable; many very fine, fine, and medium roots; many very fine and fine tubular pores; few fine flakes of mica; 15 percent by volume gravel, 20 percent cobbles, and 3 percent stones; strongly acid; gradual wavy boundary.

A2—3 to 9 inches; dark yellowish brown (10YR 3/4) very cobbly loam, yellowish brown (10YR 5/4) dry; moderate fine granular structure; friable; many very fine and fine and few medium roots; few very fine and fine tubular pores; common very fine and fine flakes of mica; 15 percent by volume gravel, 20 percent cobbles, and 3 percent stones; strongly acid; gradual wavy boundary.

Bt1—9 to 24 inches; strong brown (7.5YR 5/6) very cobbly sandy clay loam; moderate medium subangular blocky structure; friable; common very fine to medium roots; common very fine and fine tubular pores; few faint discontinuous clay films on faces of peds and surfaces of rock fragments; few fine flakes of mica; 20 percent by volume gravel, 20 percent cobbles, and 5 percent stones; strongly acid; clear wavy boundary.

Bt2—24 to 39 inches; strong brown (7.5YR 5/6) very cobbly clay loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common fine and medium tubular pores; few distinct continuous clay films on faces of peds and surfaces of rock fragments; few fine flakes of mica; 20 percent by volume gravel, 25 percent cobbles, and 5 percent stones; strongly acid; clear wavy boundary.

Bt3—39 to 52 inches; strong brown (7.5YR 5/6) very cobbly sandy loam; moderate medium subangular blocky structure; friable; common very fine and fine roots; common fine and medium tubular pores; few faint discontinuous clay films on faces of peds and surfaces of rock fragments; few fine flakes of mica; 20 percent by volume gravel, 30 percent cobbles, and 5 percent stones; strongly acid; clear wavy boundary.

BC—52 to 77 inches; yellowish brown (10YR 5/6) extremely cobbly sandy loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; few very fine and fine roots; few fine tubular pores; common very fine and fine flakes of mica; 25 percent by volume gravel, 35 percent cobbles, and 5 percent stones; moderately acid; clear wavy boundary.

C—77 to 87 inches; dark yellowish brown (10YR 4/4) extremely cobbly sandy loam; massive; few very fine and fine roots; few very fine and fine tubular pores; common very fine and fine flakes of mica; 30 percent by volume gravel, 35 percent cobbles, and 10 percent stones; 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 by volume in the A horizon and more than 35 percent in the B and C horizons; ranging from gravel to boulders; size typically increasing as depth increases
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 4
Texture (fine-earth fraction)—loam
Thickness—6 to 12 inches

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:
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 4 or 6, and chroma of 4 to 8
Texture (fine-earth fraction)—loamy sand, coarse sandy loam, or sandy loam saprolite

Toecane 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 primarily from felsic, high-grade metamorphic or igneous rock

Landscape: Low and intermediate mountains dominantly in the western and southern parts of the county
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, footslopes, and toeslopes
Slope range: 8 to 50 percent
Taxonomic class: Loamy-skeletal, mixed, mesic Humic Hapludults

Typical Pedon

Toecane cobbly loam in an area of Toecane-Tusquitee complex, 15 to 30 percent slopes, very bouldery (fig. 21); from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 7.7 miles south on North Carolina Highway 80S, 3.7 miles west on U.S. Forest Service Road 239, about 10 feet west in woodland adjacent to White Oak Creek; Celo USGS topographic quadrangle; lat. 35 degrees 49 minutes 43 seconds N. and long. 82 degrees 13 minutes 56 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 3 inches; very dark brown (10YR 2/2) cobbly loam, very dark grayish brown (10YR 3/2) dry; weak fine granular structure; very friable; many very fine and fine and few medium roots; common very fine flakes of mica; 5 percent by volume gravel and 10 percent cobbles; extremely acid; gradual wavy boundary.
AE—3 to 8 inches; dark brown (10YR 3/3) cobbly loam, dark brown (10YR 4/3) dry; weak fine granular structure; friable; many very fine and fine roots; few very fine and fine tubular pores; common very fine and fine flakes of mica; 10 percent by volume gravel and 10 percent cobbles; strongly acid; gradual wavy boundary.
Bt1—8 to 12 inches; dark yellowish brown (10YR 4/4) very cobbly loam; weak medium subangular blocky structure; friable; common very fine and fine roots; few faint clay films on faces of peds; common very fine and fine flakes of mica; 15 percent by volume gravel and 20 percent cobbles; strongly acid; gradual wavy boundary.
Bt2—12 to 24 inches; yellowish brown (10YR 5/4) very cobbly sandy clay loam; weak medium subangular blocky structure; friable; common very fine and fine roots; few faint clay films on faces of peds; common very fine and fine flakes of mica; 15 percent by volume gravel, 20 percent cobbles, and 5 percent stones; very strongly acid; gradual wavy boundary.
BC—24 to 30 inches; dark yellowish brown (10YR 4/6) very cobbly sandy loam; weak medium subangular blocky structure; very friable; few fine roots; common very fine and fine flakes of mica; 15 percent by volume gravel, 20 percent cobbles, and 10 percent stones; strongly acid; gradual wavy boundary.
C—30 to 63 inches; multicolored extremely cobbly loamy sand; single grained; massive; few fine roots; common very fine and fine flakes of mica; 15 percent by volume gravel, 35 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 in the A and B horizons and few to many in the C horizon
Content and size of rock fragments: 15 to 60 percent by volume in the A and B horizons and 15 to 80 percent in the C horizon; ranging from gravel to boulders; size typically increasing as depth increases
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
Texture (fine-earth fraction)—loam
Thickness—7 to 10 inches

AE or 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, loam, or sandy clay loam

Bt horizon:
Color—horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8 or may be mottled in shades of these colors
Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or sandy clay loam

BC horizon:
Color—horizon has hue of 7.5YR to 2Y, value of 4 to 6, and chroma of 3 to 8 or may be mottled in shades of these colors
Texture (fine-earth fraction)—loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam

C horizon:
Color—horizon is multicolored, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma 3 to 8, or may be mixed or mottled in shades of these colors
Texture (fine-earth fraction)—sand, loamy sand,

loamy fine sand, coarse sandy loam, sandy loam, or fine sandy loam saprolite; thin layers of loam in some pedons

Tusquitee 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 primarily from felsic, high-grade metamorphic or igneous rock
Landscape: Low and intermediate mountains dominantly in the western and southern parts of the county
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, footslopes, and toeslopes
Slope range: 8 to 50 percent
Taxonomic class: Fine-loamy, mixed, mesic Umbric Dystrochrepts

Typical Pedon

Tusquitee loam in an area of Toecane-Tusquitee complex, 15 to 30 percent slopes, very bouldery; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 6.3 miles south on North Carolina Highway 80S, 11.7 miles south on North Carolina Highway 80S, 2.3 miles south on Secondary Road 1205 to U.S. Forest Service heliport, west past heliport 300 feet on an unmarked road to a wildlife field, 150 feet south, in a stand of hemlock trees; Old Fort USGS topographic quadrangle; lat. 35 degrees 44 minutes 36 seconds N. and long. 82 degrees 13 minutes 04 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A1—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; very friable; many very fine and fine roots; many very fine and fine tubular pores; common fine flakes of mica; 2 percent by volume gravel; strongly acid; clear wavy boundary.
A2—6 to 9 inches; dark brown (10YR 3/3) fine sandy loam, brown (10YR 5/3) dry; moderate medium granular structure; very friable; many very fine and common roots; many very fine and fine tubular pores; common fine flakes of mica; 5 percent by volume gravel; moderately acid; clear irregular boundary.
Bw1—9 to 16 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak medium subangular blocky structure; very friable; common very fine and fine roots; common very fine and fine tubular pores; many fine flakes of mica; 1 percent by volume gravel; strongly acid; gradual wavy boundary.
Bw2—16 to 35 inches; dark yellowish brown (10YR 4/6) fine sandy loam; weak medium subangular blocky structure; very friable; common very fine and fine roots; common very fine and fine tubular pores; many fine flakes of mica; 10 percent by volume gravel; strongly acid; diffuse wavy boundary.
Bw3—35 to 51 inches; dark yellowish brown (10YR 4/6) fine sandy loam; weak medium subangular blocky structure; very friable; few very fine and common fine roots; few very fine and common fine tubular pores; many fine and medium flakes of mica; 10 percent by volume gravel; strongly acid; diffuse wavy boundary.
Bw4—51 to 67 inches; dark yellowish brown (10YR 4/6) fine sandy loam; weak medium subangular blocky structure; very friable; few very fine and fine roots; few very fine and fine tubular pores; many fine and medium flakes of mica; 10 percent by volume gravel; strongly acid; gradual wavy boundary.
Bw5—67 to 88 inches; yellowish brown (10YR 5/6) sandy clay loam; weak medium subangular blocky structure; friable; few very fine roots; few very fine tubular pores; common fine flakes of mica; 10 percent by volume gravel and 3 percent cobbles; strongly 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 by volume to a depth of 40 inches and less than 60 percent below a depth of 40 inches; ranging from gravel to stones
Soil reaction: Very strongly 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 4
Texture (fine-earth fraction)—loam
Thickness—7 to 10 inches

Bw horizon:
Color—hue of 5YR to 10YR, 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 5YR to 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—multicolored
Texture (fine-earth fraction)—loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam saprolite

Udifluvents

Depth class: Very deep
Drainage class: Excessively drained to somewhat poorly drained
Depth to seasonal high water table: Variable, commonly less than 4 feet from January through December
Permeability: Very rapid
Parent material: Recent alluvium
Landscape: Mountains
Landform: Flood plains dominantly along the Cane, South Toe, and Nolichucky Rivers
Landform position: Planar to slightly convex slopes
Slope range: 0 to 3 percent
Taxonomic class: Udifluvents

Typical Pedon

Udifluvents, sandy-skeletal, frequently flooded, consists of very low-lying, riverwash areas that have 0 to 3 percent slopes. Flooding has removed all of the overlying soil material. Areas include small islands and the inside river bends of the Cane, South Toe, and Nolichucky Rivers. A typical pedon is not given due to the variable nature of the soils.

Range in Characteristics

Contrasting material: Surficial deposits of gravel, cobbles, stones, and boulders that are stratified with sandy to loamy material
Thickness of underlying soil material: More than 60 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: Few to many
Content and size of rock fragments: 35 to less than 60 percent; mostly gravel or cobbles but including stones and boulders
Soil reaction: Extremely acid to moderately acid throughout the profile

C horizon:
Color—multicolored or hue of 7.5YR to 2.5Y, value of 3 to 7, and chroma of 3 to 8
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
Texture (fine-earth fraction)—coarse sand, sand, loamy coarse sand, or loamy sand saprolite

Udorthents

Depth class: Deep or very deep
Drainage class: Somewhat excessively drained to moderately well drained
Depth to seasonal high water table: Variable, occasionally 3 to 6 feet; 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 natural soil has been excavated or covered by earthy fill material
Slope range: 0 to 50 percent
Taxonomic class: Udorthents

Typical Pedon

Udorthents, loamy, stony, consists of cut and fill areas where soil and the underlying material has 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. Other areas included in the map unit are 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

Unaka 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 throughout the county
Landform: Ridges, north- to east-facing mountain slopes, and slopes shaded by the higher mountains
Landform position: Summits and side slopes
Slope range: 8 to 95 percent
Taxonomic class: Fine-loamy, mixed, mesic Umbric Dystrochrepts

Typical Pedon

Unaka loam in an area of Porters-Unaka complex, 50 to 95 percent slopes, rocky; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.7 miles west on U.S. Highway 19W, 0.6 mile south on U.S. Forest Service Road 5508, about 50 feet south in woodland; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 52 seconds N. and long. 82 degrees 26 minutes 03 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 9 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 5/3) dry; weak medium granular structure; very friable; few very fine and common fine roots; common very fine and fine tubular pores; few very fine flakes of mica; 5 percent by volume gravel; strongly acid; clear smooth boundary.
Bw1—9 to 18 inches; yellowish brown (10YR 5/6) loam; moderate medium subangular blocky structure; friable; few fine roots; few fine tubular pores; few very fine flakes of mica; 5 percent by volume gravel; very strongly acid; gradual wavy boundary.
Bw2—18 to 27 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak medium subangular blocky structure; friable; few very fine flakes of mica; 20 percent by volume gravel; very strongly acid; gradual wavy boundary.
Cr—27 to 31 inches; weathered, highly fractured granodiorite 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.
R—31 to 42 inches; unweathered, moderately fractured granodiorite gneiss.

Range in Characteristics

Solum thickness: 18 to 36 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 20 percent by volume in the A and B horizons and 5 to 35 percent in the C horizon; ranging from gravel to stones
Soil reaction: Very strongly acid to strongly acid throughout the profile

A horizon:
Color—hue of 10YR and value and chroma of 2 or 3
Texture (fine-earth fraction)—loam
Thickness—7 to 10 inches

Bw horizon:
Color—hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6
Texture (fine-earth fraction)—loam; sandy loam or clay loam in some pedons

C horizon (if it occurs):
Color—multicolored in shades of brown, yellow, and gray
Texture (fine-earth fraction)—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
Other characteristics—few fine and medium roots in cracks that are spaced more than 4 inches apart

R layer:
Type of bedrock—unweathered, slightly fractured to highly fractured, felsic or mafic, high-grade metamorphic or igneous rock

Unicoi Series

Depth class: Shallow
Drainage class: Excessively drained
Depth to seasonal high water table: More than 6.0 feet
Permeability: Moderately rapid
Parent material: Residuum affected by soil creep, weathered from low-grade metasedimentary rock
Landscape: Low and intermediate mountains in the Flattop area
Landform: Ridges and south- to west-facing mountain slopes
Landform position: Summits and side slopes
Slope range: 15 to 95 percent
Taxonomic class: Loamy-skeletal, mixed, mesic Lithic Dystrochrepts

Typical Pedon

Unicoi gravelly loam in an area of Ditney-Unicoi complex, 30 to 50 percent slopes, very stony; from Burnsville 3.5 miles west on U.S. Highway 19E, 2.0 miles west on Secondary Road 1454, about 21.3 miles west on U.S. Highway 19W, 0.3 mile north on U.S. Forest Service Road 278, in a south-facing road cut; Chestoa USGS topographic quadrangle; lat. 36 degrees 02 minutes 10 seconds N. and long. 82 degrees 25 minutes 42 seconds W.

Oi—1 inch to 0; slightly decomposed leaf litter.
A—0 to 3 inches; brown (10YR 4/3) gravelly loam, light yellowish brown (10YR 6/4) dry; weak medium granular structure; very friable; common very fine and fine roots; common very fine to coarse tubular pores; 25 percent by volume gravel and 5 percent cobbles; extremely acid; clear smooth boundary.
Bw1—3 to 11 inches; yellowish brown (10YR 5/4) very cobbly loam; weak medium subangular blocky structure; friable; many few and medium roots; few very fine to coarse tubular pores; 15 percent by volume gravel and 30 percent cobbles; very strongly acid; gradual wavy boundary.
Bw2—11 to 15 inches; yellowish brown (10YR 5/6) very cobbly loam; weak medium subangular blocky structure; friable; few fine and medium roots; few fine and medium pores; 10 percent by volume gravel and 35 percent cobbles; very strongly acid; gradual irregular boundary.
R—15 to 26 inches; unweathered, highly fractured, low-grade arkosic metasandstone.

Range in Characteristics

Solum thickness: 7 to 20 inches
Depth to bedrock: 7 to 20 inches to hard bedrock
Content of mica flakes: None or few
Content and size of rock fragments: 15 to 60 percent by volume in the A horizon and 35 to 60 percent in the B and C horizons; mostly gravel, channers, cobbles, or flagstones
Soil reaction: Extremely acid to strongly acid throughout the profile

A horizon:
Color—hue of 10YR, value of 3 to 6, and chroma of 1 to 4; where value is 3 or less, the horizon is less than 7 inches thick
Texture (fine-earth fraction)—loam

AB horizon (if it occurs):
Color—hue of 10YR, 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—horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 8 or is mottled in shades of yellow or brown
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

C horizon (if it occurs):
Color—multicolored in shades of yellow or brown
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam saprolite

R layer:
Type of bedrock—unweathered, slightly fractured to highly fractured, low-grade metasedimentary rock

Unison 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 in the Jacks Creek, Green Mountain, and central parts of the county
Landform: Coves, colluvial fans, high stream terraces, and benches
Landform position: Head slopes, footslopes, and toeslopes
Slope range: 2 to 30 percent
Taxonomic class: Clayey, mixed, mesic Typic Hapludults

Typical Pedon

Unison loam, 2 to 8 percent slopes; from Burnsville 4.0 miles east on U.S. Highway 19E to the Micaville exit, 0.9 mile south on North Carolina Highway 80S, 50 feet east in a cropped field; Celo USGS topographic quadrangle; lat. 35 degrees 53 minutes 20 seconds N. and long. 82 degrees 12 minutes 45 seconds W.

Ap1—0 to 6 inches; dark yellowish brown (10YR 4/4) loam, light yellowish brown (10YR 6/4) dry; moderate fine granular structure; friable; many very fine and fine roots; many medium tubular pores; few very fine flakes of mica; 2 percent by volume gravel; strongly acid; clear smooth boundary.

Ap2—6 to 10 inches; dark yellowish brown (10YR 4/4) loam, light yellowish brown (10YR 6/4) dry; weak medium subangular blocky structure parting to moderate medium granular; friable; many very fine roots; common fine and many medium tubular pores; few very fine flakes of mica; 2 percent by volume gravel; strongly acid; abrupt smooth boundary.

Bt1—10 to 18 inches; yellowish brown (10YR 5/6) clay; moderate medium subangular blocky structure; friable; common very fine and fine roots; common fine and medium tubular pores; few discontinuous distinct strong brown (7.5YR 4/6) clay films on faces of peds; few discontinuous distinct brown (10YR 4/3) stains on faces of peds; common very fine flakes of mica; 2 percent by volume gravel; moderately acid; clear wavy boundary.

Bt2—18 to 26 inches; brownish yellow (10YR 6/8) clay; moderate medium subangular blocky structure; friable; common very fine and fine roots; common fine and few coarse tubular pores; few discontinuous faint strong brown (7.5YR 5/8) clay films on faces of peds; few very fine to medium black (10YR 2/1) iron-manganese concretions; few fine flakes of mica; 2 percent by volume gravel; very strongly acid; clear wavy boundary.

Bt3—26 to 36 inches; brownish yellow (10YR 6/8) clay loam; moderate medium subangular blocky structure; friable; common very fine and few fine roots; common fine and medium tubular pores; few discontinuous distinct strong brown (7.5YR 4/6) clay films on faces of peds; many fine and medium flakes of mica; 2 percent by volume gravel; moderately acid; clear wavy boundary.

Bt4—36 to 46 inches; 60 percent yellowish brown (10YR 5/8) and 40 percent yellowish brown (10YR 5/4) sandy clay loam; common fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few very fine roots; common fine and few medium tubular pores; few discontinuous faint strong brown (7.5YR 4/6) clay films on faces of peds; many fine and medium flakes of mica; 2 percent by volume gravel; strongly acid; clear wavy boundary.

BC1—46 to 61 inches; 60 percent yellowish brown (10YR 5/6) and 40 percent strong brown (7.5YR 5/6) sandy clay loam; weak coarse subangular blocky structure; friable; few very fine roots; common fine and few medium tubular pores; few patchy faint strong brown (7.5YR 4/6) clay films on faces of peds; many fine and medium flakes of mica; 7 percent by volume gravel and 5 percent cobbles; strongly acid; clear smooth boundary.

BC2—61 to 88 inches; 35 percent light yellowish brown (2.5Y 6/4), 35 percent brownish yellow (10YR 6/8), and 30 percent strong brown (7.5YR 4/6) clay loam; weak coarse subangular blocky structure; friable; few fine tubular pores; few fine rounded soft masses of black (10YR 2/1) iron-manganese concretions; many fine flakes of mica; 7 percent by volume gravel and 3 percent cobbles; 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 to many
Content and size of rock fragments: Less than 50 percent by volume in the Ap or A horizon, less than 35 percent in the Bt horizon, and less than 75 percent in the BC and C horizons; mostly gravel or cobbles
Soil reaction: Very strongly acid to moderately acid throughout the profile

Ap or A horizon:
Color—hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 3 to 6; some eroded areas have hue of 5YR; where value is 3, the horizon is less than 6 inches thick
Texture (fine-earth fraction)—loam

Bt horizon:
Color—hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 8
Texture (fine-earth fraction)—silty clay loam, clay loam, silty clay, or clay

BC horizon:
Color—hue of 2.5YR to 7.5YR, value of 3 to 8, and chroma of 3 to 6
Texture (fine-earth fraction)—loam, clay loam, silty clay loam, silty clay, or clay

C or 2C horizon (if it occurs):
Color—hue of 2.5YR to 7.5YR, value of 4 to 8, and chroma of 3 to 6
Texture (fine-earth fraction)—loam, silt loam, clay loam, silty clay loam, silty clay, or clay saprolite; some pedons have unconformity of sandy, gravelly, and cobbly substrata

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, high-grade metamorphic rock on the Black Mountain Range and from felsic or mafic, high-grade metamorphic or igneous rock on the Bald Mountains
Landscape: High mountains of the Black Mountain Range and Bald Mountains
Landform: Ridges and mountain slopes
Landform position: Summits and side slopes
Slope range: 8 to 50 percent
Taxonomic class: Fine-loamy, mixed, frigid Typic Haplumbrepts

Typical Pedon

Wayah loam in an area of Wayah-Burton complex, windswept, 15 to 30 percent slopes, bouldery; from Burnsville 0.6 mile east on U.S. Highway 19E, 16.1 miles south on North Carolina Highway 197S, at the Yancey-Buncombe County line 2.5 miles north on an unmarked gravel U.S. Forest Service road, 0.2 mile north on a private gravel road, 10 feet southwest in a grassy bald; Mt. Mitchell USGS topographic quadrangle; lat. 35 degrees 49 minutes 24 seconds N. and long. 82 degrees 22 minutes 00 seconds W.

A1—0 to 4 inches; black (10YR 2/1) loam, very dark gray (10YR 3/1) dry; weak very fine granular structure; very friable; many very fine and common fine medium roots; many very fine and fine tubular pores; common fine flakes of mica; 3 percent by volume gravel; very strongly acid; clear wavy boundary.

A2—4 to 11 inches; very dark brown (10YR 2/2) loam, brown (10YR 5/3) dry; moderate fine granular structure; very friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; 3 percent by volume gravel; strongly acid; abrupt wavy boundary.

BA—11 to 14 inches; dark yellowish brown (10YR 4/4) loam; weak medium subangular blocky structure; friable; common fine and medium roots; common very fine and fine tubular pores; common fine flakes of mica; 5 percent by volume gravel; strongly acid; gradual wavy boundary.

Bw—14 to 33 inches; dark yellowish brown (10YR 4/6) fine sandy loam; weak medium subangular blocky structure; friable; common very fine and few fine roots; common very fine and fine tubular pores; common fine flakes of mica; 5 percent by volume gravel; strongly acid; clear wavy boundary.

BC—33 to 48 inches; yellowish brown (10YR 5/4) sandy loam; weak coarse subangular structure; friable; few very fine roots; few fine tubular pores; common fine flakes of mica; 10 percent by volume gravel; strongly acid; clear wavy boundary.

C1—48 to 60 inches; 40 percent brown (10YR 4/3), 30 percent brown (10YR 5/3), and 30 percent pale brown (10YR 6/3) gravelly sandy loam saprolite; massive; friable; few very fine tubular pores; common fine flakes of mica; 12 percent by volume gravel and 5 percent cobbles; strongly acid; gradual irregular boundary.

C2—60 to 79 inches; 55 percent brown (10YR 5/3), 35 percent light gray (10YR 7/1), and 10 percent strong brown (7.5YR 5/8); gravelly sandy loam saprolite; massive; friable; common fine flakes of mica; 20 percent by volume gravel and 10 percent cobbles; strongly acid.

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 by volume; 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
Texture (fine-earth fraction)—loam
Thickness—10 to 20 inches

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, has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 8, or 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 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

Formation of the Soils

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. 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. For example, the amount of clay in a soil is directly related to the minerals that occur in the parent material. The amount of clay 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 Yancey County: residuum, colluvium, and alluvium (fig. 22).

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. In Yancey County, it is derived from three general rock types—metasedimentary, felsic crystalline, and mafic crystalline *(3)*.

Metasedimentary rocks, such as phyllite, metasandstone, and metagraywacke, weather into the parent material of Ditney, Unicoi, Chestoa, Harmiller, and Shinbone soils. These soils are yellow or brown, have root-limiting layers, and are low in natural fertility. They are in the Flattop Mountain area in the northern part of the county.

Felsic crystalline rocks, such as granite, gneiss, schist, mica-gneiss, mica-schist, pegmatite, and alaskite, weather into the parent material of Wayah, Burton, Craggey, Porters, Huntdale, Edneytown, Pigeonroost, Chestnut, Buladean, Cleveland, Ashe, Chandler, Micaville, Cashiers, and Fannin soils. These soils vary greatly in depth, color, and clay content due to the varying degree of resistance to weathering exhibited by the parent material and the wide variation in mineral composition. They occur throughout the county south and east of the Poplar community.

Mafic crystalline rocks, such as gabbro and amphibolite, yield parent material that is rich in clay-forming minerals. Clifton soils are the dominant soils that formed from this residuum. They are red and very deep and have high natural fertility. Evard, Cowee, and Huntdale soils in this geology also occur at the upper limit of their clay content range. These soils (which formed in mafic parent material) occur throughout the county but are dominantly in the Jacks Creek and Green Mountain communities.

Colluvium

Colluvium occurs throughout Yancey 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 are Saunook, Unison, Toecane, Thunder, Lostcove, Keener, Balsam, and Tanasee. Dillard soils are unique in that they formed in colluvium on toeslopes and old alluvium where it occurs on low terraces.

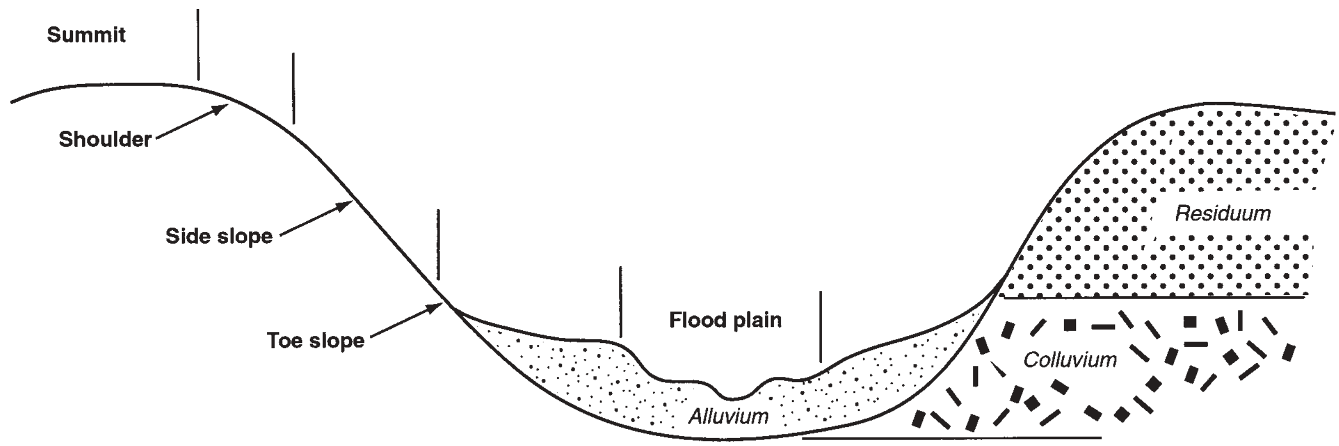

Figure 22.—Relationship of landform position and parent material.

Alluvium

Alluvium is material deposited on flood plains along streams and the South Toe, North Toe, and Cane Rivers. 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 South Toe and North Toe Rivers, 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 Yancey County. It ranges from 46 inches in the Indian Creek area in the western part of the county to more than 70 inches on the Black Mountain Range. Rain water, 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. The effects of climate also control the biological relationships among plants and other soil life. Temperature influences the kind and growth of organisms and the speed of physical and chemical 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 host distinctly different plant and animal communities, indicating that unique environmental factors are at work.

Plant and Animal Life

Plant and animals influence the formation of soil and differentiation of soil horizons. The kind and number of organisms that exist 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 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 Yancey 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 Yancey County is a result of mountain building, slope retreat, and the dissection of the land surfaces 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.

Internal drainage of the soil is affected by its position on the landscape. 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 are often well drained while soils farther back 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. 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 amount of time parent material has been exposed to the soil-forming processes accounts for some of the differences between soils. The horizons in a soil profile also take a long time to develop. This development proceeds at a rate dependent upon climate, relief, parent material, and the activity of plants and animals. Soil formation is a function of geologic time although flooding, erosion, and landslides affect soils in a human time frame.

The soils of Yancey 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 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, Porters, Ditney, 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, Toecane, 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 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 that formed in alluvium are Dellwood, Reddies, Biltmore, and Bandana.

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Glossary

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.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

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

Alpha,alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.

Amphibolite. A metamorphic rock composed mostly of an amphibole mineral (usually hornblende) and plagioclase feldspar.

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.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

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.

Arkosic. Feldspar content in arenites (sandstones) generally exceeding 25 percent.

Aspect. The direction in which a slope faces.

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.

Benchmark soil. A soil of large extent that holds a key position in the soil classification system or is of special significance to farming, engineering, forestry, or other uses.

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.

Bottom land. 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 transport to a processing facility. Most cable logging systems involve use 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 generally are yarded and reeled in while one end is lifted or the entire log is suspended. Because this system minimizes road construction, it is used in logging steep side slopes and for reducing operational costs.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Canopy. The leafy crown of trees or shrubs. (See Crown.)

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

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 has, 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 has 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 year.

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 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. Each 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.

Denitrification. The biochemical reduction of nitrate or nitrite to gaseous nitrogen either as molecular nitrogen or as an oxide of nitrogen.

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.

Dispersion (soils). The breakup of compound particles, such as soil aggregates or saprolite, into single grains, resulting in a highly erosive condition. This phenomenon results from the failure of grains to adhere or bond to one another and generally is associated with a high water content in soil containing high levels of sodium.

Dissimilar inclusions (soil). Soils that affect use or management differently than the named components of a map unit. They comprise less than 25 percent each map unit and vary from delineation to delineation. Nonlimiting dissimilar inclusions have soil properties that should not conflict with use and management. Limiting inclusions have soil properties that could interfere with use and management and special considerations may be necessary to overcome them.

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 wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. 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 near 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. A restrictive feature; the soil holds too little water for plants during dry periods.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

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.—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.—Soils that have lost an average of 25 to 75 percent of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). Throughout most cultivated areas of class 2 erosion, the surface layer consists of a mixture of the original A horizon and material from below. Some areas may have intricate patterns ranging from uneroded spots to spots where all of the original A horizon has been removed.

Class 3.—Soils that have lost an average of 75 percent or more of the original A horizon or of the uppermost 8 inches (if the original A horizon was less than 8 inches thick). In most 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.—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. Synonym: scarp.

Evapotranspiration. The combined loss of water from a given area through surface evaporation and through transpiration by plants during a specified period.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

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.

Faulting. The process of fracturing and displacement that produces a fault.

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, tilth, 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 ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity*.

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 has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, slate, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flat. A general term for a level or nearly level surface or small area of land marked by little or no relief.

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.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

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 by which it may be differentiated from other stands.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

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.

Granite. A coarse-grained igneous rock dominated by light-colored minerals, consisting of about 50 percent orthoclase and 25 percent quartz with the balance being plagioclase feldspars and ferromagnesian silicates. Granites and granodiorites comprise 95 percent of all intrusive rocks.

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 has 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.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

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 material is difficult to compact using regular earth-moving equipment.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

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 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-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

High-value crops. Crops, such as tobacco, vegetables, and ornamentals, that require a high level of management, are labor intensive, and have a potential for high 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 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.

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 potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

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.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

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.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

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 having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

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

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

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

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.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

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, and flood plain.

Landform position. Part of a landform such as a summit, shoulder slope, nose slope, side slope, toeslope, footslope, and 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. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. 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. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

Line-out beds. Elevated planting beds where woody ornamentals and Christmas tree seedlings are grown for 1 or 2 years until they are of 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-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

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 has a low resistance to deforming, sliding, or failure. It is not strong enough to support loads.

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.

Metagraywacke. A metamorphosed, dark gray, firmly indurated, coarse-grained sandstone that consists of poorly sorted, angular to subangular grains of quartz and feldspar with a variety of dark rock and mineral fragments embedded in a complex clayey matrix.

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

Metasedimentary rock. Metamorphosed sedimentary rocks, such as phyllite, metasandstone, and conglomerate.

Micas. A group of silicate minerals characterized by sheet or scale cleavage. Biotite is the ferromagnesian black mica. Muscovite is the potassic white mica.

Microrelief. 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.

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

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

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

Mottling, soil. Irregular spots of different colors that vary in number and size. 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.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

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 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.

Perched water table. A saturated zone of water in the soil standing above an unsaturated zone. It is usually caused by abrupt textural changes between soil horizons or the occurrence of compacted layers. These conditions cause percolating water to become restricted or perched within the soil.

Percolation. The 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.

Perennial water. An area that generally provides water for human or livestock consumption; commonly a lake, pond, river, or stream. Areas identified on the detailed soil maps by a special symbol typically are less than 2 acres in size.

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

Pesticide. Chemical formulations used to control insects and other animals, disease, and plant growth. Common pesticides include insecticides, animal repellents and baits, fungicides, defoliants, 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*. Originally introduced from Asia, the disease is spread by the movement of contaminated soil, 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. Growth of the disease is favored by soil and landform conditions that allow for the restricted movement of air and water in the soil. Conditions include high clay contents, saturation by high water tables, 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.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

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.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

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.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

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. An indication of 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. These zones are indications of 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.

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.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

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 the 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.

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.

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 position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

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.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

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.

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, and/or boulders).

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. Generally, felled trees are skidded or pulled with one end lifted to reduce friction and soil disturbance.

Skid trails. A system of bulldozer or tractor trails quickly built to allow for the skidding or pulling of felled trees by a tractor, bulldozer, or skidder to a landing for loading and transport to a processing facility.

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.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 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 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.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

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.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to soil blowing and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

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. Technically, the E horizon. Generally refers to a leached horizon lighter in content of organic matter than the overlying surface layer.

Suitability ratings. Ratings for the degree of suitability of soils for pasture, crops, woodland, and engineering uses. The ratings and the general criteria used for their selection are as follows:

Well suited.—The intended use may be initiated and maintained by using only the standard materials and methods typically required for that use. Good soil performance and low maintenance can be expected. Vegetation or other attributes can easily be maintained, improved, or established.

Suited.—The limitations affecting the intended use make special planning, design, or maintenance necessary. 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 intended use is difficult or costly to initiate and maintain because of certain soil properties, such as steep slopes, a severe hazard of erosion, a high water table, low fertility, and a hazard of flooding. Overcoming the unfavorable property requires special design, extra maintenance, or costly alteration. Vegetation or other attributes are difficult to establish or maintain.

Unsuited.—The intended use is very difficult or costly to initiate and maintain, and thus it 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 “Ap horizon.”

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 stream, 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.”

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 position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Ultramafic. A plutonic rock composed chiefly of mafic minerals, frequently monomineralic rocks.

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 divert it off and away from the road surface. Water bars can easily be driven over if 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.)

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

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.

Yarding paths. The paths left by cable-yarded logs as they were pulled uphill or downhill to a nearby area.

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

Table 1.—Temperature and Precipitation

(Recorded in the period 1961-90 at Celo, North Carolina)

Month	Temperature: Average daily maximum	Temperature: Average daily minimum	Temperature: Average	Temperature: 2 years in 10 will have-- Maximum temperature higher than--	Temperature: 2 years in 10 will have-- Minimum temperature lower than--	Temperature: Average number of growing degree days*	Precipitation: Average	Precipitation: 2 years in 10 will have-- Less than--	Precipitation: 2 years in 10 will have-- More than--	Precipitation: Average number of days with 0.10 inch or more	Precipitation: Average snowfall
	^oF	^oF	^oF	^oF	^oF	Units	In	In	In		In
January---	45.1	19.2	32.1	68	-9	4	4.45	2.69	6.03	7	6.8
February--	47.9	21.6	34.7	72	-2	9	4.83	2.29	7.02	7	5.9
March-----	56.3	29.6	43.0	79	8	34	6.09	3.63	8.29	9	2.7
April-----	64.9	37.1	51.0	84	17	118	4.52	2.70	6.15	7	0.8
May-------	72.0	45.0	58.5	85	26	272	5.40	3.59	7.06	8	0.0
June------	77.4	52.3	64.9	88	34	447	4.31	2.50	5.92	8	0.0
July------	80.1	56.8	68.4	89	41	571	4.74	3.12	6.22	8	0.0
August----	79.2	56.1	67.7	89	41	548	5.16	2.74	7.28	8	0.0
September-	73.6	49.7	61.6	85	30	353	4.93	2.12	7.33	6	0.0
October---	65.5	37.2	51.4	80	17	119	5.08	1.98	7.67	5	0.0
November--	57.1	29.8	43.5	75	8	34	5.04	2.74	7.06	6	0.7
December--	48.6	22.7	35.6	70	-2	12	4.24	2.14	6.06	7	2.5
Yearly:											
Average-	64.0	38.1	51.0	---	---	---	---	---	---	---	---
Extreme-	97	-16	---	90	-9	---	---	---	---	---	---
Total---	---	---	---	---	---	2,520	58.78	49.60	67.26	86	19.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minumum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

Table 2.—Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Celo, 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. 26	May 16	June 6
2 years in 10 later than--	Apr. 22	May 11	May 30
5 years in 10 later than--	Apr. 13	May 2	May 17
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 7	Sept. 27	Sept. 19
2 years in 10 earlier than--	Oct. 11	Oct. 1	Sept. 23
5 years in 10 earlier than--	Oct. 20	Oct. 8	Sept. 30

Table 3.—Growing Season

(Recorded in the period 1961-90 at Celo, North Carolina)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	173	143	117
8 years in 10	178	148	124
5 years in 10	189	159	137
2 years in 10	201	169	150
1 year in 10	206	175	156

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	10,587	5.3
BbF	Balsam cobbly loam, 50 to 95 percent slopes, rubbly	1,097	0.5
BcD	Balsam-Tanasee complex, 15 to 30 percent slopes, extremely bouldery	466	0.2
BcE	Balsam-Tanasee complex, 30 to 50 percent slopes, extremely bouldery	2,960	1.5
BdA	Bandana sandy loam, 0 to 3 percent slopes, occasionally flooded	1,540	0.8
BmA	Biltmore sand, 0 to 3 percent slopes, frequently flooded	236	0.1
BtD	Buladean-Chestnut complex, 15 to 30 percent slopes, stony	1,386	0.7
BtE	Buladean-Chestnut complex, 30 to 50 percent slopes, stony	6,665	3.3
BtF	Buladean-Chestnut complex, 50 to 95 percent slopes, stony	14,720	7.3
BwD	Burton-Craggey complex, windswept, 15 to 30 percent slopes, rocky	882	0.4
BxE	Burton-Craggey-Rock outcrop complex, windswept, 30 to 50 percent slopes,		
	very bouldery	3,008	1.5
BxF	Burton-Craggey-Rock outcrop complex, windswept, 50 to 95 percent slopes,		1.9
	very bouldery	3,778	1.9
CaB	Cashiers fine sandy loam, 2 to 8 percent slopes	54	*
CaC	Cashiers fine sandy loam, 8 to 15 percent slopes	79	*
CcD	Cashiers fine sandy loam, 15 to 30 percent slopes, stony	232	0.1
CcE	Cashiers fine sandy loam, 30 to 50 percent slopes, stony	2,253	1.1
CcF	Cashiers fine sandy loam, 50 to 95 percent slopes, stony	2,076	1.0
CdC	Chandler-Micaville complex, 8 to 15 percent slopes	238	0.1
CeD	Chandler-Micaville complex, 15 to 30 percent slopes, stony	2,585	1.3
CeE	Chandler-Micaville complex, 30 to 50 percent slopes, stony	8,103	4.0
CeF	Chandler-Micaville complex, 50 to 95 percent slopes, stony	3,656	1.8
CkF	Chestoa-Ditney-Rock outcrop complex, 30 to 95 percent slopes, very		0.7
	bouldery	1,468	0.7
CnC2	Clifton clay loam, 8 to 15 percent slopes, eroded	770	0.4
CnD2	Clifton clay loam, 15 to 30 percent slopes, eroded	4,754	2.4
CnE2	Clifton clay loam, 30 to 50 percent slopes, eroded	5,465	2.7
CrE	Craggey-Rock outcrop-Clingman complex, windswept, 30 to 50 percent		
	slopes, rubbly	290	0.1
CrF	Craggey-Rock outcrop-Clingman complex, windswept, 50 to 95 percent		
	slopes, rubbly	1,407	0.7
DeA	Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded	2,984	1.5
DrB	Dillard loam, 2 to 8 percent slopes, rarely flooded	885	0.4
DuD	Ditney-Unicoi complex, 15 to 30 percent slopes, very stony	126	*
DuE	Ditney-Unicoi complex, 30 to 50 percent slopes, very stony	576	0.3
DwF	Ditney-Unicoi complex, 50 to 95 percent slopes, very rocky	1,596	0.8
EaC2	Evard-Cowee complex, 8 to 15 percent slopes, eroded	707	0.4
EcD	Evard-Cowee complex, 15 to 30 percent slopes, stony	4,747	2.4
EcE	Evard-Cowee complex, 30 to 50 percent slopes, stony	9,623	4.8
FeC2	Fannin sandy clay loam, 8 to 15 percent slopes, eroded	980	0.5
FeD2	Fannin sandy clay loam, 15 to 30 percent slopes, eroded	4,835	2.4
FeE2	Fannin sandy clay loam, 30 to 50 percent slopes, eroded	5,915	2.9
HaD	Harmiller-Shinbone complex, 15 to 30 percent slopes, stony	661	0.3
HaE	Harmiller-Shinbone complex, 30 to 50 percent slopes, stony	710	0.4
HuC	Huntdale clay loam, 8 to 15 percent slopes, stony	64	*
HuD	Huntdale clay loam, 15 to 30 percent slopes, stony	606	0.3
HuE	Huntdale clay loam, 30 to 50 percent slopes, stony	7,155	3.6
KcD	Keener-Lostcove complex, 15 to 30 percent slopes, very bouldery	783	0.4
KcE	Keener-Lostcove complex, 30 to 50 percent slopes, very bouldery	902	0.4
NkA	Nikwasi sandy loam, 0 to 3 percent slopes, occasionally flooded	310	0.2
PeD	Pigeonroost-Edneytown complex, 15 to 30 percent slopes, stony	1,196	0.6
PeE	Pigeonroost-Edneytown complex, 30 to 50 percent slopes, stony	3,153	1.6
PuC	Porters-Unaka complex, 8 to 15 percent slopes, stony	195	*
PuD	Porters-Unaka complex, 15 to 30 percent slopes, stony	884	0.4
PuE	Porters-Unaka complex, 30 to 50 percent slopes, stony	3,958	2.0
PwF	Porters-Unaka complex, 50 to 95 percent slopes, rocky	17,549	8.7
RoA	Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded	605	0.3
SaB	Saunook sandy loam, 2 to 8 percent slopes	613	0.3

See footnote at end of table.

Table 4.—Acreage and Proportionate Extent of the Soils—Continued

Map symbol	Soil name	Acres	Percent
ScC	Saunook sandy loam, 8 to 15 percent slopes, stony	3,222	1.6
SdD	Saunook-Thunder complex, 15 to 30 percent slopes, stony	3,726	1.9
TsB	Thunder-Saunook complex, 2 to 8 percent slopes, very bouldery	278	0.1
TsC	Thunder-Saunook complex, 8 to 15 percent slopes, very bouldery	1,158	0.6
TsD	Thunder-Saunook complex, 15 to 30 percent slopes, very bouldery	6,277	3.1
TsE	Thunder-Saunook complex, 30 to 50 percent slopes, very bouldery	4,630	2.3
TuC	Toecane-Tusquitee complex, 8 to 15 percent slopes, bouldery	1,331	0.7
TwD	Toecane-Tusquitee complex, 15 to 30 percent slopes, very bouldery	5,977	3.0
TwE	Toecane-Tusquitee complex, 30 to 50 percent slopes, very bouldery	8,301	4.1
Uc	Udifluvents, sandy-skeletal, frequently flooded	359	0.2
Ud	Udorthents, loamy, stony	1,747	0.9
UrF	Unaka-Rock outcrop complex, 50 to 95 percent slopes, very bouldery	3,566	1.8
UsB	Unison loam, 2 to 8 percent slopes	778	0.4
UsC	Unison loam, 8 to 15 percent slopes	1,134	0.6
UsD	Unison loam, 15 to 30 percent slopes	626	0.3
W	Water	1,272	0.6
WbD	Wayah-Burton complex, 15 to 30 percent slopes, bouldery	72	*
WbE	Wayah-Burton complex, 30 to 50 percent slopes, bouldery	395	0.2
WcF	Wayah-Burton complex, 50 to 95 percent slopes, very rocky	1,200	0.6
WhC	Wayah-Burton complex, windswept, 8 to 15 percent slopes, bouldery	115	*
WhD	Wayah-Burton complex, windswept, 15 to 30 percent slopes, bouldery	590	0.3
WhE	Wayah-Burton complex, windswept, 30 to 50 percent slopes, bouldery	877	0.4
	Total	200,704	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)

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
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.					
BbF: 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
BcD, BcE:					
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
Tanasee	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: Bandana	Unsuited: flooding wetness climate-frost	Unsuited: flooding wetness low elevation	Poorly suited: flooding wetness too sandy	Suited: flooding wetness	Suited: flooding wetness
BmA: Biltmore	Unsuited: flooding droughty climate-frost	Unsuited: flooding droughty low elevation	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	Poorly 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

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
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
BwD:					
Burton	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate
Craggey	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate
BxE, BxF:					
Burton	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate
Craggey	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate	Unsuited: depth to rock large stones climate
Rock outcrop.					
CaB Cashiers	Well suited	Well suited	Suited: low clay	Well suited	Well suited
CaC Cashiers	Well suited	Suited: slope	Suited: low clay	Suited: slope	Suited: slope
CcD Cashiers	Suited: slope	Suited: slope	Suited: slope low clay	Suited: slope	Suited: slope
CcE Cashiers	Poorly suited: slope	Suited: slope	Poorly suited: slope low clay	Poorly suited: slope	Unsuited: slope
CcF Cashiers	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope
CdC:					
Chandler	Suited: droughty slope	Poorly suited: droughty warm aspect slope	Poorly suited: low clay	Suited: droughty slope	Suited: droughty slope
Micaville	Suited: droughty slope	Poorly suited: droughty warm aspect slope	Poorly suited: low clay	Suited: droughty slope	Poorly suited: droughty slope

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
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
CkF:					
Chestoa	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
Ditney	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.					
CnC2: Clifton	Well suited	Poorly suited: high clay warm aspect phytophthora	Poorly suited: high clay	Unsuited: high 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 high 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 high clay phytophthora	Unsuited: slope high clay eroded

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
CrE, CrF:					
Craggey	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
Rock outcrop.					
Clingman	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
DeA:					
Dellwood	Unsuited: flooding droughty climate-frost	Poorly suited: flooding droughty low elevation	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 low elevation	Poorly suited: flooding too sandy	Suited: flooding droughty	Suited: flooding droughty
DrB Dillard	Poorly suited: climate-frost flooding	Poorly suited: high clay phytophthora flooding	Suited: flooding	Poorly suited: surface clay phytophthora flooding	Suited: flooding
DuD, DuE:					
Ditney	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
Unicoi	Unsuited: slope depth to rock small stones	Unsuited: slope depth to rock warm aspect small stones	Unsuited: slope small stones low clay depth to rock	Unsuited: slope depth to rock small stones	Unsuited: slope depth to rock small stones
DwF:					
Ditney	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
Unicoi	Unsuited: slope depth to rock small stones	Unsuited: slope depth to rock warm aspect small stones	Unsuited: slope small stones low clay depth to rock	Unsuited: slope depth to rock small stones	Unsuited: slope depth to rock small stones
EaC2:					
Evard	Well suited	Suited: warm aspect phytophthora	Well suited	Poorly suited: surface clay phytophthora slope	Suited: eroded slope

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
EaC2:					
Cowee	Poorly suited: depth to rock eroded	Poorly suited: depth to rock warm aspect	Poorly suited: depth to rock	Poorly suited: surface clay depth to rock	Poorly suited: depth to rock eroded slope
EcD:					
Evard	Suited: slope	Suited: slope warm aspect	Suited: slope	Poorly suited: slope surface clay	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
EcE:					
Evard	Poorly suited: slope	Poorly suited: slope warm aspect	Poorly suited: slope	Poorly suited: slope surface clay	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
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
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

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
HuC: Huntdale	Well suited	Well suited: phytophthora	Well suited	Poorly suited: surface clay phytophthora slope	Suited: slope
HuD: 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
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	Unsuited: slope large stones
KcE:					
Keener	Poorly suited: slope	Poorly suited: slope large stones phytophthora	Poorly suited: slope	Poorly suited: slope surface clay phytophthora	Unsuited: slope large stones
Lostcove	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones
NkA: Nikwasi	Unsuited: flooding wetness climate-frost	Unsuited: flooding wetness low elevation	Unsuited: flooding wetness	Unsuited: flooding wetness	Unsuited: flooding wetness
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

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
PuC:					
Porters	Well suited	Well suited	Well suited	Suited: slope	Suited: slope
Unaka	Unsuited: depth to rock slope	Unsuited: depth to rock slope	Unsuited: depth to rock slope	Unsuited: slope depth to rock	Unsuited: slope depth to rock
PuD:					
Porters	Suited: slope	Suited: slope	Suited: slope	Suited: slope	Poorly suited: slope
Unaka	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
PuE:					
Porters	Poorly suited: slope	Suited: slope	Poorly suited: slope	Poorly suited: slope	Unsuited: slope
Unaka	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
PwF:					
Porters	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope	Unsuited: slope
Unaka	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
RoA: Rosman	Unsuited: flooding climate-frost	Poorly suited: flooding low elevation	Poorly suited: flooding too sandy	Well suited: flooding	Well suited: flooding
SaB: Saunook	Suited: climate-frost	Suited: phytophthora	Well suited	Poorly suited: surface clay phytophthora	Well suited
ScC: Saunook	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
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

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
TsB, TsC:					
Saunook	Suited: large stones climate-frost	Suited: phytophthora large stones	Suited: large stones	Poorly suited: surface clay phytophthora large stones	Suited: large stones slope
TsD, TsE:					
Thunder	Unsuited: slope large stones climate-frost	Unsuited: slope large stones	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 phytophthora	Poorly suited: slope large stones
TuC:					
Toecane	Unsuited: slope large stones climate-frost	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones
Tusquitee	Unsuited: slope large stones climate-frost	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones
TwD, TwE:					
Toecane	Unsuited: slope large stones climate-frost	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones
Tusquitee	Unsuited: slope large stones climate-frost	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones	Unsuited: slope large stones
Uc. Udifluvents					
Ud. Udorthents					
UrF:					
Unaka	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.					
UsB Unison	Suited: climate-frost	Poorly suited: high clay phytophthora	Poorly suited: high clay	Unsuited: surface clay phytophthora	Well suited: surface clay
UsC Unison	Suited: climate-frost	Poorly suited: high clay phytophthora	Poorly suited: high clay	Unsuited: surface clay phytophthora slope	Suited: surface clay slope

See footnotes at end of table.

Table 5.—Orchards and Ornamental Crops—Continued

Map symbol and soil name	Apples	Fraser fir[1]	Ball and burlap harvesting	Line-out beds[2]	Vegetables[3]
UsD-------------------- Unison	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
W. Water					
WbD, WbE, WcF:					
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
WhC, WhD, WhE:					
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

[1] In general, elevations below 3,000 or above 4,600 feet are considered marginal to unsuited for commercial Fraser fir production due to climatic limitations.

[2] In general, elevations above 4,600 feet are considered marginal to unsuited for line-out beds, except for Fraser fir, due to climatic limitations.

[3] Vegetables commonly include tomatoes, squash, bell peppers, sweet corn, cucumbers, pole/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 capability	Corn silage	Tobacco	Alfalfa hay	Grass hay	Pasture
		Tons	Lbs	Tons	Tons	AUM*
AcF:						
Ashe	7e	---	---	---	---	---
Cleveland	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
BbF:						
Balsam	7s	---	---	---	---	---
BcD:						
Balsam	7s	---	---	---	---	3.5
Tanasee	6e	---	---	---	---	6.5
BcE:						
Balsam	7s	---	---	---	---	3.5
Tanasee	7e	---	---	---	---	6.0
BdA:						
Bandana	3w	25	2,600	---	5.5	7.5
BmA:						
Biltmore	4w	---	---	---	2.0	4.0
BtD:						
Buladean	6e	---	---	---	4.0	6.5
Chestnut	6e	---	---	---	3.5	6.0
BtE:						
Buladean	7e	---	---	---	---	5.0
Chestnut	7e	---	---	---	---	5.0
BtF:						
Buladean	7e	---	---	---	---	---
Chestnut	7e	---	---	---	---	---
BwD:						
Burton	6e	---	---	---	---	---
Craggey	7s	---	---	---	---	---
BxE, BxF:						
Burton	7e	---	---	---	---	---
Craggey	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
CaB:						
Cashiers	2e	---	---	---	4.0	6.0

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 capability	Corn silage	Tobacco	Alfalfa hay	Grass hay	Pasture
		Tons	Lbs	Tons	Tons	AUM*
CaC:						
Cashiers	4e	---	---	---	4.0	6.0
CcD:						
Cashiers	6e	---	---	---	3.5	6.0
CcE:						
Cashiers	7e	---	---	---	---	5.0
CcF:						
Cashiers	7e	---	---	---	---	---
CdC:						
Chandler	4e	---	---	---	2.5	4.5
Micaville	4e	---	---	---	2.5	4.0
CeD:						
Chandler	6e	---	---	---	2.0	4.5
Micaville	6e	---	---	---	2.0	4.0
CeE:						
Chandler	7e	---	---	---	---	3.5
Micaville	7e	---	---	---	---	3.0
CeF:						
Chandler	7e	---	---	---	---	---
Micaville	7e	---	---	---	---	---
CkF:						
Chestoa	7e	---	---	---	---	---
Ditney	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
CnC2:						
Clifton	4e	19	3,000	4.5	4.5	7.0
CnD2:						
Clifton	6e	---	2,800	4.0	4.0	6.5
CnE2:						
Clifton	7e	---	---	---	---	5.0
CrE, CrF:						
Craggey	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
Clingman	7e	---	---	---	---	---
DeA:						
Dellwood	3s	---	2,000	---	3.5	7.0
Reddies	2w	---	2,600	---	4.0	8.0
DrB:						
Dillard	2w	25	3,000	4.5	7.5	10.0

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 capability	Corn silage	Tobacco	Alfalfa hay	Grass hay	Pasture
		Tons	Lbs	Tons	Tons	AUM*
DuD:						
Ditney------------------	6e	---	---	---	---	3.5
Unicoi------------------	7s	---	---	---	---	---
DuE, DwF:						
Ditney------------------	7e	---	---	---	---	---
Unicoi------------------	7s	---	---	---	---	---
EaC2:						
Evard-------------------	6e	17	2,600	4.0	4.5	6.5
Cowee-------------------	6e	16	2,000	3.0	3.5	6.0
EcD:						
Evard-------------------	6e	---	2,600	4.0	4.5	6.5
Cowee-------------------	6e	---	2,000	3.5	4.0	6.0
EcE:						
Evard-------------------	7e	---	---	---	---	6.0
Cowee-------------------	7e	---	---	---	---	5.5
FeC2:						
Fannin------------------	6e	15	2,000	3.5	4.5	6.5
FeD2:						
Fannin------------------	7e	---	---	3.0	4.0	4.5
FeE2:						
Fannin------------------	7e	---	---	---	---	4.0
HaD:						
Harmiller---------------	6e	---	---	---	3.5	6.0
Shinbone----------------	6e	---	---	---	4.0	6.0
HaE:						
Harmiller---------------	7e	---	---	---	---	6.0
Shinbone----------------	7e	---	---	---	---	6.0
HuC:						
Huntdale----------------	4e	---	---	---	5.0	8.5
HuD:						
Huntdale----------------	6e	---	---	---	5.0	8.0
HuE:						
Huntdale----------------	7e	---	---	---	---	7.5
KcD:						
Keener------------------	6e	---	---	---	4.0	6.5
Lostcove----------------	7s	---	---	---	---	6.0

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 capability	Corn silage	Tobacco	Alfalfa hay	Grass hay	Pasture
		Tons	Lbs	Tons	Tons	AUM*
KcE:						
Keener	7e	---	---	---	3.0	6.0
Lostcove	7e	---	---	---	---	5.5
NkA:						
Nikwasi	6w	---	---	---	---	6.0
PeD:						
Pigeonroost	6e	---	---	3.5	4.0	6.0
Edneytown	6e	---	---	4.0	4.5	6.5
PeE:						
Pigeonroost	7e	---	---	---	---	5.5
Edneytown	7e	---	---	---	---	6.0
PuC:						
Porters	4e	---	2,800	---	5.0	8.0
Unaka	4e	---	---	---	4.0	6.0
PuD:						
Porters	6e	---	---	---	5.0	7.5
Unaka	6e	---	---	---	4.0	5.5
PuE:						
Porters	7e	---	---	---	---	7.0
Unaka	7e	---	---	---	---	5.5
PwF:						
Porters	7e	---	---	---	---	---
Unaka	7e	---	---	---	---	---
RoA:						
Rosman	2w	25	3,000	---	6.5	9.0
SaB:						
Saunook	2e	25	3,200	5.5	6.5	9.5
ScC:						
Saunook	4e	20	3,000	5.5	6.5	9.0
SdD:						
Saunook	6e	---	2,800	---	6.0	9.0
Thunder	6s	---	2,600	---	5.5	8.5
TsB:						
Thunder	6s	---	2,600	---	5.5	8.5
Saunook	2e	25	3,200	---	6.0	9.0
TsC:						
Thunder	6s	---	2,600	---	5.5	8.0
Saunook	4e	15	3,000	---	6.0	9.0

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 capability	Corn silage	Tobacco	Alfalfa hay	Grass hay	Pasture
		Tons	Lbs	Tons	Tons	AUM*
TsD:						
Thunder	6s	---	2,600	---	5.0	8.0
Saunook	6e	---	2,800	---	5.5	9.0
TsE:						
Thunder	7s	---	---	---	---	7.5
Saunook	7e	---	---	---	---	8.0
TuC:						
Toecane	7s	---	---	---	3.5	5.5
Tusquitee	4e	---	2,800	---	4.5	7.5
TwD:						
Toecane	7s	---	---	---	3.5	5.5
Tusquitee	6e	---	---	---	4.0	6.5
TwE:						
Toecane	7e	---	---	---	---	4.5
Tusquitee	7e	---	---	---	---	5.5
Uc:						
Udifluvents	7w	---	---	---	---	---
Ud:						
Udorthents	7e	---	---	---	---	---
UrF:						
Unaka	7e	---	---	---	---	---
Rock outcrop	8s	---	---	---	---	---
UsB:						
Unison	2e	25	3,200	6.0	6.0	9.0
UsC:						
Unison	3e	23	3,000	5.5	5.5	9.0
UsD:						
Unison	4e	20	2,600	5.0	5.0	8.5
W.						
Water						
WbD:						
Wayah	6e	---	---	---	---	5.0
Burton	6e	---	---	---	---	5.0
WbE:						
Wayah	7e	---	---	---	---	4.0
Burton	7e	---	---	---	---	4.0

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 capability	Corn silage	Tobacco	Alfalfa hay	Grass hay	Pasture
		Tons	Lbs	Tons	Tons	AUM*
WcF:						
Wayah	7e	---	---	---	---	---
Burton	7e	---	---	---	---	---
WhC:						
Wayah	4e	---	---	---	---	6.0
Burton	4e	---	---	---	---	5.0
WhD:						
Wayah	6e	---	---	---	---	5.0
Burton	6e	---	---	---	---	5.0
WhE:						
Wayah	7e	---	---	---	---	4.0
Burton	7e	---	---	---	---	4.0

* Animal unit month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

Table 7.—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)
CaB	Cashiers fine sandy loam, 2 to 8 percent slopes
DrB	Dillard clay loam, 2 to 8 percent slopes, rarely flooded
RoA	Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded
SaB	Saunook sandy loam, 2 to 8 percent slopes
UsB	Unison loam, 2 to 8 percent slopes

Table 8.—Farmland of Statewide Importance

Map symbol	Soil name
CaC	Cashiers fine sandy loam, 8 to 15 percent slopes
CdC	Chandler-Micaville complex, 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
EaC2	Evard-Cowee complex, 8 to 15 percent slopes, eroded
FeC2	Fannin sandy clay loam, 8 to 15 percent slopes, eroded
UsC	Unison loam, 8 to 15 percent slopes

Table 9.—Hydric Soils List

A. Map units that are all hydric soils or have hydric soils as a major component

Map unit symbol	Map unit name
NkA	Nikwasi sandy loam, 0 to 3 percent slopes, occasionally flooded

B. 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	Wet spots	Depressions, old channels, and backwater areas away from the channel
BmA	Biltmore sand, 0 to 3 percent slopes, frequently flooded	Wet spots	Depressions, old channels, and backwater areas away from the channel
DeA	Dellwood-Reddies complex, 0 to 3 percent slopes, occasionally flooded	Poorly drained soils	Depressions, old channels, and backwater areas away from the channel
DrB	Dillard loam, 2 to 8 percent slope, rarely flooded	Poorly drained soils	Areas along drains, depressions, and seep areas on toeslopes
RoA	Rosman fine sandy loam, 0 to 3 percent slopes, occasionally flooded	Poorly drained soils	Depressions, old channels, and backwater areas away from the channel
SaB	Saunook sandy loam, 2 to 8 percent slopes	Poorly drained soils	Areas along drains, depressions, and seep areas on toeslopes
TsB	Thunder-Saunook complex, 2 to 8 percent slopes, very bouldery	Poorly drained soils and wet spots	Areas along drains, depressions, and seep areas on toeslopes
Uc	Udifluvents, sandy-skeletal, frequently flooded	Wet spots	Areas around old gravel pits filled with water and other low-lying areas
Ud	Udorthents, loam, stony	Poorly drained soils	Drainageways, seep areas, and areas around old mines filled with water
UsB	Unison loam, 2 to 8 percent slopes	Poorly drained soils	Areas along drains, depressions, and seep areas on toeslopes

Table 10.—Forestland Management and Productivity

(Refer to the "Woodland Management and Productivity" section of this soil survey for information on soil properties and management concerns)

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
AcF:										
Ashe	4R	Severe	Severe	Moderate	Moderate	Moderate	Chestnut oak	---	---	See footnote 5.
							Eastern white pine	---	---	
							Pitch pine	---	---	
							Virginia pine	---	---	
							Scarlet oak	---	---	
Cleveland	2R	Severe	Severe	Moderate	Severe	Slight	Chestnut oak	---	---	See footnote 5.
							Eastern white pine	---	---	
							Hickory	---	---	
							Virginia pine	---	---	
							Pitch pine	---	---	
							Scarlet oak	---	---	
Rock outcrop.										
BbF:										
Balsam	10R	Severe	Severe	Slight	Slight	Moderate	Red spruce	64	150	See footnote 5.
							Fraser fir	---	---	
							Northern red oak	---	---	
							Yellow birch	---	---	
							Sugar maple	---	---	
BcD:										
Balsam	10R	Moderate	Moderate	Slight	Slight	Moderate	Red spruce	64	150	See footnote 5.
							Fraser fir	---	---	
							Northern red oak	---	---	
							Yellow birch	---	---	
							Sugar maple	---	---	
Tanasee	10R	Moderate	Moderate	Slight	Slight	Moderate	Red spruce	64	150	See footnote 5.
							Fraser fir	---	---	
							Northern red oak	---	---	
							Black cherry	---	---	
							Black oak	---	---	
							American beech	---	---	
							Yellow birch	---	---	
							Sugar maple	---	---	
							Eastern hemlock	---	---	
							Yellow buckeye	---	---	
							White ash	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns					Potential productivity			Trees to manage[4]
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index[2]	Volume[3]	
									cu ft/ac	
BcE:										
Balsam-----------	10R	Severe	Severe	Slight	Slight	Moderate	Red spruce----------	64	150	See footnote 5.
							Fraser fir----------	---	---	
							Northern red oak----	---	---	
							Yellow birch--------	---	---	
							Sugar maple---------	---	---	
Tanasee----------	10R	Severe	Severe	Slight	Slight	Moderate	Red spruce----------	64	150	See footnote 5.
							Fraser fir----------	---	---	
							Northern red oak----	---	---	
							Black cherry--------	---	---	
							Black oak-----------	---	---	
							American beech------	---	---	
							Yellow birch--------	---	---	
							Sugar maple---------	---	---	
							Eastern hemlock-----	---	---	
							Yellow buckeye------	---	---	
							White ash-----------	---	---	
BdA:										
Bandana----------	8W	Slight	Moderate	Slight	Slight	Moderate	Yellow-poplar[6]------	103	112	Yellow-poplar.
							American sycamore---	---	---	
							Red maple-----------	---	---	
							River birch---------	---	---	
							Eastern hemlock-----	---	---	
BmA:										
Biltmore---------	8S	Slight	Moderate	Severe	Slight	Moderate	Yellow-poplar[6]------	106	117	Yellow-poplar, American sycamore, black walnut.
							White oak-----------	---	---	
							American sycamore---	---	---	
							Hackberry-----------	---	---	
BtD:										
Buladean---------	13R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern white pine--	97	180	Eastern white pine, yellow-poplar, chestnut oak, white oak.
							Chestnut oak--------	---	---	
							White oak-----------	---	---	
							Scarlet oak---------	---	---	
							Black oak-----------	---	---	
							Yellow-poplar-------	---	---	
							Red maple-----------	---	---	
							Hickory-------------	---	---	
							Black locust--------	---	---	
							Sourwood------------	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
BtD:										
Chestnut	10R	Moderate	Moderate	Moderate	Moderate	Moderate	Eastern white pine	78	139	Eastern white pine, yellow-poplar.
							Yellow-poplar	---	---	
							Scarlet oak	---	---	
							White oak	70	52	
							Black oak	71	53	
							Chestnut oak	69	51	
BtE, BtF:										
Buladean	13R	Severe	Severe	Moderate	Slight	Moderate	Eastern white pine	97	180	Eastern white pine, yellow-poplar, chestnut oak, white oak, scarlet oak.
							Chestnut oak	---	---	
							White oak	---	---	
							Scarlet oak	---	---	
							Black oak	---	---	
							Yellow-poplar	---	---	
							Red maple	---	---	
							Hickory	---	---	
							Black locust	---	---	
							Sourwood	---	---	
Chestnut	10R	Severe	Severe	Moderate	Moderate	Moderate	Eastern white pine	78	139	Eastern white pine, yellow-poplar.
							Yellow-poplar	---	---	
							Scarlet oak	---	---	
							White oak	70	52	
							Black oak	71	53	
							Chestnut oak	69	51	
BwD:										
Burton	2R	Moderate	Moderate	Severe	Moderate	Slight	Northern red oak	---	---	See footnote 5.
							Red spruce	---	---	
							Fraser fir	---	---	
Craggey	2D	Moderate	Moderate	Severe	Severe	Slight	Northern red oak	---	---	See footnote 5.
							Red spruce	---	---	
							Fraser fir	---	---	
BxE, BxF:										
Burton	2R	Severe	Severe	Severe	Moderate	Slight	Northern red oak	---	---	See footnote 5.
							Red spruce	---	---	
							Fraser fir	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns					Potential productivity			Trees to manage[4]
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Common trees	Site index[2]	Volume[3]	
									cu ft/ac	
BxE, BxF:										
Craggey----------	2R	Severe	Severe	Severe	Severe	Slight	Northern red oak----	---	---	See footnote 5.
							Red spruce----------	---	---	
							Fraser fir----------	---	---	
Rock outcrop.										
CaB, CaC:										
Cashiers---------	7A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar-------	93	95	Yellow-poplar, eastern white pine, northern red oak.
							Eastern white pine--	91	168	
							Northern red oak----	84	66	
							Eastern hemlock-----	---	---	
							Yellow buckeye------	---	---	
							American beech------	---	---	
							White ash-----------	---	---	
CcD:										
Cashiers---------	7R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar-------	93	97	Yellow-poplar, eastern white pine, northern red oak.
							Eastern white pine--	91	168	
							Northern red oak----	84	66	
							Eastern hemlock-----	---	---	
							Yellow buckeye------	---	---	
							American beech------	---	---	
							White ash-----------	---	---	
CcE, CcF:										
Cashiers---------	7R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar-------	93	97	Yellow-poplar, eastern white pine, northern red oak.
							Eastern white pine--	91	168	
							Northern red oak----	84	66	
							Eastern hemlock-----	---	---	
							Yellow buckeye------	---	---	
							American beech------	---	---	
							White ash-----------	---	---	
CdC:										
Chandler---------	11A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine--	88	162	Eastern white pine, chestnut oak, white oak.
							Chestnut oak--------	76	58	
							Virginia pine-------	---	---	
							Pitch pine----------	---	---	
							Scarlet oak---------	---	---	
							Hickory-------------	---	---	
							Yellow-poplar-------	---	---	
							White oak-----------	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
CdC:										
Micaville	10A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine	---	---	Eastern white pine.
							Chestnut oak	---	---	
							Scarlet oak	---	---	
							White oak	---	---	
							Yellow-poplar	---	---	
							Hickory	---	---	
							Black oak	---	---	
CeD:										
Chandler	11R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern white pine	88	162	Eastern white pine, chestnut oak, white oak.
							Chestnut oak	76	58	
							Virginia pine	---	---	
							Pitch pine	---	---	
							Scarlet oak	---	---	
							Hickory	---	---	
							Yellow-poplar	---	---	
							White oak	---	---	
Micaville	10R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern white pine	---	---	Eastern white pine.
							Chestnut oak	---	---	
							Scarlet oak	---	---	
							White oak	---	---	
							Yellow-poplar	---	---	
							Hickory	---	---	
							Black oak	---	---	
CeE, CeF:										
Chandler	11R	Severe	Severe	Moderate	Slight	Moderate	Eastern white pine	88	162	Eastern white pine, chestnut oak, white oak.
							Chestnut oak	76	58	
							Virginia pine	---	---	
							Pitch pine	---	---	
							Scarlet oak	---	---	
							Hickory	---	---	
							Yellow-poplar	---	---	
							White oak	---	---	
Micaville	10R	Severe	Severe	Moderate	Slight	Moderate	Eastern white pine	---	---	Eastern white pine.
							Chestnut oak	---	---	
							Scarlet oak	---	---	
							White oak	---	---	
							Yellow-poplar	---	---	
							Hickory	---	---	
							Black oak	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
CkF:										
Chestoa----------	5R	Severe[7]	Severe	Slight	Moderate	Moderate	Yellow-poplar-------	---	---	See footnote 5.
							Eastern white pine--	---	---	
							Northern red oak----	---	---	
							Black cherry--------	---	---	
							American basswood---	---	---	
							Eastern hemlock-----	---	---	
							Yellow buckeye------	---	---	
Ditney-----------	8R	Severe[7]	Severe	Moderate	Moderate	Moderate	Eastern white pine--	68	116	See footnote 5.
							Shortleaf pine------	---	---	
							Virginia pine-------	---	---	
							Pitch pine----------	---	---	
Rock outcrop.										
CnC2:										
Clifton----------	12A	Slight	Slight	Moderate	Slight	Moderate	Eastern white pine--	95	176	Eastern white pine,
							Yellow-poplar-------	96	100	yellow-poplar,
							Scarlet oak---------	---	---	white oak,
							Virginia pine-------	---	---	chestnut oak.
							Pitch pine----------	---	---	
CnD2:										
Clifton----------	12R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern white pine--	95	176	Eastern white pine,
							Yellow-poplar-------	96	100	yellow-poplar,
							Scarlet oak---------	---	---	white oak,
							Virginia pine-------	---	---	chestnut oak.
							Pitch pine----------	---	---	
CnE2:										
Clifton----------	12R	Severe	Severe	Moderate	Slight	Moderate	Eastern white pine--	95	176	Eastern white pine,
							Yellow-poplar-------	96	100	yellow-poplar,
							Scarlet oak---------	---	---	white oak,
							Virginia pine-------	---	---	chestnut oak.
							Pitch pine----------	---	---	
CrE, CrF:										
Craggey----------	2R	Severe	Severe	Severe	Severe	Slight	Northern red oak----	---	---	See footnote 5.
							Red spruce----------	---	---	
							Fraser fir----------	---	---	
Rock outcrop.										

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
CrE, CrF:										
Clingman	2R	Severe	Severe	Severe	Severe	Moderate	Northern red oak	---	---	See footnote 5.
							Red spruce	---	---	
							Fraser fir	---	---	
DeA:										
Dellwood	8F	Slight	Slight	Moderate	Slight	Moderate	Yellow-poplar	100	107	Yellow-poplar, eastern white pine.
							Eastern white pine	91	168	
							River birch	---	---	
							American sycamore	---	---	
							Eastern hemlock	---	---	
Reddies	8A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	105	115	Yellow-poplar, eastern white pine.
							American sycamore	---	---	
							Eastern white pine	---	---	
							River birch	---	---	
DrB:										
Dillard	12A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine	---	---	Eastern white pine, black walnut, yellow-poplar.
							Virginia pine	---	---	
							Yellow-poplar	---	---	
							Pitch pine	---	---	
DuD:										
Ditney	8R	Slight[7]	Moderate	Moderate	Moderate	Moderate	Eastern white pine	68	116	Eastern white pine.
							Shortleaf pine	---	---	
							Virginia pine	---	---	
							Pitch pine	---	---	
Unicoi	7R	Slight[7]	Moderate	Moderate	Severe	Slight	Eastern white pine	---	---	Eastern white pine.
							Virginia pine	---	---	
							Pitch pine	---	---	
							Scarlet oak	---	---	
							Chestnut oak	---	---	
DuE:										
Ditney	8R	Severe[7]	Severe	Moderate	Moderate	Moderate	Eastern white pine	68	116	Eastern white pine.
							Shortleaf pine	---	---	
							Virginia pine	---	---	
							Pitch pine	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
DuE:										
Unicoi	7R	Severe[7]	Severe	Moderate	Severe	Slight	Eastern white pine	---	---	Eastern white pine.
							Virginia pine	---	---	
							Pitch pine	---	---	
							Scarlet oak	---	---	
							Chestnut oak	---	---	
DwF:										
Ditney	8R	Severe[7]	Severe	Moderate	Moderate	Moderate	Eastern white pine	68	116	See footnote 5.
							Shortleaf pine	---	---	
							Virginia pine	---	---	
							Pitch pine	---	---	
Unicoi	7R	Severe[7]	Severe	Moderate	Severe	Slight	Eastern white pine	---	---	See footnote 5.
							Virginia pine	---	---	
							Pitch pine	---	---	
							Scarlet oak	---	---	
							Chestnut oak	---	---	
EaC2:										
Evard	12A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine	91	168	Eastern white pine.
							Pitch pine	---	---	
							Virginia pine	---	---	
							White oak	---	---	
							Hickory	---	---	
Cowee	10D	Slight	Slight	Slight	Moderate	Moderate	Eastern white pine	78	139	Eastern white pine.
							Chestnut oak	55	38	
							Virginia pine	---	---	
							Scarlet oak	---	---	
							Pitch pine	---	---	
							Black oak	---	---	
							White oak	---	---	
							Hickory	---	---	
							Red maple	---	---	
							Blackgum	---	---	
EcD:										
Evard	12R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern white pine	91	168	Eastern white pine,
							Pitch pine	---	---	yellow-poplar,
							Virginia pine	---	---	white oak,
							Yellow-poplar	95	98	chestnut oak.
							White oak	---	---	
							Hickory	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
EcD:										
Cowee	10R	Moderate	Moderate	Moderate	Moderate	Moderate	Eastern white pine	78	139	Eastern white pine.
							Chestnut oak	55	38	
							Virginia pine	---	---	
							Scarlet oak	---	---	
							Yellow-poplar	---	---	
							Pitch pine	---	---	
							Black oak	---	---	
							Hickory	---	---	
							White oak	---	---	
							Red maple	---	---	
							Blackgum	---	---	
EcE:										
Evard	12R	Severe	Severe	Moderate	Slight	Moderate	Eastern white pine	91	168	Eastern white pine, yellow-poplar, white oak, chestnut oak.
							Pitch pine	---	---	
							Virginia pine	---	---	
							Yellow-poplar	95	98	
							White oak	---	---	
							Hickory	---	---	
Cowee	10R	Severe	Severe	Moderate	Moderate	Moderate	Eastern white pine	78	139	Eastern white pine.
							Chestnut oak	55	38	
							Virginia pine	---	---	
							Scarlet oak	---	---	
							Yellow-poplar	80	71	
							Pitch pine	---	---	
							Black oak	---	---	
							White oak	---	---	
							Hickory	---	---	
							Red maple	---	---	
							Blackgum	---	---	
FeC2:										
Fannin	12A	Slight	Slight	Slight	Slight	Moderate	Eastern white pine	94	174	Eastern white pine, yellow-poplar, white oak, chestnut oak.
							Yellow-poplar	96	100	
							Pitch pine	---	---	
							Virginia pine	---	---	
							Scarlet oak	---	---	
							Chestnut oak	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
FeD2:										
Fannin	12R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern white pine	94	174	Eastern white pine, yellow-poplar, white oak, chestnut oak.
							Yellow-poplar	96	100	
							Pitch pine	---	---	
							Virginia pine	---	---	
							Scarlet oak	---	---	
							Chestnut oak	---	---	
FeE2:										
Fannin	12R	Severe	Severe	Moderate	Slight	Moderate	Eastern white pine	94	174	Eastern white pine, yellow-poplar, white oak, chestnut oak.
							Yellow-poplar	96	100	
							Pitch pine	---	---	
							Virginia pine	---	---	
							Scarlet oak	---	---	
							Chestnut oak	---	---	
HaD:										
Harmiller	10R	Moderate[7]	Moderate	Moderate	Moderate	Moderate	Eastern white pine[6]	80	144	Eastern white pine.
							Chestnut oak	---	---	
							Scarlet oak	---	---	
							White oak	---	---	
							Black oak	---	---	
							Hickory	---	---	
							Pitch pine	---	---	
							Virginia pine	---	---	
Shinbone	11R	Moderate[7]	Moderate	Moderate	Slight	Moderate	Eastern white pine	---	---	Eastern white pine.
							White oak	---	---	
							Chestnut oak	---	---	
							Scarlet oak	---	---	
							Black oak	---	---	
							Hickory	---	---	
							Pitch pine	---	---	
							Shortleaf pine	---	---	
							Virginia pine	---	---	
HaE:										
Harmiller	10R	Severe[7]	Severe	Moderate	Moderate	Moderate	Eastern white pine[6]	80	144	Eastern white pine.
							Chestnut oak	---	---	
							Scarlet oak	---	---	
							White oak	---	---	
							Black oak	---	---	
							Hickory	---	---	
							Pitch pine	---	---	
							Virginia pine	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
HaE:										
Shinbone	11R	Severe[7]	Severe	Moderate	Slight	Moderate	Eastern white pine	---	---	Eastern white pine.
							White oak	---	---	
							Chestnut oak	---	---	
							Scarlet oak	---	---	
							Black oak	---	---	
							Hickory	---	---	
							Pitch pine	---	---	
							Shortleaf pine	---	---	
							Virginia pine	---	---	
HuC:										
Huntdale	8A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	106	117	Yellow-poplar, northern red oak, white oak, black cherry.
							Northern red oak	---	---	
							White oak	---	---	
							Eastern white pine	---	---	
							Cucumbertree	---	---	
							Sweet birch	---	---	
							Black cherry	---	---	
HuD:										
Huntdale	8R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar	106	117	Yellow-poplar, northern red oak, white oak, black cherry.
							Northern red oak	---	---	
							White oak	---	---	
							Eastern white pine	---	---	
							Cucumbertree	---	---	
							Sweet birch	---	---	
							Black cherry	---	---	
HuE:										
Huntdale	8R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar	106	117	Yellow-poplar, northern red oak, white oak, black cherry.
							Northern red oak	---	---	
							White oak	---	---	
							Eastern white pine	---	---	
							Cucumbertree	---	---	
							Sweet birch	---	---	
							Black cherry	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
KcD:										
Keener	8R	Moderate	Moderate	Moderate	Slight	Moderate	Yellow-poplar	---	---	Yellow-poplar, northern red oak, eastern white pine.
							Northern red oak	---	---	
Lostcove	7R	Moderate	Moderate	Moderate	Slight	Moderate	Yellow-poplar[6]	98	104	Yellow-poplar, eastern white pine, northern red oak, white oak.
							Eastern white pine	97	180	
							Northern red oak	---	---	
							White oak	---	---	
							Eastern hemlock	---	---	
							Red maple	---	---	
							Chestnut oak	---	---	
KcE:										
Keener	8R	Severe	Severe	Moderate	Slight	Moderate	Yellow-poplar	---	---	Yellow-poplar, northern red oak, eastern white pine.
							Northern red oak	---	---	
Lostcove	7R	Severe	Severe	Moderate	Slight	Moderate	Yellow-poplar[6]	98	104	Yellow-poplar, eastern white pine, northern red oak, white oak.
							Eastern white pine	97	180	
							Northern red oak	---	---	
							White oak	---	---	
							Eastern hemlock	---	---	
							Red maple	---	---	
							Chestnut oak	---	---	
NkA:										
Nikwasi	6W	Slight	Severe	Severe	Slight	Severe	Yellow-poplar	88	86	Yellow-poplar.
							Eastern white pine	---	---	
							American sycamore	---	---	
							Red maple	---	---	
							Yellow birch	---	---	
							Eastern hemlock	---	---	
PeD:										
Pigeonroost	12R	Moderate	Moderate	Moderate	Moderate	Moderate	Eastern white pine	94	174	Eastern white pine, yellow-poplar, white oak, chestnut oak.
							Yellow-poplar	---	---	
							White oak	---	---	
							Chestnut oak	---	---	
							Scarlet oak	---	---	
							Black oak	---	---	
							Red maple	---	---	
							Hickory	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
PeD:										
Edneytown--------	12R	Moderate	Moderate	Moderate	Slight	Moderate	Eastern white pine--	91	168	Eastern white pine,
							Pitch pine----------	---	---	yellow-poplar,
							Virginia pine-------	---	---	white oak,
							Yellow-poplar-------	95	98	chestnut oak.
							White oak-----------	---	---	
							Hickory-------------	---	---	
PeE:										
Pigeonroost------	12R	Severe	Severe	Moderate	Moderate	Moderate	Eastern white pine--	94	174	Eastern white pine,
							Yellow-poplar-------	---	---	yellow-poplar,
							White oak-----------	---	---	white oak,
							Chestnut oak--------	---	---	chestnut oak.
							Scarlet oak---------	---	---	
							Black oak-----------	---	---	
							Red maple-----------	---	---	
							Hickory-------------	---	---	
Edneytown--------	12R	Severe	Severe	Moderate	Slight	Moderate	Eastern white pine--	91	168	Eastern white pine,
							Pitch pine----------	---	---	yellow-poplar,
							Virginia pine-------	---	---	white oak,
							Yellow-poplar-------	95	98	chestnut oak.
							White oak-----------	---	---	
							Hickory-------------	---	---	
PuC:										
Porters----------	7A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar-------	97	102	Yellow-poplar,
							Northern red oak[6]---	82	64	northern red oak,
							Eastern white pine--	88	162	black cherry,
							Black cherry--------	---	---	white ash.
							White ash-----------	---	---	
Unaka------------	6A	Slight	Slight	Slight	Moderate	Moderate	Yellow-poplar[6]------	90	90	Yellow-poplar,
							Northern red oak----	77	59	northern red oak.
							Eastern white pine--	---	---	
PuD:										
Porters----------	7R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar-------	97	102	Yellow-poplar,
							Northern red oak[6]---	82	64	northern red oak,
							Eastern white pine--	88	162	black cherry,
							Black cherry--------	---	---	white ash.
							White ash-----------	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
PuD:										
Unaka	6R	Slight	Moderate	Slight	Moderate	Moderate	Yellow-poplar[6]	90	90	Yellow-poplar, northern red oak.
							Northern red oak	77	59	
							Eastern white pine	---	---	
PuE, PwF:										
Porters	7R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar	97	102	Yellow-poplar, northern red oak, black cherry, white ash.
							Northern red oak[6]	82	64	
							Eastern white pine	88	162	
							Black cherry	---	---	
							White ash	---	---	
Unaka	6R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar[6]	90	90	Yellow-poplar, northern red oak.
							Northern red oak	77	59	
							Eastern white pine	---	---	
RoA:										
Rosman	9A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	110	124	Yellow-poplar, eastern white pine, black walnut.
							Eastern white pine	100	186	
							American sycamore	---	---	
							Black walnut	---	---	
							Red maple	---	---	
							River birch	---	---	
SaB, ScC:										
Saunook	8A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	107	119	Yellow-poplar, eastern white pine, northern red oak, black cherry, white ash.
							Eastern white pine	104	194	
							Northern red oak	---	---	
							White oak	---	---	
							Eastern hemlock	---	---	
							White ash	---	---	
							Black cherry	---	---	
SdD:										
Saunook	8R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar	107	119	Yellow-poplar, eastern white pine, northern red oak, black cherry, white ash.
							Eastern white pine	104	194	
							Northern red oak	---	---	
							White oak	---	---	
							Eastern hemlock	---	---	
							White ash	---	---	
							Black cherry	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
SdD:										
Thunder	8R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar[6]	105	115	Yellow-poplar, eastern white pine, northern red oak, black cherry, white ash.
							Northern red oak	92	74	
							White ash	---	---	
							Black cherry	---	---	
TsB, TsC:										
Thunder	8X	Slight	Moderate	Slight	Slight	Moderate	Yellow-poplar[6]	105	115	Yellow-poplar, eastern white pine, northern red oak, black cherry, white ash.
							Northern red oak	92	74	
							Black cherry	---	---	
							White ash	---	---	
Saunook	8A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	107	119	Yellow-poplar, eastern white pine, northern red oak, black cherry, white ash.
							Eastern white pine	104	194	
							Northern red oak	---	---	
							White oak	---	---	
							Eastern hemlock	---	---	
							Black cherry	---	---	
							White ash	---	---	
TsD:										
Thunder	8R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar[6]	105	115	Yellow-poplar, eastern white pine, northern red oak, black cherry, white ash.
							Northern red oak	92	74	
							Black cherry	---	---	
							White ash	---	---	
Saunook	8R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar	107	119	Yellow-poplar, eastern white pine, northern red oak, black cherry, white ash.
							Eastern white pine	104	194	
							Northern red oak	---	---	
							White oak	---	---	
							Eastern hemlock	---	---	
							Black cherry	---	---	
							White ash	---	---	
TsE:										
Thunder	8R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar[6]	105	115	Yellow-poplar, eastern white pine, northern red oak, black cherry, white ash.
							Northern red oak	92	74	
							Black cherry	---	---	
							White ash	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
TsE:										
Saunook	8R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar	107	119	Yellow-poplar,
							Eastern white pine	104	194	eastern white
							Northern red oak	---	---	pine, northern red
							White oak	---	---	oak, black cherry,
							Eastern hemlock	---	---	white ash.
							Black cherry	---	---	
							White ash	---	---	
TuC:										
Toecane	8A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar[6]	104	114	Yellow-poplar,
							Eastern hemlock	---	---	eastern white
							Yellow birch	---	---	pine, northern red
							Northern red oak	---	---	oak, black cherry.
							Black cherry	---	---	
Tusquitee	8A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	103	112	Yellow-poplar,
							Eastern white pine	100	186	eastern white
							Northern red oak	---	---	pine, black
							Black cherry[6]	83	---	cherry, northern
							Black walnut	---	---	red oak, white ash.
							Hickory	---	---	
							Black locust	---	---	
							Eastern hemlock	---	---	
							White oak	---	---	
							Yellow birch	---	---	
							American beech	---	---	
							White ash	---	---	
TwD:										
Toecane	8R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar[6]	104	114	Yellow-poplar,
							Eastern hemlock	---	---	eastern white
							Yellow birch	---	---	pine, northern red
							Northern red oak	---	---	oak, black cherry.
							Black cherry	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
TwD:										
Tusquitee	8R	Moderate	Moderate	Slight	Slight	Moderate	Yellow-poplar	103	112	Yellow-poplar, eastern white pine, black cherry, northern red oak, white oak.
							Eastern white pine	100	186	
							Northern red oak	---	---	
							Black cherry[6]	83	---	
							Black walnut	---	---	
							Hickory	---	---	
							Black locust	---	---	
							Eastern hemlock	---	---	
							White oak	---	---	
							Yellow birch	---	---	
							American beech	---	---	
							White ash	---	---	
TwE:										
Toecane	8R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar[6]	104	114	Eastern white pine, yellow-poplar, northern red oak, black cherry.
							Eastern hemlock	---	---	
							Yellow birch	---	---	
							Northern red oak	---	---	
							Black cherry	---	---	
Tusquitee	8R	Severe	Severe	Slight	Slight	Moderate	Yellow-poplar	103	112	Yellow-poplar, eastern white pine, black cherry, northern red oak, white ash.
							Eastern white pine	100	186	
							Northern red oak	---	---	
							Black cherry[6]	83	---	
							Black walnut	---	---	
							Hickory	---	---	
							Black locust	---	---	
							Eastern hemlock	---	---	
							White oak	---	---	
							Yellow birch	---	---	
							American beech	---	---	
							White ash	---	---	
Uc. Udifluvents										
Ud. Udorthents										

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
UrF:										
Unaka	6R	Severe	Severe	Slight	Moderate	Moderate	Yellow-poplar[6]	90	90	See footnote 5.
							Eastern white pine	---	---	
							Northern red oak	77	59	
Rock outcrop.										
UsB, UsC:										
Unison	7A	Slight	Slight	Slight	Slight	Moderate	Yellow-poplar	---	---	Yellow-poplar, eastern white pine.
UsD:										
Unison	7R	Moderate	Moderate	Moderate	Slight	Moderate	Yellow-poplar	---	---	Yellow-poplar, eastern white pine.
W.										
Water										
WbD:										
Wayah	4R	Moderate	Moderate	Slight	Slight	Moderate	Northern red oak	72	54	Northern red oak, red spruce, Fraser fir.
							Black cherry	72	---	
							Red spruce	57	129	
							Fraser fir[6]	60	138	
							American beech	64	---	
							Yellow birch	---	---	
							Sugar maple	---	---	
							Black oak	---	---	
							Yellow buckeye	---	---	
							Eastern hemlock	---	---	
							Sweet birch	---	---	
Burton	3R	Moderate	Moderate	Slight	Moderate	Slight	Northern red oak	---	---	Fraser fir, red spruce.
							Red spruce	---	---	
							American beech	---	---	
							Fraser fir	---	---	
							American mountainash	---	---	
							Yellow birch	---	---	
							Sugar maple	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Management concerns: Plant competition	Potential productivity: Common trees	Potential productivity: Site index[2]	Potential productivity: Volume[3]	Trees to manage[4]
									cu ft/ac	
WbE, WcF:										
Wayah	4R	Severe	Severe	Slight	Slight	Moderate	Northern red oak	72	54	Northern red oak, red spruce, Fraser fir.
							Black cherry	72	---	
							Red spruce	57	129	
							Fraser fir[6]	60	138	
							American beech	64	---	
							Yellow birch	---	---	
							Sugar maple	---	---	
							Black oak	---	---	
							Yellow buckeye	---	---	
							Eastern hemlock	---	---	
							Sweet birch	---	---	
Burton	3R	Severe	Severe	Slight	Moderate	Slight	Northern red oak	---	---	Fraser fir, red spruce.
							Red spruce	---	---	
							American beech	---	---	
							Fraser fir	---	---	
							American mountainash	---	---	
							Yellow birch	---	---	
							Sugar maple	---	---	
WhC:										
Wayah	2A	Slight	Slight	Severe	Slight	Slight	Northern red oak	---	---	See footnote 5.
							Red spruce	---	---	
							Fraser fir	---	---	
Burton	2D	Slight	Slight	Severe	Moderate	Slight	Northern red oak	---	---	See footnote 5.
							Red spruce	---	---	
							Fraser fir	---	---	
WhD:										
Wayah	2R	Moderate	Moderate	Severe	Slight	Slight	Northern red oak	---	---	See footnote 5.
							Red spruce	---	---	
							Fraser fir	---	---	
Burton	2R	Moderate	Moderate	Severe	Moderate	Slight	Northern red oak	---	---	See footnote 5.
							Red spruce	---	---	
							Fraser fir	---	---	

See footnotes at end of table.

Table 10.—Forestland Management and Productivity—Continued

Map symbol and soil name	Ordination symbol[1]	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Potential productivity: Common trees	Site index[2]	Volume[3]	Trees to manage[4]
									cu ft/ac	
WhE:										
Wayah-----------	2R	Severe	Severe	Severe	Slight	Slight	Northern red oak----	---	---	See footnote 5.
							Red spruce----------	---	---	
							Fraser fir----------	---	---	
Burton----------	2R	Severe	Severe	Severe	Moderate	Slight	Northern red oak----	---	---	See footnote 5.
							Red spruce----------	---	---	
							Fraser fir----------	---	---	

[1] The number in the ordination symbol denotes the potential productivity in cubic meters per hectare per year for a group or range of site indices for the indicator species (first tree listed under "Common trees"). One cubic hectare equals 14.3 cubic feet per acre per year.

[2] Site indices were assigned using available plot data and comparison curves. Where insufficient plot data exists, site index was assigned based on data from soils with similar properties. Where no data and no soil with similar properties exist, soils were assigned a probable ordination symbol without any site indices. *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.*

[3] Potential productivity is measured as yield 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.

[4] 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. Planting of hardwoods on a site should be based on the recommendation of a professional forester.

[5] This is a noncommercial forestland unit. See map unit description for composition and management concerns.

[6] Data exists but there are not enough plots to meet standards of sampling and analysis.

[7] Some soils are subject to mass movement (landslides). Road construction should be avoided where this is a problem.

Table 11.—Recreational Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
AcF:					
Ashe	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Cleveland	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock
Rock outcrop	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
BbF:					
Balsam	Severe: slope too stony	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: large stones slope
BcD:					
Balsam	Severe: slope too stony	Severe: slope large stones	Severe: slope large stones	Moderate: large stones slope	Severe: large stones slope
Tanasee	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
BcE:					
Balsam	Severe: slope too stony	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: large stones slope
Tanasee	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
BdA:					
Bandana	Severe: flooding wetness	Moderate: wetness flooding	Severe: wetness flooding	Moderate: wetness flooding	Severe: flooding wetness
BmA:					
Biltmore	Severe: flooding too sandy	Severe: too sandy flooding	Severe: too sandy flooding	Severe: too sandy flooding	Severe: droughty flooding too sandy
BtD:					
Buladean	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Chestnut	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
BtE, BtF:					
Buladean	Severe: slope too acid	Severe: slope too acid	Severe: slope too acid	Severe: slope	Severe: too acid slope
Chestnut	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
BwD:					
Burton	Severe: slope too stony	Severe: slope large stones	Severe: slope large stones	Moderate: large stones slope	Severe: large stones slope
Craggey	Severe: slope depth to rock too stony	Severe: slope depth to rock large stones	Severe: depth to rock slope large stones	Severe: fragile large stones slope	Severe: slope depth to rock large stones
BxE, BxF:					
Burton	Severe: slope too stony	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: large stones slope
Craggey	Severe: slope depth to rock too stony	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope fragile depth to rock	Severe: slope depth to rock
Rock outcrop	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
CaB:					
Cashiers	Slight	Slight	Moderate: slope	Slight: erodes easily	Slight
CaC:					
Cashiers	Moderate: slope	Moderate: slope	Severe: slope	Slight: erodes easily	Moderate: slope
CcD:					
Cashiers	Severe: slope	Severe: slope	Severe: slope	Moderate: slope erodes easily	Severe: slope
CcE, CcF:					
Cashiers	Severe: slope	Severe: slope	Severe: slope	Severe: slope erodes easily	Severe: slope
CdC:					
Chandler	Moderate: slope	Moderate: slope	Severe: slope	Moderate: erodes easily	Moderate: slope
Micaville	Moderate: slope	Moderate: slope	Severe: slope	Moderate: erodes easily	Moderate: slope
CeD:					
Chandler	Severe: slope	Severe: slope	Severe: slope	Moderate: slope erodes easily	Severe: slope

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
CeD:					
Micaville	Severe: slope	Severe: slope	Severe: slope	Moderate: slope erodes easily	Severe: slope
CeE, CeF:					
Chandler	Severe: slope	Severe: slope	Severe: slope	Severe: slope erodes easily	Severe: slope
Micaville	Severe: slope	Severe: slope	Severe: slope	Severe: slope erodes easily	Severe: slope
CkF:					
Chestoa	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: too acid slope
Ditney	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop	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
CnC2:					
Clifton	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
CnD2:					
Clifton	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
CnE2:					
Clifton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
CrE, CrF:					
Craggey	Severe: slope depth to rock too stony	Severe: slope depth to rock large stones	Severe: depth to rock slope large stones	Severe: slope fragile large stones	Severe: slope depth to rock large stones
Rock outcrop	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
Clingman	Severe: slope excess humus depth to rock	Severe: slope excess humus	Severe: slope excess humus depth to rock	Severe: fragile slope depth to rock	Severe: too acid slope depth to rock
DeA:					
Dellwood	Severe: flooding	Moderate: flooding	Severe: small stones flooding	Moderate: flooding	Severe: droughty flooding

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
DeA:					
Reddies	Severe: flooding	Moderate: flooding	Moderate: small stones wetness flooding	Moderate: flooding	Moderate: droughty flooding
DrB:					
Dillard	Severe: flooding	Slight	Moderate: slope percs slowly	Slight	Slight
DuD:					
Ditney	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Unicoi	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Moderate: slope depth to rock	Severe: depth to rock slope
DuE, DwF:					
Ditney	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Unicoi	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock	Severe: depth to rock slope
EaC2:					
Evard	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Cowee	Severe: too acid	Severe: too acid	Severe: slope too acid	Slight	Severe: too acid
EcD:					
Evard	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Cowee	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
EcE:					
Evard	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Cowee	Severe: slope	Severe: slope	Severe: slope too acid	Severe: slope	Severe: slope
FeC2:					
Fannin	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
FeD2:					
Fannin	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
FeE2:					
Fannin	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HaD:					
Harmiller	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Shinbone	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
HaE:					
Harmiller	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Shinbone	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
HuC:					
Huntdale	Severe: too acid slope	Severe: too acid slope	Severe: slope too acid	Slight	Severe: too acid slope
HuD:					
Huntdale	Severe: slope too acid	Severe: slope too acid	Severe: slope too acid	Moderate: slope	Severe: too acid slope
HuE:					
Huntdale	Severe: slope too acid	Severe: slope too acid	Severe: slope too acid	Severe: slope	Severe: too acid slope
KcD:					
Keener	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Lostcove	Severe: slope too stony	Severe: slope large stones	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
KcE:					
Keener	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Lostcove	Severe: slope too stony	Severe: slope large stones	Severe: large stones slope	Severe: slope large stones	Severe: large stones slope
NkA:					
Nikwasi	Severe: flooding wetness	Severe: wetness flooding	Severe: wetness flooding	Severe: wetness flooding	Severe: wetness flooding

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
PeD:					
Pigeonroost	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Edneytown	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
PeE:					
Pigeonroost	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Edneytown	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
PuC:					
Porters	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Unaka	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
PuD:					
Porters	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Unaka	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
PuE, PwF:					
Porters	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Unaka	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	Moderate: slope too acid	Slight	Severe: too acid
ScC:					
Saunook	Moderate: slope	Moderate: slope	Moderate: slope	Slight	Moderate: slope
SdD:					
Saunook	Severe: slope	Severe: slope	Severe: slope too acid	Moderate: slope	Severe: too acid slope
Thunder	Severe: slope too stony	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TsB:					
Thunder	Severe: too stony	Severe: large stones	Severe: large stones	Severe: large stones	Severe: large stones
Saunook	Slight	Slight	Moderate: slope	Slight	Moderate slope
TsC:					
Thunder	Severe: too stony slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope	Severe: large stones slope
Saunook	Moderate: slope	Moderate: slope	Moderate: slope	Slight	Moderate: slope
TsD:					
Thunder	Severe: slope too stony	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones
Saunook	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
TsE:					
Thunder	Severe: slope too stony	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones
Saunook	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
TuC:					
Toecane	Moderate: slope too stony	Moderate: slope large stones	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
Tusquitee	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
TwD:					
Toecane	Severe: slope too stony	Severe: slope large stones	Severe: large stones slope	Moderate: large stones slope	Severe: large stones slope
Tusquitee	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
TwE:					
Toecane	Severe: slope too stony	Severe: slope large stones	Severe: large stones slope	Severe: slope large stones	Severe: large stones slope
Tusquitee	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Uc. Udifluvents					
Ud. Udorthents					

Table 11.—Recreational Development—Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
UrF:					
Unaka	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Rock outcrop	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
UsB:					
Unison	Slight	Slight	Moderate: slope	Slight	Slight
UsC:					
Unison	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
UsD:					
Unison	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
W.					
Water					
WbD:					
Wayah	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Burton	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
WbE, WcF:					
Wayah	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Burton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
WhC:					
Wayah	Moderate: slope	Moderate: slope	Severe: slope	Slight	Moderate: slope
Burton	Moderate: slope large stones	Moderate: slope large stones	Severe: slope	Moderate: large stones	Severe: large stones
WhD:					
Wayah	Severe: slope	Severe: slope	Severe: slope	Moderate: slope	Severe: slope
Burton	Severe: slope	Severe: slope	Severe: slope	Moderate: large stones slope	Severe: slope
WhE:					
Wayah	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Burton	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 12.—Building Site Development

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

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: depth to rock slope	Severe: slope	Severe: depth to rock slope	Severe: slope	Severe: slope depth to rock	Severe: slope
Cleveland	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock
Rock outcrop	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock
BbF:						
Balsam	Severe: slope cutbanks cave	Severe: slope	Severe: slope cutbanks cave	Severe: slope	Severe: slope cutbanks cave	Severe: large stones slope
BcD, BcE:						
Balsam	Severe: slope large stones cutbanks cave	Severe: slope large stones	Severe: slope large stones cutbanks cave	Severe: slope large stones	Severe: slope large stones cutbanks cave	Severe: large stones slope
Tanasee	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
BdA:						
Bandana	Severe: cutbanks cave wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Moderate: flooding wetness
BmA:						
Biltmore	Severe: cutbanks cave	Severe: flooding	Severe: flooding cutbanks cave	Severe: flooding	Severe: flooding	Moderate: droughty flooding
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 depth to rock	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
BwD:						
Burton	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: slope depth to rock	Severe: large stones slope
Craggey	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock large stones

Table 12.—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
BxE, BxF:						
Burton	Severe: depth to rock slope	Severe: slope	Severe: depth to rock slope	Severe: slope	Severe: slope	Severe: large stones slope
Craggey	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock
Rock outcrop	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock
CaB:						
Cashiers	Moderate: cutbanks cave	Slight	Moderate: cutbanks cave	Moderate: slope	Severe: low strength	Slight
CaC:						
Cashiers	Moderate: slope cutbanks cave	Moderate: slope	Moderate: slope cutbanks cave	Severe: slope	Severe: low strength	Moderate: slope
CcD, CcE, CcF:						
Cashiers	Severe: slope cutbanks cave	Severe: slope	Severe: slope cutbanks cave	Severe: slope	Severe: slope low strength cutbanks cave	Severe: slope
CdC:						
Chandler	Moderate: slope cutbanks cave	Moderate: slope	Moderate: slope cutbanks cave	Severe: slope	Severe: low strength	Moderate: slope droughty
Micaville	Moderate: slope depth to rock	Moderate: slope	Moderate: depth to rock	Severe: slope	Severe: low strength depth to rock	Moderate: slope droughty
CeD, CeE, CeF:						
Chandler	Severe: slope cutbanks cave	Severe: slope	Severe: slope cutbanks cave	Severe: slope	Severe: slope low strength	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: slope low strength depth to rock	Severe: slope droughty
CkF:						
Chestoa	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope
Ditney	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope
Rock outcrop	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock

Table 12.—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
CnC2:						
Clifton	Moderate: too clayey slope	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
CrE, CrF:						
Craggey	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock
Rock outcrop	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock
Clingman	Severe: depth to rock slope	Severe: low strength slope depth to rock	Severe: depth to rock slope	Severe: slope low strength depth to rock	Severe: depth to rock slope low strength	Severe: too acid slope depth to rock
DeA:						
Dellwood	Severe: cutbanks cave wetness	Severe: flooding	Severe: flooding wetness	Severe: flooding	Severe: flooding	Severe: droughty flooding
Reddies	Severe: cutbanks cave wetness	Severe: flooding	Severe: flooding wetness	Severe: flooding	Severe: flooding	Moderate: droughty flooding
DrB:						
Dillard	Severe: wetness	Severe: flooding	Severe: flooding wetness	Severe: flooding	Moderate: low strength wetness	Slight
DuD, DuE, DwF:						
Ditney	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope
Unicoi	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: depth to rock slope
EaC2:						
Evard	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: slope
Cowee	Moderate: depth to rock slope	Moderate: slope	Severe: depth to rock slope	Severe: slope	Moderate: slope depth to rock	Moderate: slope

Table 12.—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, EcE:						
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	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
Shinbone	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope	Severe: slope depth to rock	Severe: slope
HuC:						
Huntdale	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Severe: slope
HuD, HuE:						
Huntdale	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
KcD, KcE:						
Keener	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Lostcove	Severe: cutbanks cave large stones slope	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: large stones slope
NkA:						
Nikwasi	Severe: cutbanks cave wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: flooding wetness	Severe: wetness flooding	Severe: wetness
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: cutbanks cave slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope

Table 12.—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
PuC:						
Porters-------	Moderate: depth to rock slope	Moderate: slope	Severe: depth to rock slope	Severe: slope	Moderate: slope	Moderate: slope
Unaka---------	Severe: depth to rock	Moderate: slope depth to rock	Severe: depth to rock	Severe: slope	Moderate: depth to rock slope	Moderate: slope depth to rock
PuD, PuE, PwF:						
Porters-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Unaka---------	Severe: depth to rock slope	Severe: slope	Severe: depth to rock 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	Moderate: low strength	Slight
ScC:						
Saunook-------	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: low strength slope	Moderate slope
SdD:						
Saunook-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Thunder-------	Severe: cutbanks cave large stones slope	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones
TsB:						
Thunder-------	Severe: cutbanks cave large stones	Severe: large stones	Severe: large stones	Severe: large stones	Severe: large stones	Severe: large stones
Saunook-------	Slight	Slight	Slight	Moderate: slope	Moderate: low strength	Slight
TsC:						
Thunder-------	Severe: cutbanks cave large stones	Severe: large stones	Severe: large stones	Severe: slope large stones	Severe: large stones	Severe: slope large stones
Saunook-------	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: low strength slope	Moderate: large stones

Table 12.—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
TsD, TsE:						
Thunder-------	Severe: cutbanks cave large stones slope	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones
Saunook-------	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope low strength	Severe: slope
TuC:						
Toecane-------	Severe: cutbanks cave large stones	Severe: large stones	Severe: large stones	Severe: slope large stones	Severe: large stones	Severe: large stones
Tusquitee-----	Moderate: slope	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Moderate: large stones slope
TwD, TwE:						
Toecane-------	Severe: cutbanks cave large stones slope	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: slope large stones	Severe: large stones slope
Tusquitee-----	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Uc. Udifluvents						
Ud. Udorthents						
UrF:						
Unaka---------	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock
Rock outcrop--	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock
UsB:						
Unison--------	Moderate: too clayey	Moderate: shrink-swell	Moderate: shrink-swell	Moderate: shrink-swell slope	Severe: low strength	Moderate: too clayey
UsC:						
Unison--------	Moderate: too clayey slope	Moderate: shrink-swell slope	Moderate: slope shrink-swell	Severe: slope	Severe: low strength	Moderate: slope too clayey
UsD:						
Unison--------	Severe: slope too clayey	Severe: slope	Severe: slope	Severe: slope	Severe: low strength slope	Severe: slope too clayey

Table 12.—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
W.						
Water						
WbD, WbE, WcF:						
Wayah	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Burton	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: slope depth to rock	Severe: too acid slope depth to rock
WhC:						
Wayah	Slight	Moderate: slope	Moderate: slope	Severe: slope	Moderate: slope	Slight
Burton	Severe: depth to rock	Moderate: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Moderate: depth to rock slope	Moderate: depth to rock
WhD, WhE:						
Wayah	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Burton	Severe: depth to rock slope	Severe: slope depth to rock	Severe: depth to rock slope	Severe: slope depth to rock	Severe: slope depth to rock	Severe: slope depth to rock

Table 13.—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: slope, depth to rock, seepage.	Poor: slope, depth to rock.
Rock outcrop	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.
BbF:					
Balsam	Severe: slope, large stones, poor filter.	Severe: large stones, seepage, slope.	Severe: large stones, seepage, slope.	Severe: seepage, slope.	Poor: slope, large stones.
BcD, BcE:					
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.
Tanasee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, seepage, slope.
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, small stones, depth to rock.

Table 13.—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
BwD:					
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.
Craggey	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock, seepage.	Poor: slope, depth to rock.
BxE, BxF:					
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.
Craggey	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock, seepage.	Poor: slope, depth to rock.
Rock outcrop	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.
CaB:					
Cashiers	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: hard to pack.
CaC:					
Cashiers	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: slope, hard to pack.
CcD, CcE, CcF:					
Cashiers	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope, hard to pack.
CdC:					
Chandler	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: hard to pack.
Micaville	Severe: slope, depth to rock.	Severe: seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: hard to pack, depth to rock.
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.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Poor: depth to rock, slope.

Table 13.—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
CkF:					
Chestoa	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.
Ditney	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	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.
CnC2:					
Clifton	Moderate: percs slowly, slope.	Severe: slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: hard to pack, too clayey.
CnD2, CnE2:					
Clifton	Severe: slope, percs slowly.	Severe: slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: hard to pack, slope, too clayey.
CrE, CrF:					
Craggey	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock, seepage.	Poor: slope, depth to rock.
Rock outcrop	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.
Clingman	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock, seepage.	Poor: excess humus, slope, depth to rock.
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.
DrB:					
Dillard	Severe: percs slowly, wetness.	Severe: wetness.	Severe: too clayey, wetness, seepage.	Severe: wetness.	Fair: too clayey.
DuD, DuE, DwF:					
Ditney	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 13.—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
DuD, DuE, DwF:					
Unicoi	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: slope, depth to rock, seepage.	Poor: slope, small stones, depth to rock.
EaC2:					
Evard	Moderate: slope.	Severe: slope.	Moderate: slope, seepage.	Moderate: slope.	Fair: slope.
Cowee	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Poor: depth to rock.
EcD, EcE:					
Evard	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, seepage.	Severe: slope.	Poor: slope.
Cowee	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Poor: slope, depth to rock.
FeC2:					
Fannin	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, seepage.	Moderate: slope.	Poor: slope, hard to pack.
FeD2, FeE2:					
Fannin	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, seepage.	Severe: slope.	Poor: slope, hard to pack.
HaD, HaE:					
Harmiller	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Poor: slope, small stones, depth to rock.
Shinbone	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones, depth to rock.
HuC:					
Huntdale	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, seepage.	Moderate: slope.	Fair: slope.
HuD, HuE:					
Huntdale	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, seepage.	Severe: slope.	Poor: slope.
KcD, KcE:					
Keener	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.

Table 13.—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
KcD, KcE:					
Lostcove	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: large stones, slope, seepage.	Severe: slope, seepage.	Poor: large stones, slope.
NkA:					
Nikwasi	Severe: flooding, wetness, poor filter.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: seepage, small stones, too sandy.
PeD, PeE:					
Pigeonroost	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, depth to rock, seepage.	Poor: slope, depth to rock.
Edneytown	Severe: slope.	Severe: slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
PuC:					
Porters	Moderate: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage.	Fair: slope, small stones, depth to rock.
Unaka	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, slope.
PuD, PuE, PwF:					
Porters	Severe: slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: slope.
Unaka	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Poor: depth to rock, slope.
RoA:					
Rosman	Severe: flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage, wetness.	Poor: wetness, too sandy, seepage.
SaB:					
Saunook	Moderate: percs slowly.	Moderate: seepage.	Severe: seepage.	Slight	Good.
ScC:					
Saunook	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Moderate: slope.	Fair: slope.

Table 13.—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
SdD:					
Saunook	Severe: slope, percs slowly.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Fair: slope.
Thunder	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: large stones, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
TsB:					
Thunder	Severe: large stones.	Severe: large stones, seepage.	Severe: large stones, seepage.	Severe: seepage, slope.	Poor: large stones.
Saunook	Moderate: percs slowly.	Moderate: seepage.	Severe: seepage.	Slight	Good.
TsC:					
Thunder	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: large stones, seepage.	Severe: seepage.	Poor: large stones, slope.
Saunook	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: slope.	Poor: slope.
TsD, TsE:					
Thunder	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: large stones, seepage, slope.	Severe: seepage, slope.	Poor: large stones, slope.
Saunook	Severe: slope, percs slowly.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: slope.	Poor: slope.
TuC:					
Toecane	Severe: large stones.	Severe: large stones, seepage, slope.	Severe: seepage, depth to rock.	Severe: seepage.	Poor: large stones, slope.
Tusquitee	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: slope.
TwD, TwE:					
Toecane	Severe: large stones, slope.	Severe: large stones, seepage, slope.	Severe: seepage, slope, depth to rock.	Severe: seepage, slope.	Poor: large stones, slope.
Tusquitee	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
Uc. Udifluvents					
Ud. Udorthents					

Table 13.—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
UrF:					
Unaka	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, depth to rock, seepage.	Poor: depth to rock, slope.
Rock outcrop	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.
UsB:					
Unison	Moderate: percs slowly.	Moderate: slope.	Severe: seepage, too clayey.	Slight	Poor: hard to pack, too clayey.
UsC:					
Unison	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage, too clayey.	Moderate: slope.	Poor: hard to pack, too clayey.
UsD:					
Unison	Severe: slope, percs slowly.	Severe: slope.	Severe: seepage, slope, too clayey.	Severe: slope.	Poor: hard to pack, too clayey.
W.					
Water					
WbD, WbE, WcF:					
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.
WhC:					
Wayah	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too acid.	Severe: seepage.	Fair: slope.
Burton	Severe: depth to rock.	Severe: seepage, slope, depth to rock.	Severe: seepage, depth to rock.	Severe: seepage, depth to rock.	Poor: slope, depth to rock.
WhD, WhE:					
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 14.—Construction Materials

(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	Roadfill	Sand	Gravel	Topsoil
AcF:				
Ashe	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, depth to rock.
Cleveland	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones, depth to rock.
Rock outcrop	Poor: slope, depth to rock.	Improbable: depth to rock.	Improbable: depth to rock.	Poor: slope, depth to rock.
BbF:				
Balsam	Poor: slope, large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, large stones, slope.
BcD:				
Balsam	Fair: large stones, slope.	Improbable: large stones.	Improbable: larges stones.	Poor: area reclaim, large stones, slope.
Tanasee	Fair: slope.	Probable	Probable	Poor: area reclaim, slope, small stones.
BcE:				
Balsam	Poor: slope, large stones.	Improbable: slope, large stones.	Improbable: slope, large stones.	Poor: area reclaim, large stones, slope.
Tanasee	Poor: slope.	Probable	Probable	Poor: area reclaim, slope, small stones.
BdA:				
Bandana	Fair: wetness.	Probable	Probable	Poor: area reclaim, small stones.
BmA:				
Biltmore	Poor: too sandy.	Probable	Improbable: too sandy.	Poor: too sandy.
BtD:				
Buladean	Fair: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, area reclaim.

Table 14.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
BtD:				
Chestnut	Poor: depth to rock, slope.	Improbable: thin layer, excess fines.	Improbable: thin layer, excess fines.	Poor: slope, small stones.
BtE, BtF:				
Buladean	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, area reclaim.
Chestnut	Poor: slope, depth to rock.	Improbable: thin layer, excess fines.	Improbable: thin layer, excess fines.	Poor: slope, small stones.
BwD:				
Burton	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: large stones, slope, depth to rock.
Craggey	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
BxE, BxF:				
Burton	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: large stones, slope, depth to rock.
Craggey	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
Rock outcrop	Poor: slope, depth to rock.	Improbable: depth to rock.	Improbable: depth to rock.	Poor: slope, depth to rock.
CaB, CaC:				
Cashiers	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
CcD:				
Cashiers	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
CcE, CcF:				
Cashiers	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
CdC, CeD:				
Chandler	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, area reclaim.
Micaville	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.

Table 14.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
CeE, CeF:				
Chandler	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Micaville	Poor: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
CkF:				
Chestoa	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
Ditney	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
Rock outcrop	Poor: slope, depth to rock.	Improbable: depth to rock.	Improbable: depth to rock.	Poor: slope, depth to rock.
CnC2:				
Clifton	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
CnD2:				
Clifton	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
CnE2:				
Clifton	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, too clayey.
CrE, CrF:				
Craggey	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
Rock outcrop	Poor: slope, depth to rock.	Improbable: depth to rock.	Improbable: depth to rock.	Poor: slope, depth to rock.
Clingman	Poor: slope, depth to rock.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, too acid, depth to rock.
DeA:				
Dellwood	Poor: large stones.	Probable	Probable	Poor: area reclaim, small stones, too sandy.
Reddies	Poor: large stones.	Probable	Probable	Poor: area reclaim, small stones.

Table 14.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
DrB:				
Dillard	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
DuD, DuE, DwF:				
Ditney	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
Unicoi	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
EaC2:				
Evard	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: slope, too clayey.
Cowee	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, too acid, depth to rock.
EcD:				
Evard	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones.
EcE:				
Evard	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
Cowee	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones.
FeC2, FeD2, FeE2:				
Fannin	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
HaD:				
Harmiller	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
Shinbone	Fair: low strength, slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
HaE:				
Harmiller	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.

Table 14.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
HaE:				
Shinbone	Poor: slope, depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
HuC:				
Huntdale	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
HuD:				
Huntdale	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
HuE:				
Huntdale	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
KcD:				
Keener	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
Lostcove	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones.
KcE:				
Keener	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, slope.
Lostcove	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones.
NkA:				
Nikwasi	Poor: wetness.	Probable	Probable	Poor: area reclaim, small stones, wetness.
PeD:				
Pigeonroost	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, area reclaim.
Edneytown	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
PeE:				
Pigeonroost	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, area reclaim.
Edneytown	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.

Table 14.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
PuC:				
Porters	Fair: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Unaka	Poor: depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: small stones, depth to rock.
PuD:				
Porters	Fair: slope, depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Unaka	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
PuE, PwF:				
Porters	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Unaka	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
RoA:				
Rosman	Good	Probable	Probable	Fair: area reclaim.
SaB, ScC:				
Saunook	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
SdD:				
Saunook	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Thunder	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, slope.
TsB, TsC:				
Thunder	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones.
Saunook	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
TsD:				
Thunder	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, slope.

Table 14.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
TsD:				
Saunook	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
TsE:				
Thunder	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, slope.
Saunook	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
TuC:				
Toecane	Poor: large stones.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones.
Tusquitee	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
TwD:				
Toecane	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, slope.
Tusquitee	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
TwE:				
Toecane	Poor: large stones, slope.	Improbable: large stones, excess fines.	Improbable: large stones, excess fines.	Poor: area reclaim, large stones, slope.
Tusquitee	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope, small stones.
Uc. Udifluvents				
Ud. Udorthents				
UrF:				
Unaka	Poor: depth to rock, slope.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: slope, small stones, depth to rock.
Rock outcrop	Poor: slope, depth to rock.	Improbable: depth to rock.	Improbable: depth to rock.	Poor: slope, depth to rock.

Table 14.—Construction Materials—Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
UsB, UsC:				
Unison	Fair: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.
UsD:				
Unison	Fair: shrink-swell, slope, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, too clayey.
W.				
Water				
WbD:				
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: large stones, slope, depth to rock.
WbE, WcF:				
Wayah	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Burton	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: large stones, slope, depth to rock.
WhC:				
Wayah	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Burton	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: large stones, depth to rock.
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: large stones, slope.
WhE:				
Wayah	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, slope.
Burton	Poor: slope, depth to rock.	Improbable: excess fines, thin layer.	Improbable: excess fines, thin layer.	Poor: large stones, slope, depth to rock.

Table 15.—Water Management

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

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 droughty depth to rock	Limitation: slope large stones depth to rock	Limitation: large stones slope depth to rock
Cleveland	Severe: depth to rock slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope droughty depth to rock	Limitation: slope large stones depth to rock	Limitation: large stones slope droughty
Rock outcrop	Severe: depth to rock slope	Severe: depth to rock	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
BbF:						
Balsam	Severe: seepage slope	Severe: seepage large stones	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: slope large stones	Limitation: large stones slope droughty
BcD, BcE:						
Balsam	Severe: seepage slope	Severe: seepage large stones	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: slope large stones	Limitation: large stones slope droughty
Tanasee	Severe: seepage slope	Severe: seepage	Limitation: deep to water	Limitation: slope soil blowing	Limitation: slope large stones too sandy	Limitation: large stones slope
BdA:						
Bandana	Severe: seepage flooding	Severe: piping wetness	Limitation: flooding	Limitation: wetness	Limitation: large stones wetness	Limitation: large stones wetness
BmA:						
Biltmore	Severe: seepage flooding	Severe: seepage piping	Limitation: deep to water	Limitation: droughty fast intake	Limitation: too sandy	Limitation: droughty
BtD, BtE, BtF:						
Buladean	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope rooting depth droughty	Limitation: slope too sandy	Limitation: slope rooting depth
Chestnut	Severe: seepage slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope droughty depth rock	Limitation: slope depth to rock	Limitation: slope depth to rock

Table 15.—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
BwD:						
Burton	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: slope large stones depth to rock	Limitation: large stones slope depth to rock
Craggey	Severe: depth to rock slope	Severe: thin layer	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
BxE, BxF:						
Burton	Severe: seepage slope	Severe: piping thin layer	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: slope large stones depth to rock	Limitation: large stones slope depth to rock
Craggey	Severe: depth to rock slope	Severe: thin layer	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
Rock outcrop	Severe: depth to rock slope	Severe: depth to rock	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
CaB:						
Cashiers	Severe: seepage	Severe: piping hard to pack	Limitation: deep to water	Limitation: slope droughty	Limitation: erodes easily	Favorable
CaC, CcD, CcE, CcF:						
Cashiers	Severe: seepage slope	Severe: piping hard to pack	Limitation: deep to water	Limitation: slope droughty	Limitation: slope erodes easily	Limitation: slope
CdC, CeD, CeE, CeF:						
Chandler	Severe: seepage slope	Severe: piping hard to pack	Limitation: deep to water	Limitation: slope erodes easily	Limitation: slope erodes easily	Limitation: slope
Micaville	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope rooting depth erodes easily	Limitation: slope erodes easily	Limitation: slope rooting depth
CkF:						
Chestoa	Severe: seepage slope	Severe: thin layer	Limitation: deep to water	Limitation: slope droughty	Limitation: slope depth to rock	Limitation: slope droughty depth to rock
Ditney	Severe: seepage slope	Severe: thin layer	Limitation: deep to water	Limitation: slope droughty depth to rock	Limitation: slope depth to rock	Limitation: slope droughty depth to rock
Rock outcrop	Severe: depth to rock slope	Severe: depth to rock	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock

Table 15.—Water Management—Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
CnC2, CnD2, CnE2:						
Clifton----------	Severe: seepage slope	Severe: hard to pack	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
CrE, CrF:						
Craggey----------	Severe: depth to rock slope	Severe: thin layer	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
Rock outcrop-----	Severe: depth to rock slope	Severe: depth to rock	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
Clingman---------	Severe: depth to rock slope	Severe: excess humus thin layer	Limitation: deep to water	Limitation: slope depth to rock rooting depth	Limitation: slope depth to rock	Limitation: slope depth to rock rooting depth
DeA:						
Dellwood---------	Severe: seepage flooding	Severe: seepage large stones	Limitation: flooding large stones	Limitation: large stones droughty	Limitation: large stones too sandy	Limitation: large stones droughty
Reddies----------	Severe: seepage flooding	Severe: seepage	Limitation: flooding large stones	Limitation: large stones droughty	Limitation: large stones too sandy	Limitation: large stones droughty
DrB:						
Dillard----------	Moderate: slope	Moderate: piping	Limitation: slope	Limitation: slope wetness	Limitation: wetness	Favorable
DuD, DuE, DwF:						
Ditney-----------	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope droughty depth to rock	Limitation: slope depth to rock	Limitation: slope droughty depth to rock
Unicoi-----------	Severe: depth to rock slope	Severe: large stones	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: slope large stones depth to rock	Limitation: large stones slope droughty
EaC2, EcD, EcE:						
Evard------------	Severe: slope	Severe: seepage piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
Cowee------------	Severe: slope	Severe: thin layer piping	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock

Table 15.—Water Management—Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Features affecting-- Drainage	Irrigation	Terraces and diversions	Grassed waterways
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: slope depth to rock rooting depth	Limitation: slope depth to rock	Limitation: slope depth to rock
Shinbone---------	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: slope rooting depth	Limitation: slope	Limitation: slope rooting depth
HuC, HuD, HuE:						
Huntdale---------	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
KcD, KcE:						
Keener-----------	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
Lostcove---------	Severe: slope	Severe: seepage large stones	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: slope large stones	Limitation: large stones slope droughty
NkA:						
Nikwasi----------	Severe: seepage	Severe: seepage wetness	Limitation: flooding large stones cutbanks cave	Limitation: wetness droughty flooding	Limitation: large stones wetness	Limitation: large stones wetness
PeD, PeE:						
Pigeonroost------	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: slope depth to rock too acid	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
PuC:						
Porters----------	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
Unaka------------	Severe: seepage depth to rock	Severe: piping	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth rock
PuD, PuE, PwF:						
Porters----------	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope

Table 15.—Water Management—Continued

Map symbol and soil name	Limitations for-- Pond reservoir areas	Limitations for-- Embankments, dikes, and levees	Features affecting-- Drainage	Features affecting-- Irrigation	Features affecting-- Terraces and diversions	Features affecting-- Grassed waterways
PuD, PuE, PwF:						
Unaka	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth rock
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
SdD:						
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: slope large stones droughty	Limitation: slope large stones	Limitation: large stones slope droughty
TsB:						
Thunder	Severe: seepage	Severe: large stones	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: large stones	Limitation: large stones droughty
Saunook	Severe: seepage	Severe: seepage	Limitation: deep to water	Limitation: slope	Favorable	Favorable
TsC, TsD, TsE:						
Thunder	Severe: seepage slope	Severe: large stones	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: slope large stones	Limitation: large stones slope droughty
Saunook	Severe: seepage slope	Severe: seepage	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
TuC, TwD, TwE:						
Toecane	Severe: seepage slope	Severe: seepage large stones	Limitation: deep to water	Limitation: slope large stones droughty	Limitation: slope large stones too sandy	Limitation: large stones slope droughty
Tusquitee	Severe: seepage slope	Severe: piping	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope

Table 15.—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
Uc. Udifluvents						
Ud. Udorthents						
UrF: Unaka	Severe: slope	Severe: piping	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
Rock outcrop	Severe: depth to rock slope	Severe: depth to rock	Limitation: deep to water	Limitation: slope depth to rock	Limitation: slope depth to rock	Limitation: slope depth to rock
UsB: Unison	Severe: seepage	Severe: hard to pack	Limitation: deep to water	Limitation: slope	Favorable	Favorable
UsC, UsD: Unison	Severe: seepage slope	Severe: hard to pack	Limitation: deep to water	Limitation: slope	Limitation: slope	Limitation: slope
W. Water						
WbD, WbE, WcF, WhC, WhD, WhE: 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 large stones droughty	Limitation: slope large stones depth to rock	Limitation: large stones slope depth to rock

Table 16.—Engineering Index Properties

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
AcF:												
Ashe----------	0-6	Gravelly loam	SC-SM, SM	A-2, A-4	0-5	5-10	80-90	75-90	60-90	30-49	25-35	NP-7
	6-26	Gravelly loam, loam, sandy loam, fine sandy loam.	SC-SM, SM	A-4	0-2	5-20	85-100	80-95	60-95	35-49	25-35	NP-7
	26-34	Gravelly loam, 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
	34-45	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Cleveland-----	0-15	Loam-----------	SM	A-2, A-4	0-1	2-5	80-95	75-90	60-80	20-50	0-30	NP-3
	15-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop--	---	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BbF:												
Balsam--------	0-11	Cobbly loam----	SM	A-1-b, A-2-5, A-5	5-20	15-37	75-91	70-85	30-75	20-49	41-70	NP-7
	11-20	Very cobbly fine sandy loam, very cobbly sandy loam, very stony sandy loam, very cobbly 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
	20-42	Very cobbly loam, very cobbly fine sandy loam, very stony loam, very stony fine 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
	42-62	Very cobbly sandy loam, very stony coarse sandy loam, very stony loam.	GM, GP-GM, SP-SM, SM	A-2-4, A-1, A-3	5-40	15-45	33-85	23-75	14-60	5-25	15-30	NP-7

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BcD, BcE:												
Balsam--------	0-11	Cobbly loam----	SM	A-2-5, A-1-b, A-5	5-20	15-37	75-91	70-85	30-75	20-49	41-70	NP-7
	11-20	Very cobbly fine sandy loam, very cobbly sandy loam, very stony sandy loam, very cobbly 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
	20-42	Very cobbly loam, very cobbly fine sandy loam, very stony loam, very stony fine 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
	42-62	Very cobbly sandy loam, very stony coarse sandy loam, very stony loam.	GM, GP-GM, SP-SM, SM	A-1, A-2-4, A-3	5-40	15-45	33-85	23-75	14-60	5-25	15-30	NP-7
Tanasee-------	0-15	Loam-----------	MH, ML, SM	A-2-4, A-4, A-5	0-1	0-5	90-100	80-95	50-85	25-60	30-60	NP-7
	15-28	Sandy loam, gravelly sandy loam, loam.	ML, SM	A-2-4, A-1, A-4, A-5	0-5	0-15	70-100	60-95	30-85	20-60	30-50	NP-7
	28-62	Gravelly sandy loam, sandy loam, loam.	ML, CL-ML, SC-SM, SM	A-2-4, A-1, A-4, A-5	0-5	0-15	70-100	60-95	30-85	20-60	25-50	NP-7
BdA:												
Bandana-------	0-9	Sandy loam-----	ML, SC-SM, CL-ML, SM	A-2-4, A-4	0	0-10	90-100	85-100	60-90	30-70	15-35	NP-10
	9-31	Sandy loam, fine sandy loam, gravelly sandy loam.	SC-SM, SM	A-2-4, A-4	0	0-15	90-100	65-100	50-80	25-49	15-25	NP-5
	31-62	Very gravelly sand, extremely gravelly sand, very cobbly loamy sand.	GP-GM, SM, GM, SP-SM	A-1	0-5	5-50	50-85	25-70	15-40	5-20	10-15	NP

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BmA:												
Biltmore------	0-20	Sand-----------	SM, SP-SM	A-2-4	0	0-5	95-100	90-100	55-88	10-35	10-20	NP
	20-63	Loamy sand, sand, fine sand.	SM, SP-SM	A-2-4, A-3	0	0-8	95-100	85-100	55-96	5-35	10-20	NP
BtD, BtE, BtF:												
Buladean------	0-5	Loam-----------	ML, SC, CL, SM	A-2-4, A-4	0-2	0-5	90-100	85-100	60-90	30-75	25-40	NP-10
	5-32	Sandy loam, loam, coarse sandy loam.	ML, SC, CL, SM	A-2-4, A-4	0-1	0-5	90-100	85-100	60-90	30-75	25-40	NP-10
	32-47	Gravelly sandy loam, sandy loam, coarse sandy loam, loamy sand.	SC-SM, SM	A-2-4, A-4	0-1	0-5	80-100	75-100	60-95	20-49	15-30	NP-7
	47-58	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Chestnut------	0-13	Loam-----------	ML, CL-ML, SC-SM, SM	A-2, A-4, A-5	0-2	0-5	85-100	80-95	60-95	30-55	20-50	NP-9
	13-32	Sandy loam, gravelly sandy loam.	SC-SM, SM	A-2, A-4, A-5	0-5	0-25	75-98	65-97	60-85	34-49	20-45	NP-10
	32-43	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
BwD:												
Burton--------	0-11	Cobbly loam----	SM	A-4, A-2, A-5	2-10	5-35	80-95	75-95	60-90	25-45	30-50	NP-7
	11-25	Cobbly sandy loam, very cobbly fine sandy loam, gravelly sandy loam.	SC-SM, GM, SM, SP-SM	A-1-b, A-2	0-15	10-35	45-75	40-65	35-55	10-30	25-35	NP-7
	25-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Craggey-------	0-16	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
	16-27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
BxE, BxF:												
Burton--------	0-11	Cobbly loam----	SM	A-2, A-4, A-5	2-10	5-35	80-95	75-95	60-90	25-45	30-50	NP-7
	11-25	Cobbly sandy loam, very cobbly fine sandy loam, gravelly sandy loam.	SC-SM, GM, SM, SP-SM	A-1-b, A-2	0-15	10-35	45-75	40-65	35-55	10-30	25-35	NP-7
	25-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Craggey-------	0-16	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
	16-27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop--	0-62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
CaB, CaC, CcD, CcE, CcF:												
Cashiers-----	0-13	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-2-4, A-4, A-5	0-2	0-5	90-100	85-100	60-85	25-65	30-50	NP-7
	13-50	Sandy loam, fine sandy loam, gravelly sandy loam.	ML, SC-SM, CL-ML, SM	A-2-4, A-4	0-2	0-5	70-95	60-95	50-85	25-65	30-50	NP-7
	50-78	Loamy sand, sandy loam, gravelly sandy loam, gravelly fine sandy loam.	SC-SM, SM	A-1-b, A-2-4, A-4	0-2	0-15	70-95	60-95	30-75	20-50	30-50	NP-7
CdC, CeD, CeE, CeF:												
Chandler-----	0-4	Fine sandy loam	ML, MH, SM	A-4, A-2, A-5	0-1	0-5	90-100	85-100	60-85	25-65	30-76	NP-7
	4-69	Loam, fine sandy loam, sandy loam.	ML, MH, SM	A-4, A-2, A-5	0-5	0-15	90-100	85-100	60-85	25-65	30-60	NP-7
Micaville----	0-18	Sandy loam-----	SC-SM, SM	A-2-4, A-4	0-5	0-5	90-100	80-100	50-70	25-49	15-35	NP-7
	18-54	Gravelly sandy loam, gravelly loamy sand, sandy loam.	SC-SM, SM, SP-SM	A-1-b, A-4, A-2-4	0-2	0-15	75-100	60-100	35-75	10-40	15-40	NP-7
	54-65	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
CkF:												
Chestoa-------	0-8	Sandy loam-----	SC-SM, SM	A-2-4, A-4	0-2	0-5	85-100	75-100	50-75	25-49	15-30	NP-7
	8-13	Sandy loam, loam, channery loamy sand.	SC-SM, SM	A-1-b, A-2-4, A-4	0-5	2-20	75-95	65-90	45-75	20-49	15-30	NP-7
	13-26	Channery sandy loam, channery loamy sand, loam.	SC-SM, SM	A-1-b, A-2-4, A-4	0-5	2-20	70-95	60-85	40-70	20-49	15-30	NP-7
	26-37	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Ditney--------	0-17	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-2-4, A-4	0	0-6	90-100	80-95	65-80	30-60	0-30	NP-10
	17-25	Very gravelly sandy loam, loam, sandy loam, cobbly loam.	ML, CL-ML, SC-SM, SM	A-2-4, A-4	0	5-30	65-100	60-100	45-75	25-60	0-30	NP-10
	25-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop--	0-62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
CnC2, CnD2, CnE2:												
Clifton------	0-8	Clay loam------	CL-ML, CL, ML	A-5, A-4, A-6, A-7	0	0-5	90-100	90-100	80-95	60-80	30-50	5-20
	8-40	Clay, clay loam	MH, ML	A-7	0	0-5	95-100	85-100	75-100	60-85	41-65	12-30
	40-79	Fine sandy loam, loam.	CL, SM, ML, SC	A-6, A-4, A-5	0-5	0-15	90-100	85-100	70-100	45-65	15-35	NP-18
CrE, CrF:												
Craggey-------	0-16	Gravelly loam	GM, SM, SC-SM	A-1-b, A-2	0-5	5-15	55-95	50-90	30-60	15-35	25-50	NP-7
	16-27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop--	0-62	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Clingman------	0-15	Peat-----------	PT	A-8	0-2	0-5	---	---	---	---	---	---
	15-19	Loamy sand, sandy loam, loam.	ML, CL-ML, SC-SM, SM	A-1-b, A-2-4, A-4	0-2	0-5	85-100	75-95	35-85	15-75	15-30	NP-5
	19-30	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
DeA:												
Dellwood------	0-15	Loamy fine sand	ML, SM	A-2-4, A-4	0-2	0-5	90-100	69-99	50-92	20-55	15-37	NP-4
	15-67	Very gravelly coarse sand, extremely gravelly sand, very gravelly loamy sand.	GP, GM, GP-GM, SP	A-1	0-5	10-25	13-75	10-55	4-40	1-15	10-20	NP
Reddies-------	0-13	Fine sandy loam	ML, SM	A-2-4, A-4	0	0-5	90-100	80-100	50-95	25-55	25-37	NP-7
	13-23	Fine sandy loam, sandy loam, gravelly sandy loam.	ML, SM	A-1-b, A-2-4, A-4	0-1	0-15	70-100	60-95	30-85	15-55	25-35	NP-7
	23-62	Extremely cobbly loamy coarse sand, extremely gravelly sand, very gravelly sand, very cobbly sand, very gravelly fine sandy loam.	GM, GP-GM, SP-SM, SM	A-1	0-5	10-50	13-75	10-55	4-40	1-15	10-14	NP
DrB:												
Dillard-------	0-8	Loam----------	CL, ML	A-4	0	0-2	95-100	90-100	75-95	60-85	0-35	NP-10
	8-27	Clay loam, sandy clay loam, loam.	ML, CL, SC	A-6, A-4, A-7	0	0-2	95-100	85-100	60-95	45-70	30-45	7-22
	27-63	Clay loam, sandy clay loam, clay.	CH, CL	A-6, A-7	0	0-2	98-100	95-100	70-95	60-90	36-55	15-30
DuD, DuE, DwF:												
Ditney--------	0-17	Fine sandy loam	CL-ML, SM, ML, SC-SM	A-2-4, A-4	0	0-6	90-100	80-95	65-80	30-60	0-30	NP-10
	17-25	Gravelly sandy loam, sandy loam, loam, cobbly loam.	ML, CL-ML, SC-SM, SM	A-2-4, A-4	0	5-30	65-100	60-100	45-75	25-60	0-30	NP-10
	25-36	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
DuD, DuE, DwF:												
Unicoi--------	0-3	Gravelly loam	SC-SM, SM	A-1-b, A-2	0	0-10	70-85	50-70	30-50	20-35	0-25	NP-6
	3-15	Very cobbly loam, very cobbly sandy loam, very stony loam.	GM, GC-GM, SC-SM, SM	A-1-b, A-2	0	20-50	60-75	40-65	30-50	20-35	0-25	NP-6
	15-26	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
EaC2:												
Evard---------	0-32	Clay loam------	CL, SM, ML, SC	A-2, A-4, A-7-6, A-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	32-63	Loam, sandy loam, sandy clay loam.	ML, CL, SC, SM	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	0-25	NP-9
Cowee---------	0-31	Clay loam------	CL, SC	A-2-4, A-4, A-2-6	0	0-5	90-100	85-100	70-85	30-80	26-50	5-15
	31-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
EcD, EcE:												
Evard---------	0-4	Loam----------	ML	A-4	0	0-5	90-100	90-100	85-95	60-75	0-35	NP-9
	4-32	Clay loam, sandy clay loam.	CL, ML, SM, SC	A-4, A-2, A-6, A-7-6	0	0-2	90-100	85-100	60-95	30-70	25-45	7-18
	32-63	Loam, sandy loam, sandy clay loam.	CL, SM, ML, SC	A-2, A-4	0	0-5	80-100	75-100	60-95	20-55	0-25	NP-9
Cowee---------	0-4	Gravelly loam	ML, SC-SM, SM	A-2, A-2-4, A-5, A-4	0-5	0-15	75-95	65-85	55-75	20-51	26-41	NP-12
	4-31	Clay loam, gravelly sandy clay loam, loam.	CL, ML, SM, SC	A-4, A-2, A-6, A-7	0-2	0-15	47-99	45-90	32-85	17-60	26-50	5-22
	31-42	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
FeC2, FeD2, FeE2:												
Fannin-------	0-3	Sandy clay loam	CL, MH, SM, ML	A-2, A-7, A-4, A-6	0-2	0-10	90-100	85-100	70-100	30-80	30-55	5-25
	3-31	Sandy clay loam, clay loam, loam.	MH, CL, ML, SM	A-4, A-6, A-7	0	2-10	97-100	90-100	67-95	40-85	30-55	5-25
	31-80	Fine sandy loam, sandy loam, loam.	ML, SM	A-2, A-4, A-5	0	0-15	75-100	70-98	60-90	15-70	30-50	NP-10
HaD, HaE:												
Harmiller-----	0-3	Loam-----------	ML, CL, SC, SM	A-2-4, A-4	0-1	0-5	85-100	80-100	65-85	30-75	15-30	NP-10
	3-17	Loam, clay loam, gravelly loam.	ML, SC, CL, SM	A-4, A-5, A-7-6, A-6	0-1	0-15	70-100	60-100	55-95	40-85	35-50	9-20
	17-33	Gravelly coarse sandy loam, gravelly loam, sandy loam.	GM, SC, SM	A-2-4, A-4	0-1	0-25	60-100	40-90	30-80	20-49	15-25	NP-10
	33-44	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Shinbone------	0-7	Loam-----------	ML, CL, SC, SM	A-2-4, A-4	0-1	0-5	85-100	80-100	65-85	30-75	20-30	NP-10
	7-32	Channery loam, channery sandy clay loam, channery clay loam.	ML, CL, SC, SM	A-4, A-5, A-6	0-1	5-15	70-95	60-95	55-85	35-80	25-50	5-20
	32-45	Channery fine sandy loam, channery sandy loam, channery loam.	ML, CL, SC, SM	A-2-4, A-4	0-1	5-15	70-100	55-99	40-90	30-70	20-30	NP-10
	45-81	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
HuC, HuD, HuE:												
Huntdale------	0-9	Clay loam------	CL, ML, CL-ML, MH	A-4, A-6	0-2	0-5	85-100	75-100	65-95	55-95	25-50	5-20
	9-28	Clay loam, loam, silt loam.	ML, CL, SC, SM	A-4, A-6, A-7	0-2	0-5	90-100	85-100	75-90	40-85	25-40	NP-15
	28-63	Fine sandy loam, sandy loam, loam.	ML, CL, SC, SM	A-4, A-2-4, A-6	0-2	0-5	90-100	80-100	60-90	35-75	15-35	NP-10

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
KcD, KcE:												
Keener--------	0-30	Loam-----------	ML, CL-ML, SC-SM, SM	A-4	0	0-5	96-100	86-98	68-98	40-80	0-25	NP-7
	30-79	Very cobbly clay loam, very cobbly sandy clay loam.	CL-ML, SM, SC, SC-SM	A-4	0	15-50	95-100	95-100	70-100	40-70	18-30	3-10
Lostcove------	0-4	Very cobbly sandy loam.	GM, GC-GM, SC-SM, SM	A-1, A-2, A-4	0-5	5-50	50-75	40-75	30-60	20-40	20-30	NP-10
	4-13	Cobbly loam, very gravelly fine sandy loam, very cobbly loam.	GC-GM, SM, 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
	13-52	Extremely cobbly loam, very cobbly loam, very gravelly clay loam.	GC-GM, GM, GC, SM	A-4, A-2, A-6, A-7-6	0-5	10-70	23-72	22-60	19-50	15-40	20-50	7-20
	52-73	Extremely gravelly coarse sandy loam, extremely cobbly sandy loam, very gravelly sandy clay loam.	GC-GM, GC, GM, SM	A-1, A-4, A-2	0-5	10-70	35-72	35-60	20-50	10-40	20-40	NP-10
NkA:												
Nikwasi-------	0-36	Sandy loam-----	ML, SM	A-2-4, A-4	0	0-5	90-100	80-99	50-93	17-55	15-37	NP-4
	36-62	Very gravelly sand, extremely gravelly coarse sand, very cobbly loamy sand.	GP-GM, GM, SM, SP-SM	A-1	0-5	10-50	25-75	10-55	7-40	1-15	10-14	NP

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
PeD, PeE:												
Pigeonroost	0-2	Loam	ML, CL, SC, SM	A-2, A-4	0-1	0-15	90-100	85-100	60-90	30-75	20-30	NP-10
	2-15	Clay loam, loam, sandy clay loam, gravelly sandy clay loam.	ML, CL, SC, SM	A-4, A-6	0-1	0-15	85-100	70-100	65-90	40-80	25-40	7-14
	15-27	Gravelly loam, loam, sandy loam.	CL, ML, SM, SC	A-2, A-4	0-1	0-15	85-100	65-100	65-95	30-75	20-30	NP-10
	27-38	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
Edneytown	0-4	Loam	ML, CL-ML, SC-SM, SM	A-2, A-4, A-5	0-1	0-2	95-100	90-100	70-85	40-70	0-25	NP-7
	4-38	Loam, sandy clay loam, clay loam.	CL, CL-ML, SC	A-4, A-6	0	0	98-100	95-100	80-97	45-75	25-35	5-15
	38-63	Sandy loam, loam, loamy sand.	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	98-100	95-100	50-90	15-70	0-25	NP-7
PuC, PuD, PuE, PwF:												
Porters	0-9	Loam	CL, CL-ML, ML	A-4	0-2	0-5	85-100	80-100	70-80	51-65	20-35	NP-10
	9-54	Gravelly loam, loam, sandy loam.	ML, CL-ML, SC-SM, SM	A-2, A-4	0-5	5-25	75-99	60-99	50-90	30-70	15-25	NP-7
	54-65	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Unaka	0-9	Loam	ML, CL-ML, SM	A-4	0	0-10	85-95	80-90	65-80	40-65	0-30	NP-7
	9-27	Gravelly loam, loam, sandy loam.	CL-ML, ML, SM	A-4	---	2-20	85-95	70-90	65-80	40-65	0-30	NP-7
	27-31	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	31-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
RoA:												
Rosman--------	0-14	Fine sandy loam	ML, SM, SC-SM	A-2-5, A-2-4, A-4	0	0	95-100	90-100	75-100	30-60	15-41	NP-7
	14-80	Loamy fine sand, fine sandy loam, loamy sand, 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-------	0-9	Sandy loam-----	MH, ML, SM	A-4, A-2, A-5, A-7-5	0	0-5	90-100	85-100	60-90	25-65	30-59	NP-14
	9-57	Sandy clay loam, loam, clay loam.	ML, SC, CL, SM	A-4, A-6, A-7	0-2	0-5	90-100	85-100	75-95	35-75	25-55	7-20
	57-79	Very cobbly sandy loam, cobbly fine sandy loam, cobbly sandy loam.	GM, SM	A-1-b, A-2-4, A-4	0-15	15-35	55-80	55-80	30-75	20-50	25-40	NP-10
SdD:												
Saunook-------	0-9	Sandy loam-----	MH, SM, ML	A-4, A-2, A-5, A-7-5	0	0-5	90-100	85-100	60-90	25-65	30-59	NP-14
	9-57	Sandy clay loam, loam, clay loam.	ML, CL, SC, SM	A-4, A-6, A-7	0-2	0-5	90-100	85-100	75-95	35-75	25-55	7-20
	57-79	Very cobbly sandy loam, cobbly fine sandy loam, cobbly sandy loam.	GM, SM	A-1-b, A-2-4, A-4	0-15	15-35	55-80	55-80	30-75	20-50	25-40	NP-10
Thunder-------	0-9	Very cobbly loam.	GC-GM, SC-SM, SC	A-2, A-4	0-5	35-62	60-75	55-65	40-50	20-40	25-35	6-15
	9-36	Very cobbly sandy clay loam, very cobbly clay loam, extremely cobbly loam.	GC-GM, SC-SM, SC	A-4, A-2, A-6	3-50	0-72	65-75	55-65	40-50	20-40	25-35	6-15
	36-79	Extremely cobbly sandy loam, very cobbly coarse sandy loam.	GC-GM, SC, SC-SM	A-1	3-50	0-72	40-60	30-45	25-35	15-20	0-30	NP-10

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
TsB, TsC, TsD, TsE:												
Thunder------	0-9	Very cobbly loam.	GC-GM, SC, SC-SM	A-2, A-4	0-5	35-62	60-75	55-65	40-50	20-40	25-35	6-15
	9-36	Very cobbly sandy clay loam, very cobbly clay loam, extremely cobbly loam.	GC-GM, SC-SM, SC	A-4, A-2, A-6	3-50	0-72	65-75	55-65	40-50	20-40	25-35	6-15
	36-79	Extremely cobbly sandy loam, very cobbly sandy loam.	GC-GM, SC-SM, SC	A-1	3-50	0-72	40-60	30-45	25-35	15-20	0-30	NP-10
Saunook------	0-9	Sandy loam-----	MH, ML, SM	A-2, A-7-5, A-4, A-5	0	0-5	90-100	85-100	60-90	25-65	30-59	NP-14
	9-57	Sandy clay loam, loam, clay loam.	ML, SC, CL, SM	A-4, A-6, A-7	0-2	0-5	90-100	85-100	75-95	35-75	25-55	7-20
	57-79	Very cobbly sandy loam, cobbly fine sandy loam, cobbly sandy loam.	GM, SM	A-1-b, A-4, A-2-4	0-15	15-35	55-80	55-80	30-75	20-50	25-40	NP-10
TuC, TwD, TwE:												
Toecane-------	0-8	Cobbly loam----	SC-SM, SM	A-2-4, A-4	2-10	25-50	70-95	65-95	45-85	30-49	15-30	NP-7
	8-24	Very cobbly loam, very cobbly sandy clay loam.	GM, GC-GM, SC-SM, SM	A-1-b, A-2-4, A-4	5-20	35-65	60-90	40-70	30-60	20-45	15-30	NP-7
	24-30	Very cobbly sandy loam, very stony fine sandy loam.	GM, SC-SM, GC-GM, SM	A-2-4, A-1-b, A-4	5-20	35-65	55-90	35-65	30-55	15-40	10-25	NP-7
	30-63	Extremely cobbly loamy sand, extremely cobbly loamy fine sand, very stony sandy loam.	GM, SC-SM, GC-GM, SM	A-1-b, A-2-4	5-25	40-80	55-80	30-50	20-40	15-30	10-20	NP-5

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
TuC, TwD, TwE:												
Tusquitee-----	0-9	Loam-----------	MH, ML	A-4, A-5	0-1	0-10	85-100	80-100	70-95	50-65	25-58	NP-10
	9-88	Fine sandy loam, sandy loam, loam, sandy clay loam.	ML, SM, SC-SM	A-4	0-1	0-15	90-100	75-100	65-95	36-65	20-40	NP-10
Uc. Udifluvents												
Ud. Udorthents												
UrF:												
Unaka---------	0-9	Loam-----------	CL-ML, ML, SM	A-4	---	2-10	85-95	80-90	65-80	40-65	0-30	NP-7
	9-27	Gravelly loam, loam, sandy loam.	CL-ML, ML, SM	A-4	---	2-20	85-95	70-90	65-80	40-65	0-30	NP-7
	27-31	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
	31-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
Rock outcrop--	0-60	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
UsB, UsC, UsD:												
Unison--------	0-10	Loam-----------	CL-ML, CL, ML	A-4, A-6	0	0-10	85-100	80-100	60-95	50-90	20-38	2-15
	10-88	Clay, clay loam, sandy clay loam, fine sandy loam.	CH, CL	A-6, A-7	0	0-25	75-100	65-100	60-100	55-95	35-65	15-35
W. Water												

Table 16.—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	
WbD, WbE:												
Wayah---------	0-14	Loam-----------	ML, SM	A-4, A-2, A-5	0-2	0-5	90-100	80-98	50-88	25-65	30-50	NP-10
	14-48	Sandy loam, fine sandy loam, gravelly sandy loam.	ML, GM, SC-SM, SM	A-1-b, A-2-4, A-4	0-5	3-15	53-99	50-97	30-87	20-55	25-35	NP-10
	48-79	Gravelly sandy loam, gravelly fine sandy loam, gravelly loamy sand.	GP-GM, GM, SM, SP-SM	A-1-b, A-2-4	0-5	3-15	53-87	50-80	20-50	10-30	20-35	NP-4
Burton--------	0-11	Cobbly loam----	SM	A-2, A-4, A-5	2-10	5-35	80-95	75-95	60-90	25-45	30-50	NP-7
	11-25	Cobbly sandy loam, very cobbly fine sandy loam, gravelly sandy loam.	GM, SP-SM, SC-SM, SM	A-1-b, A-2	0-15	10-35	45-75	40-65	35-55	10-30	25-35	NP-7
	25-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---
WcF:												
Wayah---------	0-14	Loam-----------	ML, SM	A-2, A-4, A-5	0-2	0-5	90-100	80-98	50-88	25-65	30-50	NP-10
	14-48	Sandy loam, fine sandy loam, gravelly sandy loam.	GM, ML, SM, SC-SM	A-2-4, A-1-b, A-4	0-5	3-15	53-99	50-97	30-87	20-55	25-35	NP-10
	48-79	Gravelly sandy loam, gravelly fine sandy loam, gravelly loamy sand.	GM, SP-SM, GP-GM, SM	A-1-b, A-2-4	0-5	3-15	53-87	50-80	20-50	10-30	20-35	NP-4
Burton--------	0-11	Cobbly loam----	SM	A-4, A-2, A-5	2-10	5-35	80-95	75-95	60-90	25-45	30-50	NP-7
	11-25	Cobbly sandy loam, very cobbly fine sandy loam, gravelly sandy loam.	SC-SM, SM, GM, SP-SM	A-1-b, A-2	0-15	10-35	45-75	40-65	35-55	10-30	25-35	NP-7
	25-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 16.—Engineering Index Properties—Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
WhC, WhD, WhE:												
Wayah---------	0-14	Loam-----------	ML, SM	A-2, A-5, A-4	0-2	0-5	90-100	80-98	50-88	25-65	30-50	NP-10
	14-48	Sandy loam, fine sandy loam, gravelly sandy loam.	GM, ML, SM, SC-SM	A-1-b, A-4, A-2-4	0-5	3-15	53-99	50-97	30-87	20-55	25-35	NP-10
	48-79	Gravelly sandy loam, gravelly fine sandy loam, gravelly loamy sand.	GP-GM, GM, SM, SP-SM	A-1-b, A-2-4	0-5	3-15	53-87	50-80	20-50	10-30	20-35	NP-4
Burton--------	0-11	Cobbly loam----	SM	A-2, A-5, A-4	2-10	5-35	80-95	75-95	60-90	25-45	30-50	NP-7
	11-25	Cobbly sandy loam, very cobbly fine sandy loam, gravelly sandy loam.	SC-SM, GM, SM, SP-SM	A-1-b, A-2	0-15	10-35	45-75	40-65	35-55	10-30	25-35	NP-7
	25-41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---	---

Table 17.—Physical and Chemical Properties of the Soils

(Entries under "Erosion factors--T" apply to the entire profile. Absence of an entry indicates that data were not estimated)

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter*	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Soil reaction
	In	Pct	g/cc	In/hr	In/in	Pct	Pct				pH
AcF:											
Ashe-----------	0-6	7-20	1.35-1.60	2-6	0.10-0.13	0.0-2.9	1.0-8.0**	.17	.24	2	3.5-6.0
	6-26	7-20	1.35-1.60	2-6	0.10-0.14	0.0-2.9		.17	.24		3.5-6.0
	26-34	5-15	1.45-1.65	2-6	0.08-0.12	0.0-2.9		.17	.24		3.5-6.0
	34-45	---	---	---	---	---		---	---		---
Cleveland------	0-15	6-20	1.20-1.50	2-6	0.08-0.12	0.0-2.9	1.0-8.0**	.24	.24	1	4.5-6.0
	15-26	---	---	---	---	---		---	---		---
Rock outcrop.											
BbF:											
Balsam---------	0-11	10-22	0.50-1.00	2-6	0.20-0.25	0.0-2.9	8.0-20	.10	.20	5	3.5-6.0
	11-20	15-25	1.00-1.50	2-6	0.06-0.10	0.0-2.9		.05	.17		3.5-6.0
	20-42	12-22	1.00-1.50	2-6	0.06-0.10	0.0-2.9		.05	.17		3.5-6.0
	42-62	2-15	1.20-1.60	2-6	0.04-0.09	0.0-2.9		.05	.20		3.5-6.0
BcD, BcE:											
Balsam---------	0-11	10-22	0.50-1.00	2-6	0.20-0.25	0.0-2.9	8.0-20	.10	.20	5	3.5-6.0
	11-20	15-25	1.00-1.50	2-6	0.06-0.10	0.0-2.9		.05	.17		3.5-6.0
	20-42	12-22	1.00-1.50	2-6	0.06-0.10	0.0-2.9		.05	.17		3.5-6.0
	42-62	2-15	1.20-1.60	2-6	0.04-0.09	0.0-2.9		.05	.20		3.5-6.0
Tanasee--------	0-15	10-22	1.10-1.30	2-6	0.16-0.22	0.0-2.9	8.0-20	.24	.24	5	3.5-5.5
	15-28	15-25	1.35-1.60	2-6	0.12-0.18	0.0-2.9		.20	.24		3.5-5.5
	28-62	5-20	1.35-1.60	2-6	0.10-0.16	0.0-2.9		.15	.24		4.5-5.5
BdA:											
Bandana--------	0-9	10-27	1.30-1.50	2-6	0.12-0.18	0.0-2.9	4.0-8.0	.20	.20	4	5.1-6.5
	9-31	5-20	1.30-1.50	2-6	0.10-0.16	0.0-2.9		.17	.20		5.1-6.5
	31-62	1-5	1.40-1.60	6-20	0.02-0.05	0.0-2.9		.05	.10		5.1-6.5
BmA:											
Biltmore-------	0-20	0-9	1.20-1.65	6-20	0.07-0.11	0.0-2.9	0.5-2.0	.10	.10	5	5.1-7.8
	20-63	0-12	1.20-1.70	6-20	0.06-0.10	0.0-2.9		.10	.10		5.1-7.8
BtD, BtE, BtF:											
Buladean-------	0-5	7-20	1.30-1.65	2-6	0.14-0.20	0.0-2.9	1.0-8.0	.20	.20	4	3.5-6.0
	5-32	7-20	1.30-1.65	2-6	0.12-0.18	0.0-2.9		.20	.20		3.5-6.0
	32-47	5-15	1.45-1.75	2-6	0.07-0.14	0.0-2.9		.15	.15		3.5-6.0
	47-58	---	---	---	---	---		---	---		---
Chestnut-------	0-13	7-20	1.35-1.60	2-6	0.10-0.15	0.0-2.9	1.0-8.0**	.24	.24	3	3.5-6.0
	13-32	7-20	1.35-1.60	2-6	0.08-0.12	0.0-2.9		.15	.24		3.5-6.0
	32-43	---	---	---	---	---		---	---		---
BwD:											
Burton---------	0-11	10-22	1.10-1.30	2-6	0.11-0.16	0.0-2.9	8.0-20	.15	.24	2	3.5-6.0
	11-25	8-25	1.45-1.65	2-6	0.07-0.12	0.0-2.9		.15	.24		3.5-6.0
	25-41	---	---	---	---	---		---	---		---
Craggey--------	0-16	8-25	1.10-1.30	2-6	0.10-0.15	0.0-2.9	8.0-20	.15	.20	1	3.5-6.0
	16-27	---	---	---	---	---		---	---		---

See footnotes at end of table.

Table 17.—Physical and Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter*	Erosion factors Kw	Kf	T	Soil reaction
	In	Pct	g/cc	In/hr	In/in	Pct	Pct				pH
BxE, BxF:											
Burton---------	0-11	10-22	1.10-1.30	2-6	0.11-0.16	0.0-2.9	8.0-20	.15	.24	2	3.5-6.0
	11-25	8-25	1.45-1.65	2-6	0.07-0.12	0.0-2.9		.15	.24		3.5-6.0
	25-41	---	---	---	---	---		---	---		---
Craggey--------	0-16	8-25	1.10-1.30	2-6	0.10-0.15	0.0-2.9	8.0-20	.15	.20	1	3.5-6.0
	16-27	---	---	---	---	---		---	---		---
Rock outcrop.											
CaB, CaC, CcD, CcE, CcF:											
Cashiers------	0-13	10-22	1.30-1.50	2-6	0.14-0.20	0.0-2.9	6.0-14	.32	.32	4	4.5-6.0
	13-50	10-25	1.30-1.50	2-6	0.13-0.18	0.0-2.9		.32	.32		4.5-6.0
	50-78	5-18	1.30-1.50	2-6	0.10-0.14	0.0-2.9		.32	.32		4.5-6.0
CdC, CeD, CeE, CeF:											
Chandler------	0-4	5-18	1.30-1.50	2-6	0.12-0.18	0.0-2.9	1.0-8.0	.32	.32	3	4.5-6.0
	4-69	5-18	1.30-1.50	2-6	0.11-0.15	0.0-2.9		.32	.32		4.5-6.0
Micaville-----	0-18	5-20	1.00-1.40	2-6	0.10-0.14	0.0-2.9	1.0-8.0**	.28	.28	3	3.5-6.0
	18-54	2-18	1.20-1.80	2-6	0.10-0.14	0.0-2.9		.28	.32		3.5-6.0
	54-65	---	---	---	---	---		---	---		---
CkF:											
Chestoa--------	0-8	10-20	1.35-1.50	0.6-6	0.10-0.15	0.0-2.9	6.0-14	.17	.24	2	3.5-5.5
	8-13	8-20	1.40-1.60	0.6-6	0.04-0.08	0.0-2.9		.17	.24		3.5-5.5
	13-26	8-20	1.40-1.60	0.6-6	0.06-0.10	0.0-2.9		.15	.20		3.5-5.5
	26-37	---	---	---	---	---		---	---		---
Ditney---------	0-17	5-18	1.50-1.65	2-6	0.10-0.15	0.0-2.9	1.0-8.0**	.24	.24	2	3.6-5.5
	17-25	5-18	1.50-1.65	2-6	0.05-0.13	0.0-2.9		.17	.24		3.6-5.5
	25-36	---	---	---	---	---		---	---		---
Rock outcrop.											
CnC2, CnD2, CnE2:											
Clifton-------	0-8	27-40	1.25-1.35	0.6-2	0.15-0.20	0.0-2.9	0.5-4.0	.28	.28	3	4.5-6.5
	8-40	35-55	1.20-1.60	0.6-2	0.15-0.20	0.0-2.9		.28	.28		4.5-6.5
	40-79	5-27	1.20-1.35	2-6	0.11-0.15	0.0-2.9		.28	.28		4.5-6.5
CrE, CrF:											
Craggey--------	0-16	8-25	1.10-1.30	2-6	0.10-0.15	0.0-2.9	8.0-20	.15	.20	1	3.5-6.0
	16-27	---	---	---	---	---		---	---		---
Rock outcrop.											
Clingman-------	0-15	---	0.15-0.40	2-6	0.45-0.65	0.0-2.9	20-90	---	---	1	2.0-4.4
	15-19	5-18	1.50-1.80	0.6-6	0.09-0.20	0.0-2.9		.17	.17		3.5-5.5
	19-30	---	---	0.06-2	---	---		---	---		---
DeA:											
Dellwood-------	0-15	5-15	1.30-1.50	2-6	0.10-0.15	0.0-2.9	4.0-8.0	.20	.20	3	4.5-7.3
	15-67	1-8	1.40-1.60	6-20	0.02-0.05	0.0-2.9		.05	.10		4.5-7.3
Reddies--------	0-13	5-18	1.30-1.50	2-6	0.10-0.18	0.0-2.9	4.0-8.0	.20	.20	4	4.5-7.3
	13-23	5-18	1.35-1.55	2-6	0.08-0.15	0.0-2.9		.10	.20		4.5-7.3
	23-62	1-5	1.40-1.60	6-20	0.02-0.05	0.0-2.9		.05	.15		4.5-7.3

See footnotes at end of table.

Table 17.—Physical and Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter*	Erosion factors Kw	Kf	T	Soil reaction
	In	Pct	g/cc	In/hr	In/in	Pct	Pct				pH
DrB:											
Dillard--------	0-8	10-25	1.20-1.50	0.6-2	0.15-0.20	0.0-2.9	2.0-8.0	.32	.32	4	5.1-6.0
	8-27	18-35	1.40-1.60	0.6-2	0.12-0.16	0.0-2.9		.28	.28		4.5-5.5
	27-63	30-50	1.40-1.60	0.2-0.6	0.14-0.18	3.0-5.9		.28	.28		4.5-5.5
DuD, DuE, DwF:											
Ditney---------	0-17	5-18	1.50-1.65	2-6	0.10-0.15	0.0-2.9	1.0-8.0**	.24	.24	2	3.6-5.5
	17-25	5-18	1.50-1.65	2-6	0.05-0.13	0.0-2.9		.17	.24		3.6-5.5
	25-36	---	---	---	---	---		---	---		---
Unicoi---------	0-3	5-20	1.45-1.55	2-6	0.08-0.12	0.0-2.9	1.0-8.0	.20	.28	1	3.6-5.5
	3-15	5-20	1.45-1.60	2-6	0.04-0.09	0.0-2.9		.15	.24		3.6-5.5
	15-26	---	---	---	---	---		---	---		---
EaC2:											
Evard----------	0-32	25-35	1.30-1.50	0.6-2	0.12-0.16	0.0-2.9	0.5-4.0	.24	.24	3	4.5-6.0
	32-63	12-30	1.20-1.40	0.6-2	0.10-0.25	0.0-2.9		.24	.24		4.5-6.0
Cowee----------	0-31	20-35	1.25-1.60	0.6-2	0.12-0.18	0.0-2.9	0.5-4.0	.28	.28	3	3.5-6.0
	31-42	---	---	---	---	---		---	---		---
EcD, EcE:											
Evard----------	0-4	7-25	1.30-1.50	0.6-2	0.15-0.20	0.0-2.9	1.0-8.0	.28	.28	5	4.5-6.0
	4-32	18-35	1.30-1.50	0.6-2	0.12-0.16	0.0-2.9		.24	.24		4.5-6.0
	32-63	12-30	1.20-1.40	0.6-2	0.10-0.25	0.0-2.9		.24	.24		4.5-6.0
Cowee----------	0-4	8-20	1.25-1.60	2-6	0.10-0.15	0.0-2.9	1.0-8.0	.20	.28	3	3.5-6.0
	4-31	18-35	1.30-1.60	0.6-2	0.12-0.18	0.0-2.9		.24	.28		3.5-6.0
	31-42	---	---	---	---	---		---	---		---
FeC2, FeD2, FeE2:											
Fannin--------	0-3	18-35	1.30-1.50	0.6-2	0.12-0.18	0.0-2.9	0.5-4.0	.28	.28	3	4.5-6.5
	3-31	18-35	1.30-1.50	0.6-2	0.11-0.17	0.0-2.9		.32	.32		4.5-6.5
	31-80	5-25	1.30-1.50	0.6-2	0.08-0.12	0.0-2.9		.32	.32		4.5-6.5
HaD, HaE:											
Harmiller------	0-3	5-18	1.20-1.40	2-6	0.12-0.18	0.0-2.9	1.0-8.0	.24	.24	3	3.5-6.0
	3-17	18-35	1.40-1.80	0.6-2	0.12-0.18	0.0-2.9		.28	.28		3.5-6.0
	17-33	2-18	1.40-1.80	0.6-2	0.10-0.16	0.0-2.9		.10	.20		3.5-6.0
	33-44	---	---	---	---	---		---	---		---
Shinbone-------	0-7	5-18	1.40-1.60	2-6	0.12-0.18	0.0-2.9	1.0-8.0**	.24	.24	4	3.5-6.0
	7-32	18-35	1.40-1.65	0.6-2	0.12-0.18	0.0-2.9		.17	.28		3.5-6.0
	32-45	5-20	1.40-1.85	0.6-2	0.10-0.15	0.0-2.9		.20	.24		3.5-6.0
	45-81	---	---	---	---	---		---	---		---
HuC, HuD, HuE:											
Huntdale-------	0-9	12-35	1.30-1.50	2-6	0.12-0.16	0.0-2.9	4.0-12	.28	.28	5	3.5-6.0
	9-28	18-35	1.30-1.50	0.6-2	0.12-0.18	0.0-2.9		.24	.24		3.5-6.0
	28-63	2-22	1.35-1.60	0.6-2	0.12-0.18	0.0-2.9		.20	.20		3.5-6.0
KcD, KcE:											
Keener---------	0-30	5-25	1.35-1.60	2-6	0.14-0.18	0.0-2.9	4.0-8.0**	.24	.24	5	3.6-6.0
	30-79	10-35	1.30-1.45	2-6	0.08-0.12	0.0-2.9		.20	.24		3.6-6.0
Lostcove-------	0-4	7-20	1.30-1.50	2-6	0.12-0.18	0.0-2.9	4.0-10	.10	.24	5	3.5-6.0
	4-13	7-27	1.30-1.50	2-6	0.08-0.12	0.0-2.9		.10	.28		3.5-6.0
	13-52	18-35	1.30-1.65	0.6-2	0.04-0.09	0.0-2.9		.10	.28		3.5-6.0
	52-73	7-35	1.30-1.65	0.6-2	0.05-0.10	0.0-2.9		.10	.28		3.5-6.0

See footnotes at end of table.

Table 17.—Physical and Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter*	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Soil reaction
	In	Pct	g/cc	In/hr	In/in	Pct	Pct				pH
NkA:											
Nikwasi--------	0-36	5-27	1.30-1.50	2-6	0.13-0.20	0.0-2.9	4.0-12**	.20	.20	4	4.5-6.5
	36-62	1-5	1.40-1.60	6-20	0.02-0.05	0.0-2.9		.05	.10		4.5-6.5
PeD, PeE:											
Pigeonroost----	0-2	8-20	1.35-1.60	2-6	0.14-0.20	0.0-2.9	1.0-8.0	.24	.24	3	3.5-6.0
	2-15	18-35	1.30-1.50	0.6-2	0.12-0.18	0.0-2.9		.28	.28		3.5-6.0
	15-27	8-20	1.35-1.60	0.6-2	0.14-0.20	0.0-2.9		.24	.24		3.5-6.0
	27-38	---	---	---	---	---		---	---		---
Edneytown------	0-4	8-20	1.40-1.60	2-6	0.11-0.17	0.0-2.9	1.0-8.0	.20	.20	5	4.5-6.0
	4-38	20-35	1.30-1.40	0.6-2	0.12-0.18	0.0-2.9		.24	.24		4.5-5.5
	38-63	4-15	1.30-1.50	2-6	0.06-0.12	0.0-2.9		.17	.17		4.5-5.5
PuC, PuD, PuE, PwF:											
Porters-------	0-9	10-22	1.40-1.60	2-6	0.16-0.20	0.0-2.9	6.0-14	.28	.28	3	4.5-6.5
	9-54	7-25	1.40-1.60	2-6	0.10-0.20	0.0-2.9		.24	.24		4.5-6.5
	54-65	---	---	---	---	---		---	---		---
Unaka---------	0-9	10-22	1.35-1.50	0.6-2	0.14-0.18	0.0-2.9	6.0-14	.17	.20	2	4.5-5.5
	9-27	15-25	1.35-1.50	0.6-2	0.14-0.18	0.0-2.9		.17	.20		4.5-5.5
	27-31	---	---	---	---	---		---	---		---
	31-42	---	---	---	---	---		---	---		---
RoA:											
Rosman---------	0-14	8-18	1.25-1.40	2-6	0.12-0.18	0.0-2.9	4.0-8.0	.24	.24	5	5.1-6.5
	14-80	4-18	1.25-1.50	2-6	0.10-0.18	0.0-2.9		.24	.24		5.1-6.5
SaB, ScC:											
Saunook--------	0-9	7-20	1.35-1.60	2-6	0.14-0.20	0.0-2.9	6.0-14	.24	.24	5	3.5-6.0
	9-57	18-35	1.30-1.50	0.6-2	0.12-0.20	0.0-2.9		.24	.24		4.5-6.5
	57-79	7-20	1.35-1.60	2-6	0.07-0.12	0.0-2.9		.15	.24		4.5-6.5
SdD:											
Saunook--------	0-9	7-20	1.35-1.60	2-6	0.14-0.20	0.0-2.9	6.0-14	.24	.24	5	3.5-6.0
	9-57	18-35	1.30-1.50	0.6-2	0.12-0.20	0.0-2.9		.24	.24		4.5-6.5
	57-79	7-20	1.35-1.60	2-6	0.07-0.12	0.0-2.9		.15	.24		4.5-6.5
Thunder--------	0-9	15-27	1.40-1.60	2-6	0.08-0.10	0.0-2.9	6.0-14	.05	.17	5	4.5-6.5
	9-36	15-35	1.40-1.60	0.6-2	0.08-0.12	0.0-2.9		.05	.17		4.5-6.5
	36-79	5-20	1.50-1.70	2-6	0.04-0.08	0.0-2.9		.05	.17		4.5-6.5
TsB, TsC, TsD, TsE:											
Thunder-------	0-9	15-27	1.40-1.60	2-6	0.08-0.10	0.0-2.9	6.0-14	.05	.17	5	4.5-6.5
	9-36	15-35	1.40-1.60	0.6-2	0.08-0.12	0.0-2.9		.05	.17		4.5-6.5
	36-79	5-20	1.50-1.70	2-6	0.04-0.08	0.0-2.9		.05	.17		4.5-6.5
Saunook-------	0-9	7-20	1.35-1.60	2-6	0.14-0.20	0.0-2.9	6.0-14	.24	.24	5	3.5-6.0
	9-57	18-35	1.30-1.50	0.6-2	0.12-0.20	0.0-2.9		.24	.24		4.5-6.5
	57-79	7-20	1.35-1.60	2-6	0.07-0.12	0.0-2.9		.15	.24		4.5-6.5
TuC, TwD, TwE:											
Toecane--------	0-8	10-22	1.30-1.50	2-6	0.10-0.14	0.0-2.9	6.0-14	.10	.20	5	3.5-6.0
	8-24	10-25	1.40-1.60	2-6	0.08-0.12	0.0-2.9		.10	.20		3.5-6.0
	24-30	5-20	1.40-1.60	2-6	0.06-0.10	0.0-2.9		.10	.20		3.5-6.0
	30-25	5-20	1.45-1.65	2-6	0.04-0.08	0.0-2.9		.10	.24		3.5-6.0
Tusquitee------	0-9	7-22	1.20-1.40	2-6	0.16-0.24	0.0-2.9	6.0-14	.28	.28	5	4.5-6.5
	9-88	7-25	1.30-1.60	2-6	0.15-0.21	0.0-2.9		.24	.24		4.5-6.0

See footnotes at end of table.

Table 17.—Physical and Chemical Properties of the Soils—Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea-bility (Ksat)	Available water capacity	Linear extensi-bility	Organic matter*	Erosion factors Kw	Kf	T	Soil reaction
	In	Pct	g/cc	In/hr	In/in	Pct	Pct				pH
Uc. Udifluvents											
Ud. Udorthents											
UrF:											
Unaka----------	0-9	10-22	1.35-1.50	0.6-2	0.14-0.18	0.0-2.9	6.0-14	.17	.20	2	4.5-5.5
	9-27	15-25	1.35-1.50	0.6-2	0.14-0.18	0.0-2.9		.17	.20		4.5-5.5
	27-31	---	---	---	---	---		---	---		---
	31-42	---	---	---	---	---		---	---		---
Rock outcrop.											
UsB, UsC, UsD:											
Unison---------	0-10	10-25	1.35-1.65	0.6-6	0.14-0.20	0.0-2.9	2.0-8.0	.32	.32	5	4.5-6.0
	10-88	30-70	1.30-1.60	0.6-2	0.12-0.18	3.0-5.9		.24	.28		4.5-6.0
W. Water											
WbD, WbE, WcF, WhC, WhD, WhE:											
Wayah---------	0-14	10-25	1.00-1.20	2-6	0.16-0.22	0.0-2.9	8.0-20	.24	.24	3	3.5-5.5
	14-48	15-25	1.20-1.60	2-6	0.09-0.13	0.0-2.9		.15	.24		4.5-6.0
	48-79	3-15	1.40-1.65	2-6	0.05-0.09	0.0-2.9		.10	.24		4.5-6.0
Burton--------	0-11	10-22	1.10-1.30	2-6	0.11-0.16	0.0-2.9	8.0-20	.15	.24	2	3.5-6.0
	11-25	8-25	1.45-1.65	2-6	0.07-0.12	0.0-2.9		.15	.24		3.5-6.0
	25-41	---	---	---	---	---		---	---		---

* Organic matter applies only to the uppermost layer of the soil. Refer to the detailed map unit descriptions for typical surface thickness.

** This soil has a very thin surface layer. The depth given in the first column is for combined surface and subsurface layers. Percent organic matter applies to the uppermost layer. Refer to the detailed map unit descriptions for typical surface thickness.

Table 18.—Water Features

(Depths of layers are in feet. See text for definitions of terms used in this table. Estimates of the frequency of 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: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
AcF:						
Ashe	B					
		Jan-Dec	---	---	---	None
Cleveland	C					
		Jan-Dec	---	---	---	None
Rock outcrop	D					
		Jan-Dec	---	---	---	None
BbF:						
Balsam	B					
		Jan-Dec	---	---	---	None
BcD, BcE:						
Balsam	B					
		Jan-Dec	---	---	---	None
Tanasee	B					
		Jan-Dec	---	---	---	None
BdA:						
Bandana	B					
		January	1.0-2.0	>6.0	Very brief	Occasional
		February	1.0-2.0	>6.0	Very brief	Occasional
		March	1.0-2.0	>6.0	Very brief	Occasional
		April	1.0-2.0	>6.0	Very brief	Occasional
		May	1.0-2.0	>6.0	Very brief	Occasional
		June	---	---	Very brief	Occasional
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Occasional
		September	---	---	Very brief	Occasional
		October	---	---	Very brief	Occasional
		November	---	---	Very brief	Occasional
		December	1.0-2.0	>6.0	Very brief	Occasional
BmA:						
Biltmore	A					
		January	3.5-6.0	>6.0	Very brief	Frequent
		February	3.5-6.0	>6.0	Very brief	Frequent
		March	3.5-6.0	>6.0	Very brief	Frequent
		April	3.5-6.0	>6.0	Very brief	Frequent
		May	3.5-6.0	>6.0	Very brief	Frequent
		June	---	---	Very brief	Frequent
		July	---	---	Very brief	Frequent
		August	---	---	Very brief	Frequent
		September	---	---	Very brief	Frequent
		October	---	---	Very brief	Frequent
		November	---	---	Very brief	Frequent
		December	3.5-6.0	>6.0	Very brief	Frequent

Table 18.—Water Features—Continued

Map symbol and soil name	Hydro- logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
BtD, BtE, BtF:						
Buladean	B					
		Jan-Dec	---	---	---	None
Chestnut	B					
		Jan-Dec	---	---	---	None
BwD:						
Burton	B					
		Jan-Dec	---	---	---	None
Craggey	D					
		Jan-Dec	---	---	---	None
BxE, BxF:						
Burton	B					
		Jan-Dec	---	---	---	None
Craggey	D					
		Jan-Dec	---	---	---	None
Rock outcrop	D					
		Jan-Dec	---	---	---	None
CaB, CaC, CcD, CcE, CcF:						
Cashiers	B					
		Jan-Dec	---	---	---	None
CdC, CeD, CeE, CeF:						
Chandler	B					
		Jan-Dec	---	---	---	None
Micaville	B					
		Jan-Dec	---	---	---	None
CkF:						
Chestoa	B					
		Jan-Dec	---	---	---	None
Ditney	C					
		Jan-Dec	---	---	---	None
Rock outcrop	D					
		Jan-Dec	---	---	---	None
CnC2, CnD2, CnE2:						
Clifton	B					
		Jan-Dec	---	---	---	None
CrE, CrF:						
Craggey	D					
		Jan-Dec	---	---	---	None
Rock outcrop	D					
		Jan-Dec	---	---	---	None
Clingman	D					
		Jan-Dec	---	---	---	None

Table 18.—Water Features—Continued

Map symbol and soil name	Hydro-logic group	Month	Water table Upper limit	Water table Lower limit	Flooding Duration	Flooding Frequency
			Ft	Ft		
DeA:						
Dellwood	A					
		January	2.0-4.0	>6.0	Very brief	Occasional
		February	3.5-6.0	>6.0	Very brief	Occasional
		March	3.5-6.0	>6.0	Very brief	Occasional
		April	3.5-6.0	>6.0	Very brief	Occasional
		May	3.5-6.0	>6.0	Very brief	Occasional
		June	---	---	Very brief	Occasional
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Occasional
		September	---	---	Very brief	Occasional
		October	---	---	Very brief	Occasional
		November	---	---	Very brief	Occasional
		December	---	---	Very brief	Occasional
Reddies	B					
		January	2.0-3.5	>6.0	Very brief	Occasional
		February	2.0-3.5	>6.0	Very brief	Occasional
		March	2.0-3.5	>6.0	Very brief	Occasional
		April	2.0-3.5	>6.0	Very brief	Occasional
		May	2.0-3.5	>6.0	Very brief	Occasional
		June	---	---	Very brief	Occasional
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Occasional
		September	---	---	Very brief	Occasional
		October	---	---	Very brief	Occasional
		November	---	---	Very brief	Occasional
		December	2.0-3.5	>6.0	Very brief	Occasional
DrB:						
Dillard	C					
		January	2.0-3.0	>6.0	---	Rare
		February	2.0-3.0	>6.0	---	Rare
		March	2.0-3.0	>6.0	---	Rare
		April	2.0-3.0	>6.0	---	Rare
		May	2.0-3.0	>6.0	---	Rare
		June	---	---	---	Rare
		July	---	---	---	Rare
		August	---	---	---	Rare
		September	---	---	---	Rare
		October	---	---	---	Rare
		November	---	---	---	Rare
		December	2.0-3.0	>6.0	---	Rare
DuD, DuE, DwF:						
Ditney	C					
		Jan-Dec	---	---	---	None
Unicoi	C					
		Jan-Dec	---	---	---	None
EaC2, EcD, EcE:						
Evard	B					
		Jan-Dec	---	---	---	None
Cowee	B					
		Jan-Dec	---	---	---	None
FeC2, FeD2, FeE2:						
Fannin	B					
		Jan-Dec	---	---	---	None

Table 18.—Water Features—Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
HaD, HaE:						
Harmiller	B					
		Jan-Dec	---	---	---	None
Shinbone	B					
		Jan-Dec	---	---	---	None
HuC, HuD, HuE:						
Huntdale	B					
		Jan-Dec	---	---	---	None
KcD, KcE:						
Keener	B					
		Jan-Dec	---	---	---	None
Lostcove	B					
		January	5.0-6.5	5.0-6.5	---	None
		February	5.0-6.5	5.0-6.5	---	None
		March	5.0-6.5	5.0-6.5	---	None
		April	5.0-6.5	5.0-6.5	---	None
		May	5.0-6.5	5.0-6.5	---	None
		December	5.0-6.5	5.0-6.5	---	None
NkA:						
Nikwasi	B/D					
		January	0.0-1.0	>6.0	Very brief	Occasional
		February	0.0-1.0	>6.0	Very brief	Occasional
		March	0.0-1.0	>6.0	Very brief	Occasional
		April	0.0-1.0	>6.0	Very brief	Occasional
		May	0.0-1.0	>6.0	Very brief	Occasional
		June	---	---	Very brief	Occasional
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Occasional
		September	---	---	Very brief	Occasional
		October	---	---	Very brief	Occasional
		November	0.0-1.0	>6.0	Very brief	Occasional
		December	0.0-1.0	>6.0	Very brief	Occasional
PeD, PeE:						
Pigeonroost	B					
		Jan-Dec	---	---	---	None
Edneytown	B					
		Jan-Dec	---	---	---	None
PuC, PuD, PuE, PwF:						
Porters	B					
		Jan-Dec	---	---	---	None
Unaka	B					
		Jan-Dec	---	---	---	None

Table 18.—Water Features—Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
RoA:						
Rosman	B					
		January	3.5-6.0	>6.0	Very brief	Occasional
		February	3.5-6.0	>6.0	Very brief	Occasional
		March	3.5-6.0	>6.0	Very brief	Occasional
		April	3.5-6.0	>6.0	Very brief	Occasional
		May	3.5-6.0	>6.0	Very brief	Occasional
		June	---	---	Very brief	Occasional
		July	---	---	Very brief	Occasional
		August	---	---	Very brief	Occasional
		September	---	---	Very brief	Occasional
		October	---	---	Very brief	Occasional
		November	---	---	Very brief	Occasional
		December	3.5-6.0	>6.0	Very brief	Occasional
SaB, ScC:						
Saunook	B					
		Jan-Dec	---	---	---	None
SdD:						
Saunook	B					
		Jan-Dec	---	---	---	None
Thunder	B					
		Jan-Dec	---	---	---	None
TsB, TsC, TsD, TsE:						
Thunder	B					
		Jan-Dec	---	---	---	None
Saunook	B					
		Jan-Dec	---	---	---	None
TuC, TwD, TwE:						
Toecane	B					
		Jan-Dec	---	---	---	None
Tusquitee	B					
		Jan-Dec	---	---	---	None
Uc:						
Udifluvents	A					
		January	---	---	Very brief	Frequent
		February	---	---	Very brief	Frequent
		March	---	---	Very brief	Frequent
		April	---	---	Very brief	Frequent
		May	---	---	Very brief	Frequent
		June	---	---	Very brief	Frequent
		July	---	---	Very brief	Frequent
		August	---	---	Very brief	Frequent
		September	---	---	Very brief	Frequent
		October	---	---	Very brief	Frequent
		November	---	---	Very brief	Frequent
		December	---	---	Very brief	Frequent
Ud:						
Udorthents	---					
		Jan-Dec	---	---	---	None

Table 18.—Water Features—Continued

Map symbol and soil name	Hydro-logic group	Month	Water table: Upper limit	Water table: Lower limit	Flooding: Duration	Flooding: Frequency
			Ft	Ft		
UrF:						
Unaka	B					
		Jan-Dec	---	---	---	None
Rock outcrop	D					
		Jan-Dec	---	---	---	None
UsB, UsC, UsD:						
Unison	B					
		Jan-Dec	---	---	---	None
W:						
Water	---					
		Jan-Dec	---	---	---	None
WbD, WbE, WcF, WhC, WhD, WhE:						
Wayah	B					
		Jan-Dec	---	---	---	None
Burton	B					
		Jan-Dec	---	---	---	None

Table 19.—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		Potential for frost action	Risk of corrosion	
	Kind	Depth to top		Uncoated steel	Concrete
		In			
AcF:					
Ashe	Bedrock (lithic)	20-40	Moderate	Low	High
Cleveland	Bedrock (lithic)	10-20	Moderate	Low	High
Rock outcrop	Bedrock (lithic)	0-0	None	---	---
BbF:					
Balsam	---	---	Moderate	High	High
BcD, BcE:					
Balsam	---	---	Moderate	High	High
Tanasee	---	---	Moderate	Low	High
BdA:					
Bandana	---	---	Low	High	Moderate
BmA:					
Biltmore	---	---	Low	Low	Moderate
BtD, BtE, BtF:					
Buladean	Bedrock (paralithic)	40-60	Moderate	Low	High
Chestnut	Bedrock (paralithic)	20-40	Moderate	Low	High
BwD:					
Burton	Bedrock (lithic)	20-40	Moderate	High	High
Craggey	Bedrock (lithic)	10-20	Moderate	High	High
BxE, BxF:					
Burton	Bedrock (lithic)	20-40	Moderate	High	High
Craggey	Bedrock (lithic)	10-20	Moderate	High	High
Rock outcrop	Bedrock (lithic)	0-0	None	---	---
CaB, CaC, CcD, CcE, CcF:					
Cashiers	---	---	Moderate	Low	Moderate
CdC, CeD, CeE, CeF:					
Chandler	---	---	Moderate	Low	High
Micaville	Bedrock (paralithic)	40-60	Moderate	Moderate	High
CkF:					
Chestoa	Bedrock (lithic)	20-40	Low	High	Moderate
Ditney	Bedrock (lithic)	20-40	Moderate	Low	Moderate
Rock outcrop	Bedrock (lithic)	0-0	None	---	---

Table 19.—Soil Features—Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top		Uncoated steel	Concrete
		In			
CnC2, CnD2, CnE2:					
Clifton	---	---	Moderate	Low	Moderate
CrE, CrF:					
Craggey	Bedrock (lithic)	10-20	Moderate	High	High
Rock outcrop	Bedrock (lithic)	0-0	None	---	---
Clingman	Bedrock (lithic)	3-20	Moderate	High	High
DeA:					
Dellwood	---	---	Low	Low	Moderate
Reddies	---	---	Low	Low	Moderate
DrB:					
Dillard	---	40-60	Moderate	Moderate	High
DuD, DuE, DwF:					
Ditney	Bedrock (lithic)	20-40	Moderate	Low	Moderate
Unicoi	Bedrock (lithic)	7-20	Moderate	Low	Moderate
EaC2, EcD, EcE:					
Evard	---	---	Moderate	Moderate	High
Cowee	Bedrock (paralithic)	20-40	Moderate	Moderate	High
FeC2, FeD2, FeE2:					
Fannin	---	---	Moderate	Moderate	Moderate
HaD, HaE:					
Harmiller	Bedrock (paralithic)	20-40	Moderate	Low	High
Shinbone	Bedrock (paralithic)	40-60	Moderate	Low	High
HuC, HuD, HuE:					
Huntdale	---	---	Moderate	Moderate	High
KcD, KcE:					
Keener	---	---	None	Moderate	Moderate
Lostcove	---	---	Moderate	Low	High
NkA:					
Nikwasi	---	---	Moderate	High	High
PeD, PeE:					
Pigeonroost	Bedrock (paralithic)	20-40	Moderate	Moderate	High
Edneytown	---	---	Moderate	Moderate	Moderate
PuC, PuD, PuE, PwF:					
Porters	Bedrock (lithic)	40-60	Moderate	Low	High
Unaka	Bedrock (lithic)	20-40	None	Low	Moderate

Table 19.—Soil Features—Continued

Map symbol and soil name	Restrictive layer		Potential for frost action	Risk of corrosion	
	Kind	Depth to top		Uncoated steel	Concrete
		In			
RoA:					
Rosman	---	---	Moderate	Moderate	Moderate
SaB, ScC:					
Saunook	---	---	Moderate	Low	High
SdD:					
Saunook	---	---	Moderate	Low	High
Thunder	---	---	Moderate	Moderate	Moderate
TsB, TsC, TsD, TsE:					
Thunder	---	---	Moderate	Moderate	Moderate
Saunook	---	---	Moderate	Low	High
TuC, TwD, TwE:					
Toecane	---	61-99	Low	High	High
Tusquitee	---	---	Moderate	Moderate	Moderate
Uc.					
Udifluvents					
Ud.					
Udorthents					
UrF:					
Unaka	Bedrock (lithic)	20-40	None	Low	Moderate
Rock outcrop	Bedrock (lithic)	0-0	None	---	---
UsB, UsC, UsD:					
Unison	---	---	Moderate	High	Moderate
W.					
Water					
WbD, WbE, WcF, WhC, WhD, WhE:					
Wayah	---	---	Moderate	Low	High
Burton	Bedrock (lithic)	20-40	Moderate	High	High

Table 20.—Classification of the Soils

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series. The soils were classified using the 1994 Keys to Soil Taxonomy)

Soil name	Family or higher taxonomic class
Ashe	Coarse-loamy, mixed, mesic Typic Dystrochrepts
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 Dystrochrepts
Burton	Fine-loamy, mixed, frigid Typic Haplumbrepts
Cashiers	Fine-loamy, micaceous, mesic Umbric Dystrochrepts
*Chandler	Coarse-loamy, micaceous, mesic Typic Dystrochrepts
Chestnut	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Chestoa	Coarse-loamy, siliceous, mesic Umbric Dystrochrepts
Cleveland	Loamy, mixed, mesic Lithic Dystrochrepts
Clifton	Clayey, mixed, mesic Typic Hapludults
Clingman	Dysic Lithic Borofolists
Cowee	Fine-loamy, mixed, mesic Typic Hapludults
Craggey	Loamy, mixed, frigid Lithic Haplumbrepts
Dellwood	Sandy-skeletal, mixed, mesic Fluventic Haplumbrepts
Dillard	Fine-loamy, mixed, mesic Aquic Hapludults
Ditney	Coarse-loamy, mixed, mesic Typic Dystrochrepts
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 Dystrochrepts
Keener	Fine-loamy, siliceous, mesic Typic Hapludults
Lostcove	Loamy-skeletal, siliceous, mesic Typic Hapludults
*Micaville	Coarse-loamy, micaceous, mesic Typic Dystrochrepts
*Nikwasi	Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Cumulic Humaquepts
Pigeonroost	Fine-loamy, mixed, mesic Typic Hapludults
Porters	Fine-loamy, mixed, mesic Umbric Dystrochrepts
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
Tanasee	Fine-loamy, mixed, frigid Typic Haplumbrepts
Thunder	Loamy-skeletal, mixed, mesic Humic Hapludults
Toecane	Loamy-skeletal, mixed, mesic Humic Hapludults
Tusquitee	Fine-loamy, mixed, mesic Umbric Dystrochrepts
Udifluvents	Udifluvents
Udorthents	Udorthents
Unaka	Fine-loamy, mixed, mesic Umbric Dystrochrepts
Unicoi	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Unison	Clayey, mixed, mesic Typic Hapludults
Wayah	Fine-loamy, mixed, frigid Typic Haplumbrepts

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