United States
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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;
Avery Soil and Water
Conservation District; and
Avery County Board of
Commissioners

## Soil Survey of Avery County, North Carolina

## How To Use This Soil Survey

## General Soil Map

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

## Detailed Soil Maps

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

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

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

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


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 Natural Resources Conservation Service; the United States Department of Agriculture, Forest Service; the North Carolina Department of Environment and Natural Resources; the North Carolina Agricultural Research Service; the North Carolina Cooperative Extension Service; the Avery Soil and Water Conservation District; and the Avery County Board of Commissioners. The survey is part of the technical assistance furnished to the Avery Soil and Water Conservation District. The Avery County Board of Commissioners provided financial assistance for the survey.

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

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Cover: Avery County is known for its high-quality Fraser fir Christmas trees and for Grandfather Mountain, which attracts many visitors annually due to its unique plant and animal communities and beautiful scenery.

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

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## Foreword

This soil survey contains information that affects land use planning in Avery 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 land use 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 land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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

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

Mary K. Combs
State Conservationist
Natural Resources Conservation Service

# Soil Survey of Avery County, North Carolina 

By John W. Tuttle, Natural Resources Conservation Service<br>Soils surveyed by John W. Tuttle and Timothy P. Harlan, Natural Resources Conservation Service<br>United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with<br>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; Avery Soil and Water Conservation District; and Avery County Board of Commissioners

Avery County is located in the northern mountains of western North Carolina (fig. 1). It is about 214 miles northwest of Raleigh, the State Capital. It consists of 158,124 acres, or approximately 247 square miles, of very steep mountains, rolling intermountain hills, and narrow valleys. Elevation ranges from 1,600 feet above sea level on Lost Cove Creek near Edgemont to 6,200 feet at Grassy Bald in the Yellow Mountains.

The county is in the southern Blue Ridge Mountain Physiographic Province. It is bordered on the east by Watauga and Caldwell Counties, on the south by Burke and McDowell Counties, and on the west by Mitchell County. It is bordered on the north by Carter County, Tennessee. In 2000, according to the U.S. Census Bureau, the county had a population of 17,167. Newland, the county seat, had a population of 704.

This survey updates the survey of Avery County published in 1955 (3). It provides additional information and has larger maps, which show the soils in greater detail.

## General Natural of the Survey Area

This section gives general information about Avery County. It describes history; economic development; geology and mineral resources; physiography, relief, and drainage; and climate.


Figure 1.-Location of Avery County in North Carolina.

## History

The survey area is part of the Toe River Valley. It was once home to the Cherokee Indians, who used the area primarily as a hunting ground. The first European settlement, known as the Watauga settlement, was founded about 1769. By 1865, the area had trading posts at Banner Elk, Cranberry, Plumtree, and Hughes. Most of the early settlers were Scotch-Irish and English. Due to the rugged mountains and lack of roads, the settlers lived in virtual isolation. This area was used more as hunting grounds than for permanent settlements. Digging ginseng was also profitable for the early settlers.

Avery County has the distinction of being the 100th and last county to be formed in the State of North Carolina. In 1911, the North Carolina General

Assembly created Avery County from parts of Watauga, Caldwell, and Mitchell Counties. The survey area was part of a land grant made November 9, 1783, to Colonel Waightstill Avery, for whom the county was named. Waightstill Avery was a colonel in the Revolutionary War, was a member of the North Carolina State Legislature, and served as North Carolina Attorney General.

## Economic Development

Initially, Avery County had a subsistence-based agricultural economy. The lack of reliable transportation hindered the production of crops on a commercial scale. As roads were improved and transportation options were increased, crops began to be grown commercially. In the 1950's, the main cash crops were cabbage, potatoes, tobacco, and beans. In 1955, there were 13 grade-A dairies in the county.

Agriculture in Avery County has changed considerably. The production of Christmas trees and other ornamentals crops accounts for the largest part of present-day gross farm income. Beef cattle, vegetables, fruits, berries, burley tobacco, and fish make up the majority of the remaining income. Generally, farms are small and specialized and produce high-value crops. In 1997, according to the North Carolina Department of Agriculture, the county had 429 farms covering 27,037 acres, including 9,328 acres of harvested cropland. Cash receipts in 2000 totaled 37 million dollars. It is estimated, however, that less than 25 percent of farmers derive their full income from farming. According to the Avery Chamber of Commerce, the production of Christmas trees and ornamental crops is the county's second leading industry and generates approximately 30 million dollars in sales annually. More than 900 families are active in this business. More Fraser firs and ornamental shrubbery are shipped from Avery County than from any other county in the southern United States.

Early industries in Avery County were closely linked to its natural resources. Maple syrup and maple sugar were produced at "sugar camps." Sawmills were common throughout the county because timber was plentiful. Because 157,117 acres, or about 78 percent of the county, is currently in timberland, forest products are still an important industry. The growing conditions in the county are conducive to the production of quality hardwoods.

The Spruce Pine Mining District, a portion of which is in Avery County, at one time provided more than 70 percent of all the mica used in the nation. Other resources, such as kaolin clay, block feldspar, and iron ore (magnetite), have also been mined in the county.

There is one large mining company still in operation. The company extracts and processes dunite for the mineral olivine, which is used as a molding and casting sand. Quartz, feldspar, mica, and crushed stone are also mined.

Tourism, according to the Avery Chamber of Commerce, is the leading industry in Avery County, and generates approximately 51 million dollars in sales each year. Attractions include the South's highest ski slopes, nine major golf resorts, and scenic Grandfather Mountain. The scenic Blue Ridge Parkway and Pisgah National Forest are also hubs for much tourism (fig. 2). The mountain arts and craft tradition contributes greatly to the economic development of Avery County. According to the U.S. Bureau of Economic Analysis, gross retail sales in Avery County reached approximately 195 million dollars for the period July 2000 to June 2001.

Economic opportunity in the form of light industry and the provision of goods and services in support of the tourist industry has also played an important role in the county's development. The construction of retirement and second homes is providing an increasing number of jobs. Avery County offers a high quality of life, and entrepreneurs are moving to the area to start small businesses. Many retirees, who built summer homes in the survey area, permanently settle here.

## Geology and Mineral Resources

Carl E. Merschat, North Carolina Department of Environment and Natural Resources, prepared this section.

Avery County is located in the Blue Ridge Mountains Physiographic Province of the Appalachian Mountain system. Its eastern part is the Blue Ridge Escarpment-a steep, rugged, sloping landscape with a crest marked by the Eastern Continental Divide. The escarpment is the result of headward erosion by streams flowing to the Atlantic Ocean more rapidly than those flowing west into the Gulf of Mexico.

The metamorphic and igneous rocks of Avery County range in age from 600 million years to more than one billion years. They are metamorphosed, folded, and faulted multiple times. The distribution and character of the rocks of the county control the shape of its land surface. A rock's resistance to weathering and erosion is controlled by its mineral composition, joint spacing, and thickness of layering. Quartz-rich rocks are generally the most resistant.

The rocks underlying Grandfather Mountain are metamorphosed sedimentary rocks, such as metagraywackes and meta-arkoses. Both of these rock


Figure 2.-The Blue Ridge Parkway winds its way through Avery County, offering many opportunities to view the area's natural beauty.
types are locally conglomeratic and contain abundant quartz. The distinctive profile that gives Grandfather Mountain its name is a product of the resistant metaarkoses and metagraywackes that underlie the mountain.

Less resistant metasiltstones underlie the headwater valleys of the Linville and Watauga Rivers. These metasiltstones contain calcium, magnesium, and iron carbonate minerals.

The high elevation and relief of Beech Mountain can be attributed to the massiveness of the underlying granite. Because of thin layering, abundant and closely spaced joints, fractures, and faults, the exposed surface area of the surrounding rocks is greater. As a result, the rocks weather more rapidly.

The metamorphic and deformation history of the rocks of the survey area is complex. The first metamorphism and deformation event took place over one billion years ago. This event deformed and
metamorphosed rocks of the migmatitic biotitehornblende gneiss unit, the biotite granitic gneiss unit, and possibly the granodiorite gneiss unit. It was characterized by very high temperatures and pressures and the growth of the diagnostic mineral hypersthene.

Igneous rocks intruded the older basement rocks about 700 million years ago. They are known as the Crossnore Plutonic Group, which is the largest and most distinct intrusive body in the Beech "granite" that underlies Beech Mountain.

The second regional event took place about 475 million years ago and affected all of the rocks in Avery County, except the 390-million-year-old intrusive alaskite and pegmatite. This event metamorphosed and deformed the sedimentary rocks of the Ashe Metamorphic Suite, the Alligator Back Formation, and the Grandfather Mountain Formation in addition to the rocks of the basement complex.

Just before or during this second event, the Holland

Mountain fault formed. The event carried the Ashe Metamorphic Suite and the Alligator Back Formation over the older migmatitic biotite-hornblende gneiss unit. The Holland Mountain fault and other faults in Avery County are inactive, recrystallized ancient faults.

About 390 million years ago, igneous intrusive rocks of granodiorite to quartz diorite composition, which are locally known as alaskite, intruded the metasedimentary rocks of the Ashe Metamorphic Suite and the Alligator Back Formation in the southwestern part of the survey area.

In northern part of the survey area, about 300 to 370 million years ago, the Fork Ridge thrust fault carried the biotite granitic gneiss and migmatitic biotitehornblende gneiss unit over and onto the granodiorite gneiss unit.

The last major event that deformed the rocks occurred about 300 million years ago. During this event, the rocks of the survey area were transported northwestward along major thrust faults at least 30 miles and probably more than 125 miles. In the eastern part of the county, the Linville Falls fault transported basement rocks and rocks of the Ashe Metamorphic Suite and the Alligator Back Formation over rocks of the Grandfather Mountain Formation, the Chilhowee Group, and other basement rocks. This fault was then upwarped and later eroded to expose younger and relatively unmetamorphosed rocks that underlie the Blue Ridge geologic belt. The resulting feature is known as a window.

A very important portion of the Spruce Pine Mining District lies in Avery County. The Unimin Brushy Creek mine and School House quartz plant located along Brushy Creek produce a quartz product that, after being further beneficiated in Mitchell County, North Carolina, cannot be matched anywhere else in the world.

This quartz is used in the production of ultra-high purity quartz-the most valuable commodity produced in the Spruce Pine Mining District today. Feldspar and mica are by-products of this mining activity in Avery County. Feldspar is used chiefly in the ceramic and sanitary-ware industries, and mica is used in the paint and wallboard industries.

Another industrial mineral mined in Avery County is olivine, which is a translucent to transparent, green to yellow-green magnesium silicate that has special refractory properties. Olivine is used as molding and casting sand for the foundry industry and is also used by the sandblasting industry. It occurs in dunite, an olivine-rich variety of ultramafic rock that is at a few locations in Avery County.

The largest and best known dunite deposit is the Frank deposit, which is mined intermittently.

Crushed stone is another valuable commodity that is currently mined in the county. It is used in the construction of nearly all residential, commercial, and industrial buildings and in most public works projects, such as roads, bridges, dams, water and sewer systems, and airports.

Historically, magnetite, sheet mica, block feldspar, and kaolin have been produced in the survey area.

## Physiography, Relief, and Drainage

Avery County is in the southern Blue Ridge Mountain Physiographic Province. The physiography of the county consists of high, intermediate, and low mountains; intermountain hills; coves; terraces; and flood plains. It is gently sloping to very steep on the uplands and nearly level on the flood plains, except along the larger rivers where the flood plains widen and are nearly level or gently sloping. Elevation ranges from 1,600 feet above sea level on Lost Cove Creek near Edgemont to 6,200 feet at Grassy Bald in the Yellow Mountains along the North Carolina-Tennessee State line.

The county is mountainous throughout, except in intermountain hills in and around Newland, Crossnore, and Ingalls where the relief is comparatively smooth. Along streams, creeks, and rivers, areas are gently sloping and nearly level. The majority of the county is on a plateau-like landscape. The surrounding counties have relatively lower elevations, except where there are adjoining mountain peaks. Avery County has many mountains with elevations greater than 4,500 feet. Most of these mountains are exposed to harsh, windswept conditions and extremely cold temperatures.

Along the southeastern portion of the county is a landscape known as the Blue Ridge Escarpment. Elevations range from 3,800 to 4,000 feet at the crest to approximately 2,000 feet in the valley. An extreme is reached at the nearly 6,000-foot-high crest of Grandfather Mountain, and elevations decrease abruptly to nearly 1,600 feet in the mountain valleys.

The county is drained by several different rivers. The Eastern Continental Divide separates the water flow in Avery County into two major directions. The Linville River and its tributaries, including the creeks and streams originating on the Blue Ridge Escarpment, flow east towards the Atlantic Ocean. The Toe River, the Watauga River, the Elk River, and their tributaries flow west towards the Mississippi River and eventually to the Gulf of Mexico. The Linville River originates west of Grandfather Mountain, flows south, leaves the county near the Linville Falls area, and enters into Burke County, North Carolina. The river descends down


Figure 3.-An accumulation of granular ice on the windward side of trees and other vegetation is known as rime ice. Rime ice forms from super cooled fog or clouds. This is a common sight in winter throughout the county at the higher elevations.
the Blue Ridge Escarpment via the Linville Gorge. The Toe River is the largest river in the county. It originates in the Newland area and flows west and then south and southwest into Mitchell County, North Carolina. The Watauga River also originates west of Grandfather Mountain. It flows north into Watauga County, North Carolina. The Elk River originates to the south and east of Banner Elk and flows west and northwest into Carter County, Tennessee.

## Climate

In Avery 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 but several inches of moisture is added to the soil 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 (fig. 3). In Avery County, snow cover does not last except at the high elevations and on northerly aspects.

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.

Tables 1 A and 1 B give data on temperature and precipitation for the survey area as recorded at Banner Elk and Grandfather Mountain, North Carolina, in the period 1971 to 2000. Tables 2A and 2B show probable dates of and length of the growing season.

In winter, the average temperature is 33.6 degrees $F$ at Banner Elk and 29.9 degrees at Grandfather Mountain. The average daily minimum temperature in winter is 23.0 degrees at Banner Elk and 22.1 degrees at Grandfather Mountain. The lowest temperatures on record at these sites, both occurring on January 21, 1985, were - 31 degrees at Banner Elk and -32 degrees at Grandfather Mountain.

In summer, the average temperature is 65.4 degrees at Banner Elk and 61.6 degrees at Grandfather Mountain. The average daily maximum temperature in summer is 75.9 degrees at Banner Elk and 68.1 degrees at Grandfather Mountain. The highest recorded temperatures are 92 degrees at Banner Elk, recorded on August 18, 1988, and 91 degrees at Grandfather Mountain, recorded on August 27, 1968.

Annual precipitation increases from west to east across the county. Estimated annual rainfall is 50 inches along the North Carolina-Tennessee State line and 60 inches along the Blue Ridge Parkway.

The average annual precipitation is 50.38 inches at Banner Elk and 62.82 inches at Grandfather Mountain. Of this, about 45 percent usually falls in May through September. The growing season for most crops falls within this period. The heaviest 1-day amounts of precipitation during the period of record were 7.40 inches at Banner Elk on October 5, 1995, and 6.38 inches at Grandfather Mountain on March 12, 1963. Thunderstorms occur on about 45 days each year, and most occur between May and August.

The average seasonal snowfall is 41.4 inches at Banner Elk and 58.1 inches at Grandfather Mountain. The greatest snow depth at any one time during the period of record was 30 inches at Banner Elk, recorded on March 13, 1993, and 29 inches at Grandfather Mountain, recorded on January 27, 1977. On average, there is at least 1 inch of snow on the ground about 30 days per year at Banner Elk and about 44 days per year at Grandfather Mountain. The heaviest 1-day snowfall on record was 22.0 inches at Banner Elk on March 13, 1993, and 22.5 inches at Grandfather Mountain on January 10, 1996.

The average relative humidity in midafternoon 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 possible in summer and 57 percent in winter. The prevailing wind
is highly dependent on location in this mountainous county. Valleys channel the wind flow in all directions throughout the year. Average windspeed in valley locations is highest, around 12 miles per hour, in winter and early spring. High mountain ridgetops and side slopes and prominent intermediate mountain ridgetops are often windswept. Sustained winds of more than 25 miles per hour are common at these locations.

## How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in Avery County. 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 were 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-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and
amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. 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 generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and 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 fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

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

## 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" (4, 7).

Before fieldwork began, surface drainage and preliminary boundaries of slopes and landforms were plotted stereoscopically on aerial photographs taken in 1986 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.

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 $1: 12,000$. Cultural features were transferred from 7.5-minute topographic maps of the United States Geological Survey.

## General Soil Map Units

The general soil map shows broad areas that have a distinctive pattern of soils, geology, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one map unit can occur in another but in a different pattern.

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

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

## Detailed Soil Map Units

The map units delineated on the detailed soil 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.

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. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils 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. If intensive use of small areas is planned, however, 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, Statler loam, 0 to 6 percent slopes, rarely flooded, is a phase of the Statler 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. Crossnore-Jeffrey complex, 30 to 50 percent slopes, very stony, is an example.

This survey includes miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Pits, quarries, is an example.

Table 3 gives the acreage and proportionate extent of each map unit. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils or miscellaneous areas and explains the suitability ratings.

## AcF-Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, extremely bouldery

Setting<br>Landscape:Low and intermediate mountains<br>throughout the county<br>Elevation range: 1,700 to 4,200 feet<br>Landform: Mountain ridges and slopes<br>Landform position: Summits and side slopes<br>Shape of areas: Irregular<br>Size of areas: 3 to 150 acres

## Composition

Ashe soil and similar inclusions: 55 percent
Cleveland soil and similar inclusions: 20 percent
Rock outcrop: 10 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Ashe

Surface layer:
0 to 5 inches-brown gravelly sandy loam
Subsoil:
5 to 9 inches—dark yellowish brown gravelly sandy loam
9 to 22 inches-yellowish brown gravelly sandy loam

## Underlying material:

22 to 31 inches-yellowish brown gravelly sandy loam

## Bedrock:

31 to 36 inches-hard unweathered, slightly fractured biotite granitic gneiss

## Cleveland

Surface layer:
0 to 4 inches-dark brown gravelly fine sandy loam
Subsoil:
4 to 17 inches-yellowish brown gravelly fine sandy loam

## Bedrock:

17 to 22 inches-hard unweathered, moderately fractured biotite granitic gneiss

## Rock outcrop

This part of the map unit predominantly consists of biotite granitic gneiss bedrock.

## Properties and Qualities of the Ashe and Cleveland Soils

Depth class: Ashe—moderately deep; Cleveland— shallow
Drainage class: Somewhat excessively drained
General texture class: Loamy
Permeability: Moderately rapid
Available water capacity: Low
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class: Steep or very steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion: Very severe
Rock fragments on the surface: About 5 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Ashe-extremely acid to moderately acid, except where the surface has been limed; Cleveland-very strongly acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade 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
- Cullasaja, Saunook, and Greenlee 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 soils that have hard bedrock at a depth of less than 10 inches
- Random areas of soils that have more mica in the subsoil than the Ashe and Cleveland soils
- Rubbly areas below rock outcrops and in drainageways
- Areas on prominent ridges and upper side slopes that are windswept

Similar inclusions:

- Ashe and Cleveland soils that have a loam surface layer
- Random areas of Chestnut soils that have soft bedrock at a depth of 20 to 40 inches


## Land Use

Dominant Uses: Wildlife habitat
Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited
Management concerns:

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


## Woodland Management and Productivity

Potential for commercial species: Not used Suitability:Unsuited to commercial production Management concerns:

- This map unit is severely limited for timber production because of the slope, depth to bedrock, windthrow hazard, 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, 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, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.


## Interpretive Groups

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

## BaD-Balsam very cobbly loam, windswept, 15 to 30 percent slopes, extremely bouldery

## Setting

Landscape:High mountains throughout the county
Elevation range: 4,000 to 6,000 feet
Landform: Coves and drainageways
Landform position: Footslopes and head slopes
Shape of areas: Irregular or long and narrow Size of areas: 5 to 150 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 8 inches-black very cobbly loam
8 to 15 inches-very dark brown very cobbly loam

Subsoil:
15 to 62 inches-dark yellowish brown extremely cobbly 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: 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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to frigid climatic conditions and rime ice in winter, high winds, high amounts of rainfall, and a short growing season
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Areas of rubble land in drainageways and below rock outcrops
- Random areas of soils that have fewer rock fragments than the Balsam soil
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Burton soils that have a loamy subsoil and have hard bedrock at a depth of 20 to 40 inches, in areas of rock outcrops
- Wayah soils that have a loamy subsoil, on residual landforms within the map unit
- Random areas of soils that have bedrock at a depth of less than 6.0 feet


## Similar inclusions:

- Balsam soils that have a surface layer of sandy loam or fine sandy loam
- Balsam soils that have fewer rock fragments on the surface
- Protected areas that are not windswept


## Land Use

Dominant Uses: Wildlife habitat
Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, extremely bouldery surface, damaging high winds, 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 pasture and hayland because of the extremely bouldery surface, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Ornamental crops

Suitability:Unsuited
Management concerns:

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


## Woodland Management and Productivity

Potential for commercial species: Not used Suitability: Unsuited to commercial production Management concerns:

- This map unit is severely limited for timber production because of the extremely bouldery surface and damaging high winds. 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 extremely bouldery surface, frigid climatic conditions, 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 extremely bouldery surface, seeps and springs, and poor filtering capacity.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, large stones, erodibility, frost action, seeps and springs, and differential settling
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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.
- Stones and boulders are a problem during excavation.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevents excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes. - This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:

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


## Interpretive Groups

Land capability classification:7s

## BaE-Balsam very cobbly loam, windswept, 30 to 50 percent slopes, extremely bouldery

Setting<br>Landscape:High mountains throughout the county<br>Elevation range: 4,000 to 6,000 feet<br>Landform: Coves and drainageways<br>Landform position: Side slopes and head slopes<br>Shape of areas: Irregular or long and narrow<br>Size of areas: 5 to 100 acres<br>\section*{Composition}<br>Balsam soil and similar inclusions: 90 percent<br>Dissimilar inclusions: 10 percent

## Typical Profile

Surface layer:
0 to 8 inches-black very cobbly loam
8 to 15 inches-very dark brown very cobbly loam
Subsoil:
15 to 62 inches-dark yellowish brown extremely cobbly 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: 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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to frigid climatic conditions and rime ice in winter, high winds, high amounts of rainfall, and a short growing season
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary rock

Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Areas of rubble land in drainageways and below rock outcrops
- Random areas of soils that have fewer rock fragments than the Balsam soil
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Burton soils that have a loamy subsoil and have hard bedrock at a depth of 20 to 40 inches, in areas of rock outcrops
- Wayah soils that have a loamy subsoil, on residual landforms within the map unit
- Random areas of soils that have bedrock at a depth of less than 6.0 feet


## Similar inclusions:

- Balsam soils that have a surface layer of sandy loam or fine sandy loam
- Balsam soils that have fewer rock fragments on the surface


## Land Use

Dominant Uses: Wildlife habitat Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, extremely bouldery surface, damaging high winds, 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 pasture and hayland because of the slope, extremely bouldery surface, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Ornamental crops

Suitability: Unsuited
Management concerns:

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


## Woodland Management and Productivity

## Potential for commercial species: Not used

Suitability: Unsuited to commercial production

## Management concerns:

- This map unit is severely limited for timber production because of the extremely bouldery surface and damaging high winds. 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, extremely bouldery surface, frigid climatic conditions, 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, extremely bouldery surface, seeps and springs, and poor filtering capacity.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, large stones, erodibility, frost action, seeps and springs, and differential settling
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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.
- Stones and boulders are a problem during excavation.
- Vegetating cut and fill slopes as soon as possible after construction helps to stabilize the soil and prevents excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:

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


## Interpretive Groups

Land capability classification: 7s

## BcE-Balsam-Rubble land complex, windswept, 30 to 50 percent slopes

Setting<br>Landscape:High mountains predominantly on and around Grandfather Mountain<br>Elevation range: 4,000 to 5,900 feet<br>Landform: Coves and drainageways<br>Landform position: Side slopes and head slopes<br>Shape of areas: Irregular or long and narrow<br>Size of areas: 15 to 500 acres<br>\section*{Composition}

Balsam soil and similar inclusions: 50 percent
Rubble land: 30 percent
Dissimilar inclusions: 20 percent

## Typical Profile

## Balsam

## Surface layer:

0 to 8 inches-black very cobbly loam
8 to 15 inches-very dark brown very cobbly loam

## Subsoil:

15 to 62 inches-dark yellowish brown extremely cobbly loam

## Rubble land

This part of the map unit consists of boulders, stones, cobbles, and small amounts of soil material between rock fragments.

## Properties and Qualities of the Balsam Soil

## Depth class:Very deep

Drainage class:Well drained
General texture class: Loamy with many rock fragments
Available water capacity: Low
Permeability:Moderately rapid
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 24 to 48 inches in diameter and 3 to 10 feet apart in areas of the Balsam soil; more than 90 percent surface stones and boulders that average about 10 to more than 48 inches in diameter and 0.5 to 1 foot apart in areas of rubble land
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to frigid climatic conditions and rime ice in winter, high winds, high amounts of rainfall, and a short growing season
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Burton soils that have hard bedrock at a depth of 20 to 40 inches
- Craggey soils that have hard bedrock at a depth of 10 to 20 inches
- Random areas of Clingman soils that have thick organic layers and have hard bedrock at a depth of 3 to 20 inches
- Random areas of soils that have fewer rock
fragments than the Balsam soil
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Random areas of rock outcrops
- Random areas of soils that have bedrock at a depth of less than 6.0 feet


## Similar inclusions:

- Balsam soils that have a surface layer of sandy
loam or fine sandy loam
- Balsam soils that have fewer rock fragments on the surface


## Land Use

Dominant Uses: Wildlife habitat Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, rubble land, damaging high winds, 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 pasture and hayland because of the slope, rubble land, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Ornamental crops

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, rubble land, 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 to commercial production Management concerns:- This map unit is severely limited for timber production because of the slope, rubble land, and damaging high winds (fig. 4). 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, rubble land, frigid climatic conditions, 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, rubble land, seeps and springs, 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 local roads and streets because of the slope, erodibility, and rubble land. 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, rubble land, damaging high winds, and high content of rock fragments. A site on better suited soils should be selected.

Interpretive Groups
Land capability classification: Balsam—7s; Rubble land-8s

## BcF-Balsam-Rubble land complex, windswept, 50 to 95 percent slopes

## Setting

Landscape: High mountains predominantly on and around Grandfather Mountain
Elevation range: 4,800 to 5,900 feet
Landform: Coves and drainageways
Landform position: Side slopes and head slopes
Shape of areas: Irregular or long and narrow
Size of areas: 10 to 100 acres

## Composition

Balsam soil and similar inclusions: 50 percent
Rubble land: 40 percent
Dissimilar inclusions: 10 percent


Figure 4.-Balsam-Rubble land complex, windswept, 30 to 50 percent slopes, is mostly forested. Because of the stunted and deformed trees due to windswept conditions and the high amounts of rock fragments on the surface, timber production is unprofitable.

## Typical Profile

## Balsam

Surface layer:
0 to 8 inches-black very cobbly loam
8 to 15 inches-very dark brown very cobbly loam
Subsoil:
15 to 62 inches-dark yellowish brown extremely cobbly loam

## Rubble land

This part of the map unit consist of boulders, stones, cobbles, and small amounts of soil material between rock fragments.

## Properties and Qualities of the Balsam Soil

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 15 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart in areas of the Balsam soil; more than 90 percent surface stones and boulders that average about 10 inches to more than 48 inches in diameter and 0.5 to 1 foot apart in areas of rubble land
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to frigid climatic conditions and rime ice in winter, high winds, high amounts of rainfall, and a short growing season
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Burton soils that have hard bedrock at a depth of 20
to 40 inches, on the outer edge of map units
- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, on the outer edge of map units
- Random areas of Clingman soils that have thick organic layers and have hard bedrock at a depth of 3 to 20 inches
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Random areas of rock outcrops
- Random areas of soils that have hard bedrock at a depth of less than 60 inches


## Similar inclusions:

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


## Land Use

Dominant Uses: Wildlife habitat Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability: Unsuited

Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, rubble land, damaging high winds, 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 pasture and hayland because of the slope, rubble land, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, rubble land, 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 <br> Suitability: Unsuited to commercial production

## Management concerns:

- This map unit is severely limited for timber production because of the slope, rubble land, and damaging high winds. 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, rubble land, frigid climatic conditions, 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, rubble land, seeps and springs, 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 local roads and
streets because of the slope, erodibility, and rubble land. 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, rubble land, damaging high winds, and high content of rock fragments. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification: Balsam-7s; Rubble land-8s

## BuC-Burton-Craggey-Rock outcrop complex, windswept, 8 to 15 percent slopes

## Setting

Landscape:High mountains throughout the county
Elevation range: 4,300 to 5,500 feet
Landform: Mountain ridges
Landform position: Summits
Shape of areas: Long and narrow or irregular
Size of areas: 5 to 50 acres
Composition
Burton soil and similar inclusions: 60 percent
Craggey soil and similar inclusions: 20 percent
Rock outcrop: 10 percent
Dissimilar inclusions: 10 percent

## Typical Profile

## Burton

Surface layer:
0 to 18 inches-black gravelly loam

## Subsoil:

18 to 24 inches-dark yellowish brown gravelly loam
Bedrock:
24 to 29 inches-hard unweathered gabbro

## Craggey

Surface layer:
0 to 13 inches-very dark brown gravelly loam
Bedrock:
13 to 18 inches-hard unweathered gabbro

## Rock outcrop

This part of the map unit predominantly consists of gabbro bedrock.

## Properties and Qualities of the Burton and Craggey Soils

Depth class: Burton—moderately deep; Craggeyshallow
Drainage class: Burton-well drained; Craggeysomewhat excessively drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity:Very low
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion: Severe
Rock fragments on the surface: About 3 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to frigid climatic conditions and rime ice in winter, high winds, high amounts of rainfall, and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock and low-grade metasedimentary rock
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 contacts

## Minor Components

Dissimilar inclusions:

- Random areas of Wayah soils that have hard bedrock at a depth of more than 60 inches
- Random areas of soils that have hard bedrock at a depth of 40 to 60 inches
- Clingman soils that are comprised mostly of organic material, in areas of rock outcrops
- Random areas of soils that have hard bedrock at a depth of less than 10 inches
- Balsam soils that have more rock fragments in the
subsoil than the Burton and Craggey soils, in concave areas at the head of drains
- Colluvial soils that have a loamy subsoil and have bedrock at a depth of more than 60 inches, in concave areas at the heads of drains and in saddles
- Areas of rubble land below rock outcrops

Similar inclusions:

- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Craggey soils that have a surface layer of sandy loam or fine sandy loam
- Burton and Craggey soils that have a thick organic surface layer


## 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 cultivated 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.


## Pasture and hayland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for pasture and hayland 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.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for 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

[^0]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, extent of rock outcrops, and frigid climatic conditions. 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 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 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 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.


## Interpretive Groups

Land capability classification: Burton-4e; Craggey7s; Rock outcrop-8s

## BuD-Burton-Craggey-Rock outcrop complex, windswept, 15 to 30 percent slopes

Setting<br>Landscape:High mountains throughout the county Elevation range: 4,200 to 6,100 feet<br>Landform: Mountain ridges<br>Landform position: Summits and the upper side slopes

Shape of areas: Long and narrow
Size of areas: 5 to 50 acres

## Composition

Burton soil and similar inclusions: 50 percent
Craggey soil and similar inclusions: 25 percent
Rock outcrop: 10 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Burton

Surface layer:
0 to 18 inches-black gravelly loam
Subsoil:
18 to 24 inches-dark yellowish brown gravelly loam

## Bedrock.

24 to 29 inches-hard unweathered gabbro

## Craggey

Surface layer:
0 to 13 inches-very dark brown gravelly loam

## Bedrock.

13 to 18 inches-hard unweathered gabbro

## Rock outcrop

This part of the map unit predominantly consists of gabbro 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: 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 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to frigid
climatic conditions and rime ice in winter, high winds, high amounts of rainfall, and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock and low-grade metasedimentary rock
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 contacts

## Minor Components

Dissimilar inclusions:

- Random areas of Wayah soils that have hard bedrock at a depth of more than 60 inches
- Random areas of soils that have hard bedrock at a depth of 40 to 60 inches
- Clingman soils that are comprised mostly of organic material, in areas of rock outcrops
- Random areas of soils that have hard bedrock at a depth of less than 10 inches
- Balsam soils that have more rock fragments in the subsoil than the Burton and Craggey soils, in concave areas at the head of drains
- Colluvial 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
- Areas of rubble land below rock outcrops


## Similar inclusions:

- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Craggey soils that have a surface layer of sandy
loam or fine sandy loam
- Burton and Craggey soils that have a thick organic surface layer


## 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 cultivated crops because of the slope, depth to bedrock, extent of rock outcrops, damaging high winds, 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 pasture and hayland because of the slope, depth to bedrock, extent of rock outcrops, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Ornamental crops

## Suitability:Unsuited

## Management concerns:

- This map unit is severely limited for ornamental crops because of the depth to bedrock, extent of rock outcrops, slope, 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 to commercial production Management concerns:

- This map unit is severely limited for timber production because of damaging high winds, 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, extent of rock outcrops, and frigid climatic conditions. 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 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 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 ornamental crops because of the depth to bedrock, extent of rock outcrops, slope, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification:Burton-6e; Craggey7s; Rock outcrop-8s

## BuF-Burton-Craggey-Rock outcrop complex, windswept, 30 to 95 percent slopes

Setting<br>Landscape: High mountains throughout the county<br>Elevation range: 4,200 to 6,100 feet<br>Landform: Mountain ridges and slopes<br>Landform position: Summits and side slopes<br>Shape of areas: Irregular<br>Size of areas: 5 to more than 150 acres<br>\section*{Composition}

Burton soil and similar inclusions: 55 percent
Craggey soil and similar inclusions: 25 percent
Rock outcrop: 10 percent
Dissimilar inclusions: 10 percent

## Typical Profile

## Burton

Surface layer:
0 to 18 inches-black gravelly loam
Subsoil:
18 to 24 inches-dark yellowish brown gravelly loam

## Bedrock:

24 to 29 inches-hard unweathered gabbro

## Craggey

Surface layer:
0 to 13 inches-very dark brown gravelly loam
Bedrock:
13 to 18 inches-hard unweathered gabbro

## Rock outcrop

This part of the map unit predominantly consists of gabbro bedrock.

## Properties and Qualities of the Burton and Craggey Soils

Depth class:Burton—moderately deep; Craggey— shallow
Drainage class:Burton-well drained; Craggeysomewhat 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 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 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to frigid climatic conditions and rime ice in winter, high winds, high amounts of rainfall, and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock and low-grade metasedimentary rock
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 contacts

## Minor Components

Dissimilar inclusions:

- Random areas of Wayah soils that have hard bedrock at a depth of more than 60 inches
- Random areas of soils that have hard bedrock at a depth of 40 to 60 inches
- Random areas of soils that have hard bedrock at a depth of less than 10 inches
- Clingman soils that are comprised mostly of organic material, in areas of rock outcrops
- 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

Similar inclusions:

- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Craggey soils that have a surface layer of sandy loam or fine sandy loam
- Burton and Craggey soils that have a thick organic surface layer


## 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 cultivated crops because of the slope, depth to bedrock, extent of rock outcrops, damaging high winds, 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 pasture and hayland because of the slope, depth to bedrock, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, 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 to commercial production Management concerns:- This map unit is severely limited for timber production because of the slope, damaging high winds, 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, depth to bedrock, extent of rock outcrops, and frigid climatic conditions. 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, depth to bedrock, 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 and Craggey-7e; Rock outcrop-8s

## BwC-Burton-Wayah complex, windswept, 8 to 15 percent slopes, stony

## Setting

Landscape: High mountains throughout the county
Elevation range: 4,200 to 6,100 feet
Landform: Mountain ridges
Landform position:Summits
Shape of areas: Long and narrow or irregular Size of areas: 5 to 40 acres

## Composition

Burton soil and similar inclusions: 55 percent Wayah soil and similar inclusions: 35 percent Dissimilar inclusions: 10 percent

## Typical Profile

## Burton

Surface layer:
0 to 18 inches-black gravelly loam
Subsoil:
18 to 24 inches-dark yellowish brown gravelly loam
Bedrock:
24 to 29 inches-hard unweathered gabbro

## Wayah

Surface layer:
0 to 18 inches-dark brown gravelly loam
Subsoil:
18 to 32 inches-dark yellowish brown fine sandy loam
32 to 38 inches-dark yellowish brown sandy loam
Underlying material:
38 to 62 inches-multicolored gravelly loamy sand saprolite

## Soil Properties and Qualities

Depth class: Burton—moderately deep;Wayah—very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Burton-very low; Wayahmoderate
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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to high winds, frigid climatic conditions, and rime ice in winter; high amounts of rainfall; and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: Burton-20 to 40 inches to hard bedrock; Wayah-more than 60 inches

Other distinctive properties: Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

## Minor Components

Dissimilar inclusions:

- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas of rock outcrops
- Widely scattered areas of rock outcrop
- Balsam soils that have more rock fragments in the subsoil than the Burton and Wayah soils, in concave areas at the head of drains and in saddles
- Colluvial soils that have a loamy subsoil and have bedrock at a depth of more than 60 inches, in concave areas at the heads of drains and in saddles


## Similar inclusions:

- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Wayah soils that have a surface layer of fine sandy loam or sandy loam
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have a thick organic surface layer


## Land Use

Dominant Uses: Woodland, wildlife habitat, and recreation
Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Pasture and hayland

## Suitability:Suited

Management concerns: Burton-equipment use, erodibility, climate, pesticide retention, soil fertility, rooting depth, and droughtiness; Wayahequipment use, erodibility, climate, pesticide retention, and soil fertility
Management measures and considerations:

- This map unit is limited for pasture and hayland because of the slope, erodibility, damaging high winds, and short growing season.
- 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 helps to maintain pastures and increase productivity.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity when establishing, maintaining, or renovating pasture and hayland.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Burton soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited to Fraser fir production; unsuited to other ornamental crops
Management concerns: Burton-equipment use, erodibility, plant shape, climate, and depth to bedrock; Wayah-equipment use, erodibility, plant shape, and climate
Management measures and considerations:

- This map unit is severely limited for ornamental crops because of damaging high winds, a short growing season, and the depth to bedrock in the Burton soil.
- The excess twisting and bending of Fraser fir by high winds can produce reaction wood; as a result, the tree is stiff and brittle and exhibits drought symptoms under minimal water stress.
- A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Not used Suitability: Unsuited to commercial production Management concerns:

- This map unit is severely limited for timber production because of damaging high winds, a short growing season, 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: Burton—erodibility, climate, corrosivity, seeps and springs, and depth to bedrock; Wayah—erodibility, climate, corrosivity, seeps and springs, and cutbanks cave
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment
fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Design modifications may be needed to overcome high winds and frigid climatic conditions.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete. - Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Burton soil.
- Installing permanent retaining walls helps to improve soil stability.


## Septic tank absorption fields

## Suitability: Poorly suited

Management concerns: Burton-slope, climate, seeps and springs, and depth to bedrock; Wayah-slope, climate, 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.
- Design modifications may be needed to overcome frigid climatic conditions.
- 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: Suited

Management concerns: Burton-erodibility, frost action, seeps and springs, and depth to bedrock; Wayah-erodibility and frost action
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Blasting or special grading equipment may be needed for the construction of roads in areas of the Burton soil.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns:Burton-erodibility, climate, pesticide retention, soil fertility, and depth to bedrock; Wayah—erodibility, climate, pesticide retention, and soil fertility
Management measures and considerations:

- Designing plantings on natural contours helps to improve water infiltration.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Because of a short growing season, the use of native, winter-hardy landscape plants is recommended. - This map unit is subject to damaging high winds and may be unsuitable for some types of landscaping.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigating 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

## BwD—Burton-Wayah complex, windswept, 15 to 30 percent slopes, stony

Setting<br>Landscape: High mountains throughout the county<br>Elevation range: 4,200 to 6,100 feet<br>Landform: Mountain ridges<br>Landform position: Summits and the upper side slopes<br>Shape of areas: Long and narrow or irregular<br>Size of areas: 5 to 150 acres

## Composition

Burton soil and similar inclusions: 60 percent

Wayah soil and similar inclusions: 30 percent
Dissimilar inclusions: 10 percent

## Typical Profile

## Burton

Surface layer:
0 to 18 inches-black gravelly loam
Subsoil:
18 to 24 inches-dark yellowish brown gravelly loam

## Bedrock:

24 to 29 inches-hard unweathered gabbro
Wayah
Surface layer:
0 to 18 inches-dark brown gravelly loam

## Subsoil:

18 to 32 inches-dark yellowish brown fine sandy loam
32 to 38 inches-dark yellowish brown sandy loam
Underlying material:
38 to 62 inches-multicolored gravelly loamy sand saprolite

## Soil Properties and Qualities

Depth class:Burton—moderately deep;Wayah—very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Burton-very low; Wayahmoderate
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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to high winds, frigid climatic conditions, and rime ice in winter; high amounts of rainfall; and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock

Depth to bedrock: Burton-20 to 40 inches to hard bedrock; Wayah-more than 60 inches
Other distinctive properties: Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

## Minor Components

Dissimilar inclusions:

- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas of rock outcrops
- Widely scattered areas of rock outcrop
- Balsam soils that have more rock fragments in the subsoil than the Burton and Wayah soils, in concave areas at the head of drains and in saddles
- 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


## Similar inclusions:

- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Wayah soils that have a surface layer of fine sandy loam or sandy loam
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have a thick organic surface layer


## Land Use

Dominant Uses: Woodland, wildlife habitat, and recreation
Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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: Suited
Suitability for hayland: Poorly suited
Management concerns: Burton-equipment use, erodibility, climate, pesticide retention, soil fertility, rooting depth, and droughtiness; Wayahequipment use, erodibility, climate, pesticide retention, and soil fertility
Management measures and considerations:

- This map unit is limited for pasture and hayland because of the slope, erodibility, damaging high winds, and short growing season.
- 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.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Burton soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited to Fraser fir production; unsuited to other ornamental crops
Management concerns: Burton-equipment use, erodibility, plant shape, climate, and depth to bedrock; Wayah—equipment use, erodibility, plant shape, and climate
Management measures and considerations:

- This map unit is severely limited for ornamental crops because of damaging high winds, a short growing season, and the depth to bedrock in the Burton soil.
- The excess twisting and bending of Fraser fir by high winds can produce reaction wood; as a result, the tree is stiff and brittle and exhibits drought symptoms under minimal water stress.
- A site on better suited soils should be selected.


## Woodland Management and Productivity

## Potential for commercial species: Not used

Suitability: Unsuited to commercial production Management concerns:

- This map unit is severely limited for timber production because of damaging high winds, a short growing season, 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: Burton—slope, erodibility, climate, corrosivity, seeps and springs, and depth to bedrock; Wayah—slope, erodibility, climate, corrosivity, seeps and springs, and cutbanks cave

Management measures and considerations:

- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Design modifications may be needed to overcome high winds and frigid climatic conditions.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete. - Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Burton soil.
- Installing permanent retaining walls helps to improve soil stability.


## Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Burton—slope, climate, seeps and springs, and depth to bedrock; Wayah—slope, climate, 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.
- Design modifications may be needed to overcome frigid climatic conditions.
- 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: Burton—slope, erodibility, frost action, seeps and springs, and depth to bedrock; Wayah—slope, erodibility, frost action, and seeps and springs
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Blasting or special grading equipment may be needed for the construction of roads in areas of the Burton soil.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns:Burton-slope, erodibility, climate, pesticide retention, soil fertility, and depth to bedrock; Wayah-slope, erodibility, climate, pesticide retention, and soil fertility
Management measures and considerations:

- Designing plantings on natural contours helps to improve water infiltration.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Because of a short growing season, the use of native, winter-hardy landscape plants is recommended.
- This map unit is subject to damaging high winds and may be unsuitable for some types of landscaping.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigating 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

## BwE-Burton-Wayah complex, windswept, 30 to 50 percent slopes, stony

## Setting

Landscape:High mountains throughout the county
Elevation range: 4,200 to 6,100 feet
Landform: Mountain slopes and ridges

Landform position: Side slopes and summits Shape of areas: Irregular or long and narrow Size of areas: 5 to more than 200 acres

## Composition

Burton soil and similar inclusions: 60 percent Wayah soil and similar inclusions: 25 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Burton

Surface layer:
0 to 18 inches-black gravelly loam
Subsoil:
18 to 24 inches-dark yellowish brown gravelly loam
Bedrock:
24 to 29 inches-hard unweathered gabbro

## Wayah

Surface layer:
0 to 18 inches-dark brown gravelly loam
Subsoil:
18 to 32 inches-dark yellowish brown fine sandy loam
32 to 38 inches-dark yellowish brown sandy loam
Underlying material:
38 to 62 inches-multicolored gravelly loamy sand saprolite

## Soil Properties and Qualities

Depth class:Burton—moderately deep;Wayah—very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity:Burton-very low; Wayah— 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 stones and boulders that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to high winds, frigid climatic conditions, and rime ice in
winter; high amounts of rainfall; and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: Burton-20 to 40 inches to hard bedrock; Wayah—more than 60 inches
Other distinctive properties: Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

## Minor Components

## Dissimilar inclusions:

- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas of rock outcrops
- Widely scattered areas of rock outcrop
- Balsam soils that have more rock fragments in the subsoil than the Burton and Wayah soils, in concave areas at the head of drains and in saddles
- 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
- Random areas that are protected from high winds


## Similar inclusions:

- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Wayah soils that have a surface layer of fine sandy loam or sandy loam
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have a thick organic surface layer


## Land Use

Dominant Uses: Woodland, wildlife habitat, and recreation
Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

## Suitability: Unsuited <br> Management concerns:

- This map unit is severely limited for cultivated crops 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: Burton-equipment use, erodibility, pesticide retention, soil fertility, climate, rooting depth, and droughtiness; Wayah-
equipment use, erodibility, pesticide retention, soil fertility, and climate
Management measures and considerations:

- This map unit is severely limited for pasture and hayland because of the slope, erodibility, damaging high winds, and short growing season.
- 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.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Burton soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited to Fraser fir production; unsuited to other ornamental crops
Management concerns: Burton-equipment use, erodibility, climate, and depth to bedrock; Wayahequipment use, erodibility, and climate
Management measures and considerations:

- This map unit is severely limited for ornamental crops because of the slope, erodibility, damaging high winds, a short growing season, and the depth to bedrock in the Burton soil.
- The excess twisting and bending of Fraser fir by high winds can produce reaction wood; as a result, the tree is stiff and brittle and exhibits drought symptoms under minimal water stress.
- A site on better suited soils should be selected.


## Woodland Management and Productivity

## Potential for commercial species: Not used

Suitability: Unsuited to commercial production Management concerns:

- This map unit is severely limited for timber production because of damaging high winds, a short growing season, 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: Burton—slope, erodibility,
climate, corrosivity, seeps and springs, and depth to bedrock; Wayah-slope, erodibility, climate, corrosivity, seeps and springs, 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Design modifications may be needed to overcome high winds and frigid climatic conditions.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete. - Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Burton soil.
- Installing permanent retaining walls helps to improve soil stability.


## Septic tank absorption fields

## Suitability: Poorly suited

Management concerns: Burton-slope, climate, seeps and springs, and depth to bedrock; Wayah-slope, climate, 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.
- Design modifications may be needed to overcome frigid climatic conditions.
- 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:Burton-slope, erodibility, frost action, seeps and springs, and depth to bedrock; Wayah-slope, erodibility, frost action, and seeps and springs
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from
seeps and springs helps to stabilize cut and fill slopes.
- Blasting or special grading equipment may be needed for the construction of roads in areas of the Burton soil.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns:Burton-slope, erodibility, climate, pesticide retention, soil fertility, depth to bedrock, and droughtiness;Wayah-slope, erodibility, climate, pesticide retention, and soil fertility
Management measures and considerations:

- Designing plantings on natural contours helps to improve water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Because of a short growing season, the use of native, winter-hardy landscape plants is recommended. - This map unit is subject to damaging high winds and may be unsuitable for some types of landscaping.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the moderately deep rooting, 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

## BwF-Burton-Wayah complex, windswept, 50 to 80 percent slopes, stony

Setting<br>Landscape: High mountains throughout the county Elevation range: 4,200 to 6,100 feet<br>Landform: Mountain slopes

Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 5 to 40 acres
Composition
Burton soil and similar inclusions: 65 percent Wayah soil and similar inclusions: 20 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Burton

Surface layer:
0 to 18 inches-black gravelly loam

## Subsoil:

18 to 24 inches—dark yellowish brown gravelly loam
Bedrock:
24 to 29 inches-hard unweathered gabbro

## Wayah

Surface layer:
0 to 18 inches-dark brown gravelly loam
Subsoil:
18 to 32 inches-dark yellowish brown fine sandy loam
32 to 38 inches-dark yellowish brown sandy loam
Underlying material:
38 to 62 inches-multicolored gravelly loamy sand saprolite

## Soil Properties and Qualities

Depth class: Burton—moderately deep;Wayah—very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Burton-very low; Wayahmoderate
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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to high
winds, frigid climatic conditions, and rime ice in winter; high amounts of rainfall; and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: Burton-20 to 40 inches to hard bedrock; Wayah-more than 60 inches
Other distinctive properties: Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

## Minor Components

Dissimilar inclusions:

- Craggey soils that have hard bedrock at a depth of

10 to 20 inches, in areas of rock outcrops

- Widely scattered areas of rock outcrop
- Balsam soils that have more rock fragments in the subsoil than the Burton and Wayah soils, in concave areas at the head of drains and in saddles
- Random areas that are protected from high winds


## Similar inclusions:

- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Wayah soils that have a surface layer of fine sandy loam or sandy loam
- Soils that have bedrock at a depth of 40 to 60 inches
- Soils that have a thick organic surface layer


## 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 cultivated crops 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: Unsuited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited

Management concerns:

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

Woodland Management and Productivity
Potential for commercial species: Not used Suitability:Unsuited to commercial production Management concerns:

- This map unit is severely limited for timber production because of the slope, damaging high winds, short growing season, and the depth to bedrock in the Burton soil. 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, depth to bedrock, corrosivity, damaging high winds, and frigid climatic conditions. 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, erodibility, and depth to bedrock.
- 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, damaging high winds, short growing season, and depth to bedrock. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification:7e

## CaC-Cashiers sandy loam, 8 to 15 percent slopes, stony

## Setting

Landscape: Intermediate mountains predominantly in the southwestern part of the county
Elevation range: 3,800 to 4,200 feet
Landform: Mountain ridges
Landform position: Summits
Shape of areas: Irregular
Size of areas: Less than 55 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 4 inches-very dark brown sandy loam
4 to 7 inches-dark brown sandy loam
Subsoil:
7 to 31 inches-dark yellowish brown loam

## Underlying material:

31 to 62 inches-yellowish brown sandy loam 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
Rock fragments on the surface: Widely scattered stones that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from high-grade metamorphic rock that has a high mica content
Depth to bedrock: More than 60 inches
Other distinctive properties: Subsoil and underlying material that have 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 soils that have bedrock at a depth of 20 to 60 inches
- Chandler soils that have thinner surface layers with less organic matter than the Cashiers soil, at the lower elevations
- 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
- Random areas of soils that have more clay or less mica in the subsoil than the Cashiers soil


## Similar inclusions:

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


## Land Use

## Dominant Uses: Woodland

## Agricultural Development

## Cropland

Suitability: Suited
Management concerns: Equipment use, erodibility, soil fertility, pesticide retention, and climate
Management measures and considerations:

- The slope may limit the use of equipment 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 maximize crop 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.
- 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.


## Pasture and hayland

## Suitability:Well suited

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

Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and improves germination.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Well suited
Management concerns: Equipment use, erodibility, soil fertility, pesticide retention, ball and burlap harvesting, and climate
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- 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.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by 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.
- 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 watercontrol 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.
- 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Erodibility, low strength, 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 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Suited

Management concerns: Erodibility, soil fertility, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification: 4 e

## CaD—Cashiers sandy loam, 15 to 30 percent slopes, stony

## Setting

Landscape: Intermediate mountains predominantly in the southwestern part of the county
Elevation range: 4,000 to 4,200 feet

Landform:Mountain ridges
Landform position: Summits and the upper side slopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to more than 100 acres
Composition
Cashiers soil and similar inclusions: 80 percent
Dissimilar inclusions: 20 percent

## Typical Profile

Surface layer:
0 to 4 inches-very dark brown sandy loam
4 to 7 inches-dark brown sandy loam
Subsoil:
7 to 31 inches-dark yellowish brown loam
Underlying material:
31 to 62 inches-yellowish brown sandy loam 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 stones that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from high-grade metamorphic rock that has a high mica content
Depth to bedrock: More than 60 inches
Other distinctive properties: Subsoil and underlying material that have 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 soils that have bedrock at a depth of 20 to 60 inches
- Chandler soils that have thinner surface layers with less organic matter than the Cashiers soil, at the lower elevations
- 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
- Random areas of soils that have more clay or less mica in the subsoil than the Cashiers soil


## Similar inclusions:

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


## Land Use

Dominant Uses: Woodland
Other Uses: Ornamental crops, pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, soil
fertility, pesticide retention, and climate
Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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 maximize crop 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.
- 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.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Equipment use, erodibility, soil fertility, and pesticide retention
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.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.


## Ornamental crops

## Suitability:Suited

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

- This map unit may be difficult to manage for 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.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by 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.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should 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.
- Designing roads on the contour, installing watercontrol 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.
- 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 helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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, erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Slope, erodibility, soil fertility,
climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification: 6e

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

## Setting

Landscape: Intermediate mountains predominantly in the southwestern part of the county
Elevation range: 3,600 to 4,200 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits

Shape of areas: Irregular or long and narrow
Size of areas: 2 to more than 100 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 4 inches-very dark brown sandy loam
4 to 7 inches-dark brown sandy loam
Subsoil:
7 to 31 inches-dark yellowish brown loam
Underlying material:
31 to 62 inches-yellowish brown sandy loam 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 stones that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from high-grade metamorphic rock that has a high mica content
Depth to bedrock: More than 60 inches
Other distinctive properties: Subsoil and underlying material that have 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 soils that have bedrock at a depth of 20 to 60 inches
- Cullasaja soils that contain many rock fragments, in drainageways
- Chandler soils that have thinner surface layers with less organic matter than the Cashiers soil, at the lower elevations
- Saunook soils that have more clay in the subsoil than the Cashiers soil, in concave areas at the head of drains, on footslopes, and in drainageways
- Random areas of soils that have less mica in the subsoil than the Cashiers soil


## Similar inclusions:

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


## Land Use

Dominant Uses:Woodland
Other Uses: Ornamental crops, Fraser fir production, and pasture

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- 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.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.


## Ornamental crops

## Suitability:Suited

Management concerns: Slope, equipment use, erodibility, soil fertility, pesticide retention, and plant shape
Management measures and considerations:

- This soil is marginally suited to Fraser fir production.

Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.

- This map unit may be difficult to manage for 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 plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should 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 watercontrol 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.
- 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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, erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited

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

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification:7e

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

## Setting

Landscape: Intermediate mountains predominantly in the southwestern part of the county
Elevation range: 3,600 to 4,000 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: Less than 29 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 4 inches-very dark brown sandy loam
4 to 7 inches-dark brown sandy loam

Subsoil:
7 to 31 inches-dark yellowish brown loam
Underlying material:
31 to 62 inches-yellowish brown sandy loam 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 stones that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from high-grade metamorphic rock that has a high mica content
Depth to bedrock: More than 60 inches
Other distinctive properties: Subsoil and underlying material that have 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 soils that have bedrock at a depth of 20 to 60 inches
- Cullasaja soils that contain many rock fragments, in drainageways
- Chandler soils that have thinner surface layers with less organic matter than the Cashiers soil, at the lower elevations
- Saunook soils that have more clay in the subsoil than the Cashiers soil, in concave areas at the head of drains, on footslopes, and in drainageways
- Widely scattered areas of rock outcrop
- Random areas of soils that have less mica in the subsoil than the Cashiers soil

Similar inclusions:

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


## Land Use

Dominant Uses: Woodland
Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Ornamental crops

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for 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, 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 due to a high mica content. 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 erodibility.
- 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 due to a high mica content. 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

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

## Setting

Landscape:Low and intermediate mountains predominantly in the southwestern part of the county
Elevation range: 3,600 to 3,800 feet
Landform: Mountain ridges
Landform position: Summits and the upper side slopes
Shape of areas: Long and narrow or irregular Size of areas: Less than 13 acres

## Composition

Chandler soil and similar inclusions: 60 percent Micaville soil and similar inclusions: 25 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Chandler

Surface layer:
0 to 5 inches-dark yellowish brown sandy loam
Subsoil:
5 to 21 inches-yellowish brown sandy loam
Underlying material:
21 to 62 inches-sandy loam saprolite that is multicolored in shades of brown and yellow

## Micaville

Surface layer:
0 to 4 inches-dark yellowish brown loam
Subsoil:
4 to 34 inches-strong brown sandy loam
34 to 44 inches-strong brown sandy loam
Underlying material:
44 to 48 inches-strong brown and yellowish red sandy loam

## Bedrock:

48 to 62 inches-soft 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: Severe
Rock fragments on the surface:Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Chandler-very strongly acid to moderately acid, except where the surface has been limed; Micaville-extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic rock that has 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, Buladean, and Edneyville soils that have less mica in the subsoil than the Chandler and Micaville soils and have soft bedrock at a depth of 20 to more than 60 inches
- Random areas of Fannin and Watauga soils that have more clay in the subsoil than the Chandler and Micaville soils
- Cashiers soils that have thicker surface layers with more organic matter than the Chandler and Micaville soils, at the higher elevations and on north- to eastfacing slopes
- Soils that have hard bedrock at a depth of 40 to 60 inches
- Widely scattered areas of rock outcrop

Similar inclusions:

- Chandler soils that have a loam surface layer
- Micaville soils that have a sandy loam surface layer


## Land Use

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

## Agricultural Development

## Cropland

## Suitability: Poorly suited

Management concerns: Equipment use, erodibility, and soil fertility
Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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 maximize crop productivity.


## Pasture and hayland

Suitability for pasture: Suited

Suitability for hayland: Poorly suited
Management concerns: Equipment use, erodibility, droughtiness, and soil fertility
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 and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.


## 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 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 crop production.
- 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 low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should 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 watercontrol 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.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

## Suitability: Poorly suited

Management concerns: Chandler—slope, erodibility, low strength, slippage, differential settling, and corrosivity; Micaville—slope, erodibility, low strength, slippage, differential settling, corrosivity, and depth to bedrock
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 helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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; Micavilleslope 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: Chandler—slope, erodibility, low strength, slippage, differential settling, and frost action; Micaville-slope, erodibility, low strength, slippage, differential settling, frost action, and depth to bedrock
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 watercontrol structures, such as 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 helps to improve soil strength, 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, droughtiness, and depth to bedrock
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.
- 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

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

## Setting

Landscape:Low and intermediate mountains predominantly in the southwestern part of the county
Elevation range: 2,700 to 2,800 feet
Landform: Mountain slopes and ridges
Landform position:Side slopes and summits
Shape of areas: Irregular or long and narrow
Size of areas: 10 to more than 500 acres

## Composition

Chandler soil and similar inclusions: 55 percent Micaville soil and similar inclusions: 25 percent Dissimilar inclusions: 20 percent

## Typical Profile

## Chandler

Surface layer:
0 to 5 inches—dark yellowish brown sandy loam

## Subsoil:

5 to 21 inches-yellowish brown sandy loam
Underlying material:
21 to 62 inches-sandy loam saprolite that is multicolored in shades of brown and yellow

## Micaville

Surface layer:
0 to 4 inches-dark yellowish brown loam
Subsoil:
4 to 34 inches-strong brown sandy loam
34 to 44 inches-strong brown sandy loam
Underlying material:
44 to 48 inches-strong brown and yellowish red sandy loam

## Bedrock:

48 to 62 inches-soft 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
stones and cobbles that average about 10 to 24
inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Chandler-very strongly acid to moderately acid, except where the surface has been limed; Micaville-extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic rock that has 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 Fannin and Watauga soils that have more clay in the subsoil than the Chandler and Micaville soils
- Random areas of Chestnut, Buladean, and

Edneyville soils that have less mica in the subsoil than the Chandler and Micaville soils and have soft bedrock at a depth of 20 to more than 60 inches

- Saunook soils that have thicker surface layers with more organic matter than the Chandler and Micaville soils and have more clay in the subsoil, in concave areas at the head of drains, on footslopes, and in drainageways
- Cashiers soils that have thicker surface layers with more organic matter than the Chandler and Micaville soils, at the higher elevations and on north- to eastfacing slopes
- Soils that have hard bedrock at a depth of 40 to 60 inches
- Widely scattered areas of rock outcrop

Similar inclusions:

- Chandler soils that have a loam surface layer
- Micaville soils that have a sandy loam surface layer


## Land Use

Dominant Uses:Woodland
Other Uses: Pasture, ornamental crops, and building site development

## Agricultural Development

## Cropland

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for cultivated crops 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- 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.


## Ornamental crops

Suitability: Poorly suited
Management concerns: Equipment use, droughtiness, erodibility, soil fertility, and plant shape
Management measures and considerations:

- These soils are marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- This map unit may be difficult to manage for ornamental crops because of droughtiness and an equipment use limitation caused by the slope.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion. - Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- 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, 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 watercontrol 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.
- 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: Chandler-slope, erodibility, low strength, slippage, differential settling, and corrosivity; Micaville-slope, erodibility, low strength, slippage, differential settling, corrosivity, and depth to bedrock
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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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; Micavilleslope 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, erodibility, low strength, slippage, differential settling, and frost action
Management measures and considerations:

- These soils are 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 watercontrol structures, such as 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 helps to improve soil strength, 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, droughtiness, and depth to bedrock
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease.


## Interpretive Groups

Land capability classification:7e

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

Setting<br>Landscape: Low and intermediate mountains predominantly in the southwestern part of the county

Elevation range: 2,600 to 2,700 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 5 to 60 acres

## Composition

Chandler soil and similar inclusions: 50 percent Micaville soil and similar inclusions: 25 percent Dissimilar inclusions: 25 percent

## Typical Profile

## Chandler

Surface layer:
0 to 5 inches-dark yellowish brown sandy loam
Subsoil:
5 to 21 inches-yellowish brown sandy loam

## Underlying material:

21 to 62 inches-sandy loam saprolite that is multicolored in shades of brown and yellow

## Micaville

Surface layer:
0 to 4 inches-dark yellowish brown loam
Subsoil:
4 to 34 inches-strong brown sandy loam
34 to 44 inches-strong brown sandy loam
Underlying material:
44 to 48 inches-strong brown and yellowish red sandy loam

Bedrock:
48 to 62 inches-soft 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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Chandler-very strongly acid to moderately acid, except where the surface has been limed; Micaville-extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic rock that has 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, Buladean, and

Edneyville soils that have less mica in the subsoil than the Chandler and Micaville soils and have soft bedrock at a depth of 20 to more than 60 inches

- Saunook soils that have thicker surface layers with more organic matter than the Chandler and Micaville soils and have more clay in the subsoil, in concave areas at the head of drains, on footslopes, and in drainageways
- Cullasaja soils that have thicker surface layers with more organic matter than the Chandler and Micaville soils and contain many rock fragments, in drainageways
- Cashiers soils that have thicker surface layers with more organic matter than the Chandler and Micaville soils, at the higher elevations and on north- to eastfacing slopes
- Random areas of soils that have hard bedrock at a depth of 20 to 60 inches
- Widely scattered areas of rock outcrop

Similar inclusions:

- Chandler soils that have a loam surface layer
- Micaville soils that have a sandy loam surface layer


## Land Use

Dominant Uses: Woodland

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited

## Management concerns:

- This map unit is severely limited for 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, 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, soil instability due to a high mica content, and the depth to bedrock in the Micaville soil. 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, erodibility, and the depth to bedrock in the Micaville 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, soil instability, and the depth to bedrock in the Micaville soil. 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

## ChD—Chestnut-Ashe complex, 15 to 30 percent slopes, very stony

## Setting

Landscape:Low and intermediate mountains throughout the county
Elevation range: 1,800 to 4,200 feet
Landform: Mountain ridges
Landform position: Summits and the upper side slopes
Shape of areas: Long and narrow or irregular Size of areas: 2 to 100 acres

## Composition

Chestnut soil and similar inclusions: 60 percent
Ashe soil and similar inclusions: 25 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Chestnut

Surface layer:
0 to 3 inches-dark brown gravelly sandy loam

## Subsoil:

3 to 16 inches-yellowish brown loam
16 to 22 inches-yellowish brown sandy loam
Underlying material:
22 to 28 inches-brownish yellow gravelly fine sandy loam

Bedrock:
28 to 62 inches-soft weathered, slightly fractured granite

## Ashe

Surface layer:
0 to 5 inches-brown gravelly sandy loam
Subsoil:
5 to 9 inches-dark yellowish brown gravelly sandy loam
9 to 22 inches-yellowish brown gravelly sandy loam

## Underlying material:

22 to 31 inches-yellowish brown gravelly sandy loam

## Bedrock:

31 to 36 inches-hard unweathered, slightly fractured biotite granitic gneiss

## Soil Properties and Qualities

Depth class:Moderately deep
Drainage class: Chestnut-well drained; Ashesomewhat 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: About 3 percent stones and cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the
upper part, weathered from felsic, high-grade metamorphic or igneous rock
Depth to bedrock: Chestnut-20 to 40 inches to soft bedrock; Ashe-20 to 40 inches to hard bedrock

## Minor Components

Dissimilar inclusions:

- Buladean and Edneyville soils that have soft bedrock at a depth of 40 to more than 60 inches, on the smoother parts of the landscape
- Cleveland soils that have hard bedrock at a depth of 10 to 20 inches, on nose slopes and adjacent to rock outcrops
- Random areas of Pigeonroost soils that have more clay in the subsoil than the Chestnut and Ashe soils and have soft bedrock at a depth of 20 to 40 inches, on shoulder slopes and nose slopes
- Widely scattered areas of rock outcrops
- Random areas of soils that have more mica in the subsoil than the Chestnut and Ashe soils


## Similar inclusions:

- Chestnut and Ashe soils that have surface layers of loam or fine sandy loam


## Land Use

Dominant Uses: Woodland
Other Uses: Pasture, hayland, limited ornamental crop production, limited Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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, erodibility, rooting depth, droughtiness, and soil fertility Management measures and considerations:

- Because of the slope and a very stony surface, this map unit is difficult to manage for pasture and hayland.
- Because of the low available water capacity caused by the moderately deep rooting depth, these soils are difficult to manage for 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 helps to maintain pastures and 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.


## Ornamental crops

Suitability:Unsuited
Management concerns: Equipment use, erodibility, soil fertility, plant shape, rooting depth, and droughtiness
Management measures and considerations:

- This map unit is severely limited for ornamental crops because the slope and very stony surface limit equipment use.
- Because of the low available water and windthrow hazard caused by the moderately deep rooting depth, these soils are difficult to manage for ornamental crops.
- A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Low for upland hardwoods and moderately high for eastern white pine
Suitability: Poorly suited
Management concerns: Equipment use, erodibility, depth to bedrock, and windthrow hazard
Management measures and considerations:

- Productivity is limited because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to minimize road and trail construction.
- Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, depth to hard bedrock, 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 on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of hard rock or the use of special earthmoving equipment is needed to increase the depth of the Ashe soil.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

## Suitability: Poorly suited

Management concerns:

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


## Local roads and streets

## Suitability: Poorly suited

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

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing watercontrol structures, such as 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.
- The soft bedrock underlying the Chestnut soil 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns: Slope, erodibility, droughtiness, large stones, soil fertility, and depth to bedrock Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because the slope and very stony surface limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and
using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting varieties adapted to droughty conditions help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of the moderately deep rooting depth, these soils are difficult to manage for lawns and landscaping, especially if the soils have been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.
- 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

## ChE—Chestnut-Ashe complex, 30 to 50 percent slopes, very stony

## Setting

Landscape:Low and intermediate mountains throughout the county
Elevation range: 1,800 to 4,200 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits Shape of areas: Irregular or long and narrow Size of areas: 5 to more than 400 acres

## Composition

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

## Typical Profile

## Chestnut

Surface layer:
0 to 3 inches-dark brown gravelly sandy loam

## Subsoil:

3 to 16 inches-yellowish brown loam
16 to 22 inches-yellowish brown sandy loam
Underlying material:
22 to 28 inches-brownish yellow gravelly fine sandy loam

## Bedrock:

28 to 62 inches-soft weathered, slightly fractured granite

## Ashe

Surface layer:
0 to 5 inches-brown gravelly sandy loam

## Subsoil:

5 to 9 inches-dark yellowish brown gravelly sandy loam
9 to 22 inches-yellowish brown gravelly sandy loam

## Underlying material:

22 to 31 inches-yellowish brown gravelly sandy loam

## Bedrock:

31 to 36 inches-hard unweathered, slightly fractured biotite granitic gneiss

## Soil Properties and Qualities

Depth class:Moderately deep
Drainage class: Chestnut-well drained; Ashesomewhat 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: About 3 percent stones and cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock
Depth to bedrock: Chestnut-20 to 40 inches to soft bedrock; Ashe-20 to 40 inches to hard bedrock

## Minor Components

Dissimilar inclusions:

- Buladean and Edneyville soils that have soft bedrock at a depth of 40 to more than 60 inches, on the smoother parts of the landscape
- Cleveland soils that have hard bedrock at a depth of 10 to 20 inches, on nose slopes and in areas of rock outcrops
- Saunook soils that have thicker surface layers with more organic matter than the Chestnut and Ashe soils and have more clay in the subsoil, in drainageways - Cullasaja soils that have thicker surface layers with
more organic matter than the Chestnut and Ashe soils and contain many rock fragments, in drainageways - Unaka soils that have thicker surface layers with more organic matter than the Chestnut and Ashe soils and have hard bedrock at a depth of 20 to 40 inches, on north- to east-facing slopes
- Random areas of Pigeonroost soils that have soft bedrock at a depth of 20 to 40 inches and have more clay in the subsoil than the Chestnut and Ashe soils
- Widely scattered areas of rock outcrops
- Random areas of soils that have more mica in the subsoil than the Chestnut and Ashe soils


## Similar inclusions:

- Chestnut and Ashe soils that have surface layers of loam or fine sandy loam


## Land Use

Dominant Uses: Woodland
Other Uses: Pasture, recreation, and limited Fraser fir production

## Agricultural Development

## Cropland

## Suitability: Unsuited

Management concerns:

- This map unit is severely limited for cultivated crops 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: Equipment use, erodibility, rooting depth, droughtiness, and soil fertility
Management measures and considerations:

- Because of the slope and a very stony surface, this map unit is difficult to manage for pasture and hayland. - Because of the low available water capacity caused by the moderately deep rooting depth, these soils are difficult to manage for 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.


## Ornamental crops

Suitability:Unsuited

Management concerns: Equipment use, erodibility, soil fertility, plant shape, rooting depth, and droughtiness
Management measures and considerations:

- This map unit is severely limited for ornamental crops because the slope and very stony surface limit equipment use.
- Because of the low available water and windthrow hazard caused by the moderately deep rooting depth, these soils are difficult to manage for ornamental crops.
- A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Low for upland hardwoods and moderately high for eastern white pine
Suitability: Poorly suited
Management concerns: Equipment use, erodibility, depth to bedrock, and windthrow hazard
Management measures and considerations:

- Productivity is limited because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- 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, depth to hard bedrock, 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 on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of hard rock or the use of special
earthmoving equipment is needed to increase the depth of the Ashe soil.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

Suitability: Poorly suited
Management concerns:

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


## Local roads and streets

## Suitability: Poorly suited

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

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing watercontrol structures, such as 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.
- The soft bedrock underlying the Chestnut soil 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns: Slope, erodibility, droughtiness, large stones, soil fertility, and depth to bedrock Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because the slope and very stony surface limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- Because of the moderately deep rooting depth, these soils are difficult to manage for lawns and landscaping, especially if the soils have been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.
- 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

## ChF—Chestnut-Ashe complex, 50 to 95 percent slopes, very stony

## Setting

Landscape:Low and intermediate mountains throughout the county
Elevation range: 1,800 to 4,200 feet
Landform:Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 5 to more than 400 acres
Composition
Chestnut soil and similar inclusions: 50 percent
Ashe soil and similar inclusions: 35 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Chestnut

## Surface layer:

0 to 3 inches-dark brown gravelly sandy loam
Subsoil:
3 to 16 inches-yellowish brown loam
16 to 22 inches-yellowish brown sandy loam
Underlying material:
22 to 28 inches-brownish yellow gravelly fine sandy loam

Bedrock:
28 to 62 inches-soft weathered, slightly fractured granite

## Ashe

Surface layer:
0 to 5 inches-brown gravelly sandy loam

Subsoil:
5 to 9 inches-dark yellowish brown gravelly sandy loam
9 to 22 inches-yellowish brown gravelly sandy loam

## Underlying material:

22 to 31 inches-yellowish brown gravelly sandy loam
Bedrock:
31 to 36 inches-hard unweathered, slightly fractured biotite granitic gneiss

## Soil Properties and Qualities

Depth class:Moderately deep
Drainage class: Chestnut-well drained; Ashesomewhat 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: About 3 percent stones and cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock
Depth to bedrock: Chestnut-20 to 40 inches to soft bedrock; Ashe-20 to 40 inches to hard bedrock

## Minor Components

Dissimilar inclusions:

- Buladean soils that have soft bedrock at a depth of 40 to 60 inches, on the smoother parts of the landscape
- Cleveland soils that have hard bedrock at a depth of 10 to 20 inches, on nose slopes and in areas of rock outcrops
- Saunook soils that have thicker surface layers with more organic matter than the Chestnut and Ashe soils and have more clay in the subsoil, in drainageways - Cullasaja soils that have thicker surface layers with more organic matter than the Chestnut and Ashe soils and contain many rock fragments, in drainageways - Unaka soils that have thicker surface layers with more organic matter than the Chestnut and Ashe soils
and have hard bedrock at a depth of 20 to 40 inches, on north- to east-facing slopes
- Widely scattered areas of rock outcrops
- Random areas of soils that have more mica in the subsoil than the Chestnut and Ashe soils

Similar inclusions:

- Chestnut and Ashe soils that have surface layers of loam or fine sandy loam


## Land Use

Dominant Uses: Woodland
Other Uses: Recreation

## Agricultural Development

## Cropland

## Suitability:Unsuited

Management concerns:

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


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for 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: Low for upland hardwoods and moderately high for eastern white pine
Suitability: Poorly suited
Management concerns: Equipment use, erodibility, depth to bedrock, and windthrow hazard
Management measures and considerations:

- Productivity is limited because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, skid trails, and disturbance of the forest floor by heavy machinery.
- 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.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns:

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

Interpretive Groups
Land capability classification:7e

## CnD-Chestnut-Buladean complex, 15 to 30 percent slopes, stony

## Setting

Landscape:Low and intermediate mountains predominantly in the eastern part of the county Elevation range: 1,800 to 3,600 feet Landform: Mountain ridges
Landform position: Summits and the upper side slopes Shape of areas:Long and narrow or irregular Size of areas: 2 to 80 acres

## Composition

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

## Typical Profile

## Chestnut

Surface layer:
0 to 3 inches-dark brown gravelly sandy loam

## Subsoil:

3 to 16 inches-yellowish brown loam 16 to 22 inches-yellowish brown sandy loam
Underlying material:
22 to 28 inches-brownish yellow gravelly fine sandy loam

## Bedrock:

28 to 62 inches-soft weathered, slightly fractured granite

## Buladean

## Surface layer:

0 to 8 inches-dark yellowish brown gravelly sandy loam

## Subsoil:

8 to 26 inches-yellowish brown sandy loam
26 to 32 inches-dark yellowish brown sandy loam

## Underlying material:

32 to 42 inches-yellowish brown and brownish yellow loamy sand saprolite

## Bedrock:

42 to 62 inches-soft weathered, slightly fractured biotite granitic gneiss

## Soil Properties and Qualities

Depth class:Chestnut-moderately deep; Buladeandeep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Chestnut-low; Buladeanmoderate
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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock
Depth to bedrock: Chestnut-20 to 40 inches to soft bedrock; Buladean- 40 to 60 inches to soft bedrock

## Minor Components

Dissimilar inclusions:

- Edneyville soils that have bedrock at a depth of more than 60 inches, on smooth parts of the landscape
- Edneytown and Pigeonroost soils that have more clay in the subsoil than the Chestnut and Buladean soils and have soft bedrock at a depth of 20 to more than 60 inches, on shoulder slopes, nose slopes, and smooth parts of the landscape
- Saunook soils that have thicker surface layers with more organic matter than the Chestnut and Buladean soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in saddles and gaps
- Random areas of Micaville soils that have soft bedrock at a depth of 40 to 60 inches and have more mica in the subsoil than the Chestnut and Buladean soils
- Soils that have thicker surface layers with more organic matter than the Chestnut and Buladean soils, at elevations above 3,400 feet
- Ashe soils that have hard bedrock at a depth of 20 to 40 inches, on shoulder slopes and nose slopes
- Widely scattered areas of rock outcrops

Similar inclusions:

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


## Land Use

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

## Agricultural Development

## Cropland

Suitability: Poorly suited
Management concerns:Buleadean-equipment use, erodibility, soil fertility, and rooting depth; Chestnut-equipment use, erodibility, soil fertility, rooting depth, and droughtiness

Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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 maximize crop productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Chestnut soil is difficult to manage for cultivated crops.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns:Buladean-equipment use, erodibility, soil fertility, and rooting depth; Chestnut-equipment use, erodibility, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- The slope limits equipment use in the steeper areas.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Chestnut soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns:Buladean-equipment use, erodibility, soil fertility, ball and burlap harvesting, plant shape, and rooting depth; Chestnutequipment use, erodibility, soil fertility, ball and burlap harvesting, plant shape, rooting depth, and droughtiness
Management measures and considerations:

- This map unit may be difficult to manage for 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 low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Chestnut soil is difficult to manage for ornamental crops.
- 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 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 watercontrol 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.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Chestnut soil because of the restricted rooting depth and windthrow hazard.


## 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 helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Buladean—slope; Chestnutslope 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, erodibility, slippage, depth to bedrock, and frost action
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Buladean—slope, erodibility, soil fertility, and droughtiness; Chestnut-slope, erodibility, soil fertility, droughtiness, and depth to bedrock
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- 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.
- 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

## CnE-Chestnut-Buladean complex, 30 to 50 percent slopes, stony

## Setting

Landscape: Low and intermediate mountains predominantly in the eastern part of the county
Elevation range: 1,800 to 3,600 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Shape of areas: Irregular or long and narrow
Size of areas: 5 to 750 acres

## Composition

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

## Typical Profile

## Chestnut

Surface layer:
0 to 3 inches-dark brown gravelly sandy loam
Subsoil:
3 to 16 inches-yellowish brown loam
16 to 22 inches-yellowish brown sandy loam
Underlying material:
22 to 28 inches-brownish yellow gravelly fine sandy loam

Bedrock:
28 to 62 inches-soft weathered, slightly fractured granite

## Buladean

Surface layer:
0 to 8 inches-dark yellowish brown gravelly sandy loam

Subsoil:
8 to 26 inches-yellowish brown sandy loam 26 to 32 inches-dark yellowish brown sandy loam

## Underlying material:

32 to 42 inches-yellowish brown and brownish yellow loamy sand saprolite

Bedrock:
42 to 62 inches-soft weathered, slightly fractured biotite granitic gneiss

## Soil Properties and Qualities

Depth class: Chestnut-moderately deep; Buladeandeep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Chestnut-low; Buladeanmoderate
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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock
Depth to bedrock: Chestnut-20 to 40 inches to soft bedrock; Buladean-40 to 60 inches to soft bedrock

## Minor Components

Dissimilar inclusions:

- Edneyville soils that have bedrock at a depth of more than 60 inches, on smooth parts of the landscape
- Edneytown and Pigeonroost soils that have more clay in the subsoil than the Chestnut and Buladean soils and have soft bedrock at a depth of 20 to more
than 60 inches, on shoulder slopes, nose slopes, and smooth parts of the landscape
- Saunook soils that have thicker surface layers with more organic matter than the Chestnut and Buladean 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, on footslopes, and in drainageways
- Random areas of Micaville soils that have soft bedrock at a depth of 40 to 60 inches and have more mica in the subsoil than the Chestnut and Buladean soils
- Soils that have thicker surface layers with more organic matter than the Chestnut and Buladean soils, at elevations above 3,400 feet
- Ashe soils that have hard bedrock at a depth of 20 to 40 inches, on shoulder slopes and nose slopes
- Widely scattered areas of rock outcrops

Similar inclusions:

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


## Land Use

## Dominant Uses:Woodland

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

## Agricultural Development

## Cropland

## Suitability:Unsuited

Management concerns:

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


## Pasture and hayland

Suitability: Poorly suited
Suitability for hayland: Unsuited
Management concerns:Buladean-equipment use, erodibility, soil fertility, and rooting depth;
Chestnut-equipment use, erodibility, soil fertility, rooting depth, and droughtiness
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.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Chestnut soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns:Buladean-equipment use, erodibility, soil fertility, plant shape, and rooting depth; Chestnut-equipment use, erodibility, soil fertility, plant shape, rooting depth, and droughtiness
Management measures and considerations:

- These soils are marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- This map unit may be difficult to manage for ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Chestnut soil is difficult to manage for ornamental crops.
- 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 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 watercontrol 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.
- 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 restricted rooting depth and windthrow hazard.


## 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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:Buladean—slope; Chestnut— 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 watercontrol structures, such as 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns: Buladean-slope, erodibility, soil fertility, and droughtiness; Chestnut-slope, erodibility, soil fertility, droughtiness, and depth to bedrock
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- 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.
- 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

## CnF-Chestnut-Buladean complex, 50 to 80 percent slopes, stony

## Setting

Landscape:Low and intermediate mountains predominantly in the eastern part of the county
Elevation range: 1,800 to 3,600 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 5 to 150 acres

## Composition

Chestnut soil and similar inclusions: 60 percent Buladean soil and similar inclusions: 25 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Chestnut

Surface layer:
0 to 3 inches-dark brown gravelly sandy loam
Subsoil:
3 to 16 inches-yellowish brown loam
16 to 22 inches-yellowish brown sandy loam
Underlying material:
22 to 28 inches-brownish yellow gravelly fine sandy loam

Bedrock:
28 to 62 inches-soft weathered, slightly fractured granite

## Buladean

## Surface layer:

0 to 8 inches-dark yellowish brown gravelly sandy loam

## Subsoil:

8 to 26 inches-yellowish brown sandy loam
26 to 32 inches-dark yellowish brown sandy loam
Underlying material:
32 to 42 inches-yellowish brown and brownish yellow loamy sand saprolite
Bedrock:
42 to 62 inches-soft weathered, slightly fractured biotite granitic gneiss

## Soil Properties and Qualities

Depth class: Chestnut-moderately deep; Buladeandeep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Chestnut-low; Buladeanmoderate
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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic, high-grade metamorphic or igneous rock
Depth to bedrock: Chestnut-20 to 40 inches to soft bedrock; Buladean-40 to 60 inches to soft bedrock

## Minor Components

Dissimilar inclusions:

- Edneyville soils that have bedrock at a depth of more than 60 inches, on smooth parts of the landscape
- Saunook soils that have thicker surface layers with more organic matter than the Chestnut and Buladean 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, on footslopes, and in drainageways - Cullasaja soils that have thicker surface layers with more organic matter than the Chestnut and Buladean soils and contain many rock fragments, in drainageways
- Random areas of Micaville soils that have soft bedrock at a depth of 40 to 60 inches and have more mica in the subsoil than the Chestnut and Buladean soils
- Soils that have thicker surface layers with more organic matter than the Chestnut and Buladean soils, at elevations above 3,400 feet
- Ashe soils that have hard bedrock at a depth of 20 to 40 inches, on shoulder slopes and nose slopes
- Widely scattered areas of rock outcrops


## Similar inclusions:

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


## Land Use

Dominant Uses: Woodland Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for 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, 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 restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Unsuited
Management concerns:

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

Interpretive Groups
Land capability classification:7e

## CoF-Clingman-Craggey-Rock outcrop complex, windswept, 15 to 95 percent slopes, extremely bouldery

## Setting

Landscape:High mountains predominantly in the Grandfather Mountain area
Elevation range: 4,200 to 6,000 feet
Landform: Mountain ridges and slopes
Landform position: Summits and side slopes
Shape of areas: Long and narrow on summits and irregular on side slopes
Size of areas: 2 to 100 acres

## Composition

Clingman soil and similar inclusions: 45 percent Craggey soil and similar inclusions: 25 percent Rock outcrop: 20 percent
Dissimilar inclusions: 10 percent

## Typical Profile

## Clingman

## Surface layer:

0 to 4 inches-very dark brown broken face peat
Subsurface layer:
4 to 10 inches-black peat
Mineral layer:
10 to 14 inches-dark brown sandy loam

## Bedrock:

14 to 21 inches-hard unweathered, slightly fractured feldspathic sandstone

## Craggey

Surface layer:
0 to 13 inches-very dark brown gravelly loam

## Bedrock:

13 to 18 inches-hard unweathered gabbro

## Rock outcrop

This part of the map unit predominantly consists of feldspathic sandstone bedrock.

## Properties and Qualities of the Clingman and Craggey Soils

Depth class: Clingman—very shallow or shallow; Craggey-shallow
Drainage class: Somewhat excessively drained
General texture class: Clingman-organic; Craggeyloamy
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 to 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 10 percent stones and boulders that average 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Special climatic conditions: Soils subject to high winds, frigid climatic conditions, and rime ice in winter and high amounts of rainfall
Soil reaction: Clingman-extremely acid or very strongly acid in organic material and extremely acid to strongly acid in mineral layers; Craggeyextremely acid to moderately acid, except where the surface has been limed
Parent material: Clingman-organic deposits underlain by mineral layers, weathered from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary rock; Craggey-residuum affected by soil creep, weathered from felsic to mafic, high-grade metamorphic or igneous rock and low-grade metasedimentary rock
Depth to bedrock: Clingman-3 to 20 inches to hard bedrock (fig. 5); Craggey-10 to 20 inches to hard bedrock
Other distinctive properties:Water movement along bedrock contacts; random areas of seeps and springs; water saturation for short periods during


Figure 5.-The Clingman soil in Clingman-Craggey-Rock outcrop complex, windswept, 15 to 95 percent slopes, extremely bouldery, has a very high organic matter content and is shallow or very shallow to hard bedrock.
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 Clingman and Craggey soils, in drainageways and below rock outcrops
- Random areas of soils that have bedrock at a depth of more than 40 inches
- Random areas of rubble land

Similar inclusions:

- Craggey soils that have a surface layer of coarse sandy loam, sandy loam, or fine sandy loam
- Soils that have bedrock at a depth of less than 10 inches
- Clingman soils that have mineral horizons that are more than 4 inches thick


## Land Use

Dominant Uses: Wildlife habitat Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, extremely bouldery surface, extent of rock outcrops, damaging high winds, 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 pasture and hayland because of the slope, extremely bouldery surface, extent of rock outcrops, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, extremely 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 to commercial production Management concerns:

- This map unit is severely limited for timber production because of the slope, damaging high winds, depth to bedrock, extremely bouldery 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, depth to bedrock, extent of rock outcrops, and frigid climatic conditions. 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, depth to bedrock, 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:Clingman and Craggey7e; Rock outcrop-8s

## CrE—Crossnore-Jeffrey complex, 30 to 50 percent slopes, very stony

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,400 to 4,600 feet
Landform: Mountain slopes and ridges Landform position: Side slopes and summits Shape of areas: Irregular or long and narrow Size of areas: 5 to 1,000 acres

## Composition

Crossnore soil and similar inclusions: 45 percent Jeffrey soil and similar inclusions: 40 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Crossnore

## Surface layer:

0 to 7 inches-dark brown gravelly sandy loam

## Subsoil:

7 to 16 inches-yellowish brown gravelly sandy loam
16 to 22 inches-brownish yellow gravelly sandy loam
Underlying material:
22 to 30 inches-gravelly loamy sand saprolite that is multicolored in shades of brown, yellow, and white

## Bedrock:

30 to 61 inches-soft weathered, partially consolidated low-grade metasandstone

## Jeffrey

Surface layer:
0 to 5 inches-black gravelly sandy loam
5 to 9 inches-dark brown gravelly sandy loam

Subsoil:
9 to 20 inches-yellowish brown gravelly loam
Underlying material:
20 to 31 inches-yellowish brown gravelly sandy loam
Bedrock:
31 to 36 inches-hard unweathered, feldspathic sandstone

## Soil Properties and Qualities

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: 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 cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): High
Potential for 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
Soil reaction:Crossnore-extremely acid to moderately acid, except where the surface has been limed; Jeffrey-very strongly acid or strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: Crossnore-20 to 40 inches to soft bedrock; Jeffrey-20 to 40 inches to hard bedrock (fig. 6)
Other distinctive properties: Low natural fertility; water movement along bedrock contacts in areas of the Jeffrey soil

## Minor Components

Dissimilar inclusions:

- Whiteoak soils that have more clay in the subsoil
than the Crossnore and Jeffrey soils and have bedrock at a depth of more than 60 inches, in concave areas at the heads of drains, in drainageways, and on footslopes
- Spivey soils that contain more rock fragments than
the Crossnore and Jeffrey soils and have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Soils that have soft bedrock at a depth of more than 40 inches, on the smoother parts of the landscape
- Soils that have hard bedrock at a depth of less than

20 inches, on nose slopes and in areas of rock outcrops

- Widely scattered areas of rock outcrops
- Random areas of Pineola soils that have more clay in the subsoil than the Crossnore and Jeffrey soils and have soft bedrock at a depth of 20 to 40 inches
- Soco and Ditney soils that have thinner surface
layers than the Crossnore and Jeffrey soils
- Prominent summits or ridges at the higher elevations that are windswept


## Similar inclusions:

- Crossnore and Jeffrey soils that have surface layers
of loam, fine sandy loam, or coarse sandy loam


## Land Use

## Dominant Uses: Woodland <br> Other Uses: Pasture, building site development, ornamental crops, and Fraser fir production

## Agricultural Development

## Cropland

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for cultivated crops 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: Equipment use, erodibility, soil fertility, pesticide retention, rooting depth, and droughtiness
Management measures and considerations:

- Because of the slope and a very stony surface, this map unit is difficult to manage for pasture and hayland.
- Because of the low available water capacity caused
by the moderately deep rooting depth, these soils are difficult to manage for pasture and hayland.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to
recommendations based on soil tests helps to increase


Figure 6.-An example of Crossnore-Jeffrey complex, 30 to 50 percent slopes, very stony. On the right side of the excavated area is the soft bedrock, at a depth of 20 to 40 inches, of the Crossnore soil, and on the left side is the hard bedrock, at a depth of $\mathbf{2 0}$ to $\mathbf{4 0}$ inches, of the Jeffrey soil. Depth to bedrock is the dominant management concern for these soils.
the availability of plant nutrients and maximizes productivity.

- 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.


## Ornamental crops

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, soil fertility, pesticide retention, plant shape, rooting depth, and droughtiness
Management measures and considerations:

- These soils are marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- This map unit may be difficult to manage for
ornamental crops because the slope and very stony surface limit equipment use.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep
rooting depth, these soils are difficult to manage for ornamental crops.
- 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 northern hardwoods and high for eastern white pine Suitability: Poorly suited
Management concerns: Equipment use, erodibility, depth to bedrock, and windthrow hazard
Management measures and considerations:

- Productivity is limited because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soils are wet, skid trails are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- 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, depth to hard bedrock, 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 on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of hard rock or the use of special earthmoving equipment is needed to increase the depth of the Jeffrey soil.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

## Suitability: Poorly suited

Management concerns:

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


## Local roads and streets

## Suitability: Poorly suited

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

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing watercontrol structures, such as 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.
- The soft bedrock underlying the Crossnore soil 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns: Slope, erodibility, droughtiness, large stones, soil fertility, pesticide retention, and depth to bedrock
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because the slope and very stony surface limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- 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.
- 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, these soils are difficult to manage for lawns and landscaping, especially if the soils have 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

## CrF—Crossnore-Jeffrey complex, 50 to 80 percent slopes, very stony

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,400 to 4,600 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 5 to 200 acres

## Composition

Crossnore soil and similar inclusions: 50 percent Jeffrey soil and similar inclusions: 35 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Crossnore

Surface layer:
0 to 7 inches—dark brown gravelly sandy loam

## Subsoil:

7 to 16 inches-yellowish brown gravelly sandy loam
16 to 22 inches-brownish yellow gravelly sandy loam

## Underlying material:

22 to 30 inches-gravelly loamy sand saprolite that is multicolored in shades of brown, yellow, and white

## Bedrock:

30 to 61 inches-soft weathered, partially consolidated low-grade metasandstone bedrock

## Jeffrey

Surface layer:
0 to 5 inches-black gravelly sandy loam
5 to 9 inches-dark brown gravelly sandy loam
Subsoil:
9 to 20 inches-yellowish brown gravelly loam

## Underlying material:

20 to 31 inches-yellowish brown gravelly sandy loam

## Bedrock:

31 to 36 inches-hard unweathered, feldspathic sandstone

## Soil Properties and Qualities

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 cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): High
Potential for 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
Soil reaction: Crossnore-extremely acid to moderately acid, except where the surface has been limed; Jeffrey—very strongly acid or strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: Crossnore-20 to 40 inches to soft bedrock; Jeffrey-20 to 40 inches to hard bedrock
Other distinctive properties: Low natural fertility; water movement along bedrock contacts in areas of the Jeffrey soil

## Minor Components

Dissimilar inclusions:

- Whiteoak soils that have more clay in the subsoil than the Crossnore and Jeffrey soils and have bedrock at a depth of more than 60 inches, in concave areas at the heads of drains, in drainageways, and on footslopes
- Spivey soils that contain more rock fragments than the Crossnore and Jeffrey soils and have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Soils that have soft bedrock at a depth of more than 40 inches, on the smoother parts of the landscape
- Soils that have hard bedrock at a depth of less than 20 inches, on nose slopes and in areas of rock outcrops
- Widely scattered areas of rock outcrops
- Soco and Ditney soils that have thinner surface
layers than the Crossnore and Jeffrey soils
- Prominent summits or ridges at the higher elevations that are windswept


## Similar inclusions:

- Crossnore and Jeffrey soils that have surface layers of loam, fine sandy loam, or coarse sandy loam


## Land Use

Dominant Uses: Woodland
Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

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


## Ornamental crops

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for 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 northern hardwoods and high for eastern white pine Suitability: Poorly suited
Management concerns: Equipment use, erodibility, depth to bedrock, and windthrow hazard
Management measures and considerations:

- Productivity is limited because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, 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 depth to bedrock. 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, erodibility, and depth to bedrock.
- 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 depth to bedrock. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification:7e

## CsD-Cullasaja cobbly fine sandy loam, 8 to 30 percent slopes, very bouldery

## Setting

Landscape: Intermountain hills and intermediate mountains in the western part of the county
Elevation range: 3,500 to 4,000 feet
Landform: Coves, colluvial fans, and drainageways
Landform position: Footslopes and toeslopes
Shape of areas:Long and narrow or oblong
Size of areas: Less than 11 acres
Composition
Cullasaja soil and similar inclusions: 90 percent
Dissimilar inclusions: 10 percent

## Typical Profile

## Surface layer:

0 to 18 inches-very dark brown cobbly fine sandy loam
Subsoil:
18 to 60 inches-dark yellowish brown very cobbly fine sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy with many rock fragments
Permeability:Moderately rapid
Available water capacity: Low
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class: Strongly sloping or moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion: Severe or very severe
Rock fragments on the surface: Widely scattered stones and boulders that average about 24 to 48 inches in diameter and 10 to 65 feet apart
Organic matter content (surface layer): High or very high
Potential for 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 in the A horizon, except where the surface has been limed,
and very strongly acid to moderately acid in the B and C horizons
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Areas of rubble land, below rock outcrops and in drainageways
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and drainageways
- Saunook soils with fewer rock fragments and more clay in the subsoil than the Cullasaja soil, on toeslopes
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Cullasaja soils that have a surface layer of sandy loam, loam, or sandy clay loam
- Thunder soils that have more clay in the subsoil than the Cullasaja soil
- Random areas of soils that are similar to the

Cullasaja soil but have thinner surface layers

## Land Use

Dominant Uses: Woodland and wildlife habitat

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, very bouldery surface, and large amount of rock fragments in the soil. A site on better suited soils should be selected.


## Pasture and hayland

Suitability: Poorly suited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited

Management concerns:

- This map unit is severely limited for ornamental crops because of the very bouldery surface and large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the 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: Poorly suited

Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface. - Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns: Slope, large stones, erodibility, seeps and springs, cutbanks cave, and corrosivity
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for septic tank absorption fields because of the very bouldery surface, seeps and springs, poor filtering capacity, and slope.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, large stones, erodibility, seeps and springs, frost action, and differential settling
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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.
- Stones and boulders are a problem during excavation.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Unsuited
Management concerns:Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- This map unit is limited for lawns and landscaping because of the slope, very bouldery surface, and the high content of rock fragments in the soil.


## Interpretive Groups

Land capability classification:7s

## CtC—Cullasaja cobbly loam, 8 to 15

 percent slopes, extremely bouldery
## Setting

Landscape: Intermountain hills and intermediate mountains throughout the county
Elevation range: 3,000 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: 2 to 50 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 13 inches-very dark brown cobbly loam
13 to 18 inches-dark brown very cobbly loam
Subsoil:
18 to 48 inches-dark yellowish brown very cobbly loam

Underlying material:
48 to 62 inches-dark yellowish brown extremely 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: Strongly 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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to slow air drainage, which allows for late spring and early fall frosts
Soil reaction: Very strongly acid to slightly acid in the A horizon, except where the surface has been limed, and very strongly acid to moderately acid in the B and C horizons
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land, in drainageways
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Saunook soils that have fewer rock fragments than the Cullasaja soil and have more clay in the subsoil, on toeslopes
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Cullasaja soils that have a surface layer of fine sandy loam or sandy loam
- Thunder soils that have more clay in the subsoil than the Cullasaja soil
- Random areas of soils that are similar to the Cullasaja soil but have thinner surface layers


## Land Use

## Dominant Uses:Woodland

Other Uses: Pasture, hayland, ornamental crops, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, extremely bouldery surface, and large amount of rock fragments in the soil. A site on better suited soils should be selected.


## Pasture and hayland

Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns for pasture: Equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- This map unit is severely limited for pasture and hayland because of an extremely bouldery surface.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for ornamental
crops because of an extremely bouldery surface and large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the 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: Poorly suited Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability: Unsuited
Management concerns: Large stones, erodibility, seeps and springs, cutbanks cave, and corrosivity Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

Suitability: Unsuited Management concerns:

- This map unit is severely limited for septic tank absorption fields because of the extremely bouldery surface, seeps and springs, and poor filtering capacity.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Large stones, erodibility, seeps
and springs, frost action, and differential settling
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

## Suitability: Unsuited

Management concerns:Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

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


## Interpretive Groups

Land capability classification: 7s

## CtD—Cullasaja cobbly loam, 15 to 30 percent slopes, extremely bouldery

## Setting

Landscape: Intermountain hills and intermediate mountains throughout the county
Elevation range: 3,000 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: 2 to 350 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 13 inches-very dark brown cobbly loam
13 to 18 inches-dark brown very cobbly loam
Subsoil:
18 to 48 inches-dark yellowish brown very cobbly loam

Underlying material:
48 to 62 inches—dark yellowish brown extremely 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: 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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): High or very high
Potential for 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 in the A horizon, except where the surface has been limed, and very strongly acid to moderately acid in the B and C horizons
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land
- Areas of Saunook soils that have fewer rock fragments and more clay in the subsoil than the Cullasaja soil
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations
- Soils that have seeps and springs or 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 occasionally or rarely flooded for very brief periods, along stream channels

Similar inclusions:

- Cullasaja soils that have a surface layer of fine sandy loam or sandy loam
- Thunder soils that have more clay in the subsoil than the Cullasaja soil
- Random areas of soils that are similar to the

Cullasaja soil but have thinner surface layers

## Land Use

Dominant Uses: Woodland
Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops
because of the slope, erodibility, extremely bouldery surface, and large amount of rock fragments in the soil. A site on better suited soils should be selected.


## Pasture and hayland

Suitability for pasture: Poorly suited
Suitability for hayland: Unsuited
Management concerns for pasture: Equipment use, erodibility, pesticide retention, and soil fertility Management measures and considerations:

- This map unit is severely limited for pasture and hayland because of an extremely bouldery surface and the slope.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of an extremely bouldery surface and
large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the 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: Poorly suited Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns: Large stones, slope, erodibility, seeps and springs, cutbanks cave, and corrosivity Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for septic tank absorption fields because of the extremely bouldery surface, seeps and springs, poor filtering capacity, and slope.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns:Large stones, slope, erodibility, seeps and springs, frost action, and differential settling
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Unsuited
Management concerns:Large stones, slope, erodibility, soil fertility, climate, and pesticide retention Management measures and considerations:

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

Interpretive Groups
Land capability classification: 7s

## CtE-Cullasaja cobbly loam, 30 to 50 percent slopes, extremely bouldery

## Setting

Landscape: Intermountain hills and intermediate mountains throughout the county
Elevation range: 3,000 to 4,500 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, and footslopes
Shape of areas:Long and narrow or irregular
Size of areas: 2 to 250 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 13 inches-very dark brown cobbly loam
13 to 18 inches-dark brown very cobbly loam
Subsoil:
18 to 48 inches-dark yellowish brown very cobbly loam

Underlying material:
48 to 62 inches-dark yellowish brown extremely 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: 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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): High or very high
Potential for 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 in the A horizon, except where the surface has been limed, and very strongly acid to moderately acid in the B and C horizons
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land
- Random areas of rock outcrop
- Areas of Saunook soils that have fewer rock
fragments and more clay in the subsoil than the Cullasaja soil
- Soils that have bedrock at a depth of less than 6.0 feet, in drainageways and on the outer edge of map unit delineations
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0
feet, on toeslopes, in depressions, and in drainageways
Similar inclusions:
- Cullasaja soils that have a surface layer of fine sandy loam or sandy loam
- Thunder soils that have more clay in the subsoil than the Cullasaja soil
- Random areas of soils that are similar to the

Cullasaja soil but have thinner surface layers

## Land Use

Dominant Uses: Woodland
Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, erodibility, and an extremely 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 for pasture: Equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- This map unit is severely limited for pasture and hayland because of an extremely bouldery surface and the slope.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of an extremely bouldery surface and large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock
fragments in the 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: Poorly suited

Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability: Unsuited
Management concerns: Slope, large stones, erodibility, seeps and springs, cutbanks cave, and corrosivity Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for septic tank absorption fields because of the slope, extremely bouldery surface, seeps and springs, and poor filtering capacity.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Large stones, slope, erodibility, seeps and springs, frost action, and differential settling
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Unsuited
Management concerns:Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

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

Interpretive Groups
Land capability classification: 7s

## CuA-Cullowhee loam, 0 to 3 percent slopes, frequently flooded

## Setting

Landscape: Mountain valleys
Elevation range: 2,600 to 4,000 feet
Landform: Flood plains throughout the county
Landform position: Planar to slightly concave slopes
Shape of areas: Long and narrow
Size of areas: 2 to 125 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 10 inches-dark brown loam
Subsoil:
10 to 21 inches-brown sandy loam that has dark grayish brown iron depletions
Underlying material:
21 to 30 inches-dark gray sandy loam that has dark yellowish brown iron accumulations
30 to 62 inches-yellowish brown very cobbly loamy sand that has dark gray iron depletions

## Soil Properties and Qualities

Depth class:Very deep
Drainage class: Somewhat poorly drained

General texture class: Loamy in the upper part and sandy with many rock fragments in the lower part
Permeability:Moderately rapid in the upper part and rapid in the lower part
Available water capacity: Low
Depth to seasonal high water table: 1.5 to 2.0 feet from November 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): High or very high
Potential for frost action: Low
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, except where the surface has been limed
Parent material: Alluvium derived from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary 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 have strata with a high content of rock fragments at a depth of 8 to 40 inches, along stream channels or in the slightly higher positions
- Poorly drained Nikwasi soils that are 20 to 40 inches to strata with a high content of rock fragments, in depressions, old stream channels, and backwater areas
- Moderately well drained soils that have more clay in the subsoil than the Cullowhee soil, on low stream terraces
- Well drained Saunook soils that have more clay in the subsoil than the Cullowhee 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 on the wider flood plains
- Soils that are occasionally flooded
- Soils that have sandy overwash or thinner surface layers than the Cullowhee soil

Similar inclusions:

- Cullowhee soils that have a surface layer of fine sandy loam or sandy loam
- Similar soils that have more clay in the subsoil
- Random areas of similar soils that have strata with a high content of rock fragments at a depth of more than 40 inches


## Land Use

Dominant Uses: Pasture, hayland, cropland, and woodland
Other Uses: Ornamental crops

## Agricultural Development

## Cropland

Suitability:Well suited (where protected from flooding or not frequently flooded during the growing season)
Management concerns: Flooding, wetness, soil fertility, nutrient leaching, pesticide retention, and climate
Management measures and considerations:

- Because of the potential for flooding during the growing season and the wetness, this soil is difficult to manage for cropland.
- Maintaining existing artificial drainage systems helps to reduce the wetness limitation.
- Conservation tillage, winter cover crops, crop residue management, and crop rotations which include grasses and legumes help 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 maximize crop productivity.
- Using split applications of fertilizer and pesticides helps to increase their effectiveness and prevent the leaching of plant nutrients below the root zone 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.
- Because of slow air drainage, late spring frost may damage new growth in some years.


## Pasture and hayland

Suitability:Well suited (where protected from flooding or not frequently flooded during the growing season)
Management concerns: Flooding, wetness, soil fertility, nutrient leaching, pesticide retention, and erodibility

Management measures and considerations:

- Because of the potential for flooding during the growing season, this soil is difficult to manage for hayland.
- Maintaining existing drainageways and ditches helps to remove excess water.
- 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 and pesticides helps to increase their effectiveness and prevent the leaching of plant nutrients below the root zone and into the water table.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.


## Ornamental crops

Suitability: Unsuited
Management concerns:

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


## Woodland Management and Productivity

## Potential for commercial species: Moderately high for

 cove hardwoodsSuitability: 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.
- Soil-applied herbicides are retained due to herbicideorganic matter bonding, and they may damage tree seedlings when cropland is converted to woodland. - Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns:

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


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:

- This map unit is severely limited for lawns and landscaping because of the wetness, phytophthora root disease, and frequent flooding. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification:3w

## DAM—Dam

This map unit consists of water impoundment structures that are constructed of soil material and commonly covered with rock rip-rap. Paved or graveled access roads commonly cross the top of dams.

This map unit is not assigned a land capability classification.

## DeB—Dellwood cobbly sandy loam, 1 to 5 <br> percent slopes, occasionally flooded

## Setting

Landscape: Mountain valleys
Elevation range: 2,700 to 4,000 feet
Landform: Flood plains predominantly at the upper end
of mountain valleys or adjacent to streams and rivers on the larger flood plains
Landform position: Planar to slightly convex slopes Shape of areas: Long and narrow
Size of areas: 2 to 40 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 11 inches-very dark grayish brown cobbly sandy loam
11 to 16 inches-very dark grayish brown very cobbly loamy sand
Underlying material:
16 to 62 inches-dark yellowish brown extremely cobbly loamy sand

## Soil Properties and Qualities

## Depth class:Very deep

Drainage class: Moderately well drained
General texture class:Loamy or sandy in the upper part and sandy with many rock fragments in the lower part
Permeability: Moderately rapid in the surface layer and rapid or very rapid in the underlying material
Available water capacity:Very low
Depth to seasonal high water table: 2.0 to 4.0 feet from January through April
Hazard of flooding: Occasional, throughout the year with standing water for less than 2 days (fig. 7)
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
Potential for frost action: Low
Special climatic conditions: Soil 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 to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary rock
Depth to bedrock: More than 60 inches
Depth to contrasting material: 8 to 20 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:

- Somewhat poorly drained Cullowhee soils and poorly drained Nikwasi soils that have subsoils that are 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 and backwater areas
- Poorly drained soils that have strata with a high content of rock fragments at a depth of less than 20 inches, in depressions, old stream channels, and backwater areas
- Moderately well drained Reddies soils that have subsoils that are 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 the slightly higher positions
- Areas that are frequently or rarely flooded
- Random areas of soils that have a very stony or very
bouldery surface or have a high content of rock fragments in the surface layer
- Soils that have sandy overwash or thinner surface
layers than the Dellwood soil


## Similar inclusions:

- Dellwood soils that have a surface layer of loamy sand or loamy fine sand
- Dellwood soils that are well drained to somewhat excessively drained


## Land Use

Dominant Uses: Pasture and hayland
Other Uses: Cropland, recreation, and woodland

## Agricultural Development

## Cropland

Suitability: Suited
Management concerns: Flooding, tilth, droughtiness, soil fertility, nutrient leaching, pesticide retention, and climate
Management measures and considerations:

- Because of the potential for flooding during the growing season, this soil is difficult to manage for cropland.
- This soil may be difficult to till because of the high content of rock fragments in and below the surface layer.
- This soil has a low available water capacity and becomes droughty during periods of low rainfall.
- Conservation tillage, winter cover crops, crop residue management, and crop rotations which include grasses and legumes help to increase the available water capacity and improve soil fertility.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase


Figure 7.-An area of Dellwood cobbly sandy loam, 1 to 5 percent slopes, occasionally flooded. The hazard of flooding poses severe limitations for many uses. The remaining rock debris from a recent flood and the damaged structure next to the creek are evidence of this hazard.
the availability of plant nutrients and maximize crop productivity.

- Using split applications of 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 root zone 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.
- Because of slow air drainage, late spring frost may 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 winter, 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.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 root zone 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 helps to maintain pastures and increase productivity.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.


## Ornamental crops

## Suitability: Poorly suited

Management concerns: Flooding, droughtiness, root disease, soil fertility, nutrient leaching, pesticide retention, climate, and ball and burlap harvesting
Management measures and considerations:

- This map unit is difficult to manage for ornamental crops because of the flooding, droughtiness, and large amount of rock fragments in the soil.
- This soil has a low available water capacity and becomes 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 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.
- Because of slow air drainage and frost pockets, 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.
- Using split applications of fertilizer and pesticides helps to increase their effectiveness.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the root zone and into the water table.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Ball and burlap harvesting is severely limited 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 herbicideorganic matter bonding, and they may damage tree seedlings when cropland is converted to woodland. - Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.


## Urban Development

## Dwellings

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for dwellings because of flooding and 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, poor filtering capacity, and seasonal high water table.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited

## 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, droughtiness, root disease, soil fertility, nutrient leaching, pesticide retention, and climate
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because of the flooding, droughtiness, and large amount of rock fragments.
- This soil has a low available water capacity and becomes 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 ornamentals.
- In areas that flood and 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 split applications of fertilizer and pesticides helps to increase their effectiveness.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the root zone 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 landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.


## Interpretive Groups

Land capability classification: 4s

## EpC-Edneytown-Pigeonroost complex, 8 to 15 percent slopes, stony

## Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,400 to 4,200 feet
Landform: Hill and mountain ridges
Landform position: Summits
Shape of areas: Oblong or irregular
Size of areas: 2 to 30 acres

## Composition

Edneytown soil and similar inclusions: 70 percent Pigeonroost soil and similar inclusions: 20 percent Dissimilar inclusions: 10 percent

Typical Profile

## Edneytown

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

## Subsoil:

3 to 12 inches-strong brown sandy clay loam
12 to 32 inches-strong brown clay loam
32 to 43 inches-strong brown loam
Underlying material:
43 to 62 inches-strong brown sandy loam

## Pigeonroost

## Surface layer:

0 to 2 inches—dark yellowish brown gravelly loam
Subsurface layer:
2 to 6 inches-yellowish brown gravelly loam
Subsoil:
6 to 20 inches-strong brown loam
20 to 32 inches-strong brown and dark yellowish brown loam

Bedrock:
32 to 62 inches-soft weathered, moderately fractured gneiss

## Soil Properties and Qualities

Depth class: Edneytown—very deep; Pigeonroostmoderately deep
Drainage class:Well drained
General texture class: Loamy
Permeability: Moderate
Available water capacity: Edneytown—moderate; Pigeonroost-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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Edneytown—very strongly acid to moderately acid in the A and E horizons, except where the surface has been limed, and very strongly acid or strongly acid in the B and C horizons; Pigeonroost-extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: Edneytown—more than 60 inches; Pigeonroost-20 to 40 inches to soft bedrock

## Minor Components

## Dissimilar inclusions:

- Porters and Plott soils that have hard bedrock at a depth of 40 to more than 60 inches and have thicker surface layers with more organic matter than the

Edneytown and Pigeonroost soils, at the higher elevations

- Random areas of Chestnut, Buladean, and Edneyville soils that have less clay in the subsoil than the Edneytown and Pigeonroost soils and have soft bedrock at a depth of 20 to more than 60 inches
- Random areas of soils that have more mica in the subsoil than the Edneytown and Pigeonroost soils
- Soils that are moderately eroded or severely eroded
- Ashe soils that have less clay in the subsoil than the Edneytown and Pigeonroost soils and have hard bedrock at a depth of 20 to 40 inches, in areas of rock outcrops
- Widely scattered areas of rock outcrops, on narrow ridges

Similar inclusions:

- Edneytown soils that have a surface layer of sandy loam or loam
- Pigeonroost soils that have a surface layer of sandy loam or fine sandy loam
- Random areas of Edneytown and Pigeonroost soils that have red subsoils
- Random areas of 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, Fraser fir production, building site development, and woodland

## Agricultural Development

## Cropland

Suitability: Suited
Management concerns:Edneytown-equipment use, erodibility, soil fertility, tilth, and rooting depth; Pigeonroost-equipment use, erodibility, soil fertility, tilth, rooting depth, and droughtiness Management measures and considerations:

- The slope may limit the use of equipment 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 maximize crop productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Pigeonroost soil is difficult to manage for cultivated crops.


## Pasture and hayland

Suitability:Well suited
Management concerns: Edneytown-equipment use, erodibility, soil fertility, and rooting depth; Pigeonroost-equipment use, erodibility, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Preparing seedbeds on the contour when renovating pastures and establishing seedbeds help to prevent further soil erosion and increase germination.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity when establishing, maintaining, or renovating pasture and hayland.
- Using a rotational grazing system, implementing a well planned harvesting schedule, and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Pigeonroost soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Suited
Management concerns: Edneytown-equipment use, erodibility, root disease, ball and burlap harvesting, soil fertility, and rooting depth; Pigeonroostequipment use, erodibility, root disease, ball and burlap harvesting, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- 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 clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Pigeonroost soil is difficult to manage for ornamental crops.


## Woodland Management and Productivity

Potential for commercial species: Moderately high for upland hardwoods and very high for eastern white pine
Suitability:Well suited
Management concerns: Edneytown—erodibility and equipment use; Pigeonroost—erodibility, equipment use, and windthrow hazard
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 when the soils are wet prevents 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 restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

## Suitability: Suited

Management concerns: Edneytown—erodibility and corrosivity; Pigeonroost-erodibility, corrosivity, and depth to bedrock
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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:Edneytown—suited; Pigeonroost—poorly suited
Management concerns: Edneytown—slope and restricted permeability; Pigeonroost-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 Edneytown soil may improve the performance of filter fields.


## Local roads and streets

Suitability: Suited
Management concerns: Edneytown—erodibility and frost action; Pigeonroost—erodibility, frost action, and depth to bedrock
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 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: Edneytown—erodibility, soil compaction, soil fertility, and root disease; Pigeonroost—erodibility, soil compaction, soil fertility, root disease, depth to bedrock, and droughtiness
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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 irrigating 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 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: 4 e

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

## Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county Elevation range: 1,600 to 4,100 feet
Landform: Hillslopes, mountain slopes, and ridges
Landform position: Summits and the upper side slopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to 125 acres

## Composition

Edneytown soil and similar inclusions: 65 percent Pigeonroost soil and similar inclusions: 25 percent Dissimilar inclusions: 10 percent

## Typical Profile

## Edneytown

## Surface layer:

0 to 3 inches-dark yellowish brown fine sandy loam

## Subsoil:

3 to 12 inches-strong brown sandy clay loam
12 to 32 inches-strong brown clay loam
32 to 43 inches-strong brown loam
Underlying material:
43 to 62 inches-strong brown sandy loam

## Pigeonroost

## Surface layer:

0 to 2 inches-dark yellowish brown gravelly loam

## Subsurface layer:

2 to 6 inches-yellowish brown gravelly loam

## Subsoil:

6 to 20 inches-strong brown loam
20 to 32 inches-strong brown and dark yellowish brown loam

## Bedrock:

32 to 62 inches-soft weathered, moderately fractured gneiss

## Soil Properties and Qualities

Depth class:Edneytown—very deep; Pigeonroost— moderately deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderate
Available water capacity: Edneytown-moderate; Pigeonroost-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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Edneytown-very strongly acid to moderately acid in the A and E horizons, except where the surface has been limed, and very strongly acid or strongly acid in the B and C horizons; Pigeonroost-extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: Edneytown-more than 60 inches; Pigeonroost-20 to 40 inches to soft bedrock

## Minor Components

## Dissimilar inclusions:

- Porters and Plott soils that have hard bedrock at a depth of 40 to more than 60 inches and have thicker surface layers with more organic matter than the

Edneytown and Pigeonroost soils, at the higher elevations

- Saunook soils that have thicker surface layers with more organic matter than the Edneytown and Pigeonroost soils and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains
- Random areas of Chestnut, Buladean, and

Edneyville soils that have less clay in the subsoil than the Edneytown and Pigeonroost soils and have soft bedrock at a depth of 20 to more 60 inches

- Random areas soils that have more mica in the subsoil than the Edneytown and Pigeonroost soils
- Ashe soils that have less clay in the subsoil than the Edneytown and Pigeonroost soils and have hard bedrock at a depth of 20 to 40 inches, in areas of rock outcrops
- Widely scattered areas of rock outcrops, on narrow ridges


## Similar inclusions:

- Edneytown soils that have a surface layer of sandy loam or loam
- Pigeonroost soils that have a surface layer of sandy loam or fine sandy loam
- Random areas of Edneytown and Pigeonroost soils that have red subsoils
- Random areas of soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Pasture, hayland, and woodland Other Uses: Ornamental crops, Fraser fir production, and building site development

## Agricultural Development

## Cropland

## Suitability: Poorly suited

Management concerns: Edneytown-equipment use, erodibility, tilth, and soil fertility; Pigeonroostequipment use, erodibility, tilth, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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 help 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 maximize crop productivity.
- Because of the low available water capacity caused
by the moderately deep rooting depth, the Pigeonroost soil is difficult to manage for cultivated crops.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns:Edneytown-equipment use, erodibility, and soil fertility; Pigeonroostequipment use, erodibility, soil fertility, rooting depth, and droughtiness
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 helps to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Pigeonroost soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability:Suited
Management concerns:Edneytown-equipment use, erodibility, root disease, ball and burlap harvesting, soil fertility, and plant shape; Pigeonroostequipment use, erodibility, root disease, ball and burlap harvesting, soil fertility, plant shape, rooting depth, and droughtiness
Management measures and considerations:

- This map unit may be difficult to manage for 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 clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Avoiding ball and burlap harvesting during extreme
moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Pigeonroost soil is difficult to manage for ornamental crops.


## Woodland Management and Productivity

Potential for commercial species: Moderately high for upland hardwoods and very high for eastern white pine
Suitability: Suited
Management concerns: Edneytown—erodibility and equipment use; Pigeonroost-erodibility, equipment use, and windthrow hazard
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 when the soils are wet prevents rutting of the soil surface and damage to trees 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 restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns:Edneytown-slope, erodibility, and corrosivity; Pigeonroost-slope, erodibility, corrosivity, and depth to bedrock
Management measures and considerations:

- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Edneytown-slope and restricted permeability; Pigeonroost-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 Edneytown soil may improve the performance of filter fields.


## Local roads and streets

## Suitability: Poorly suited

Management concerns:Edneytown-slope, erodibility, and frost action; Pigeonroost-slope, erodibility, frost action, and depth to bedrock
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 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: Edneytown-slope, erodibility, soil compaction, soil fertility, and root disease; Pigeonroost-slope, erodibility, soil compaction, soil fertility, root disease, depth to bedrock, and droughtiness
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and
using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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 irrigating 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 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 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

## EpE-Edneytown-Pigeonroost complex, 30 to 50 percent slopes, stony

## Setting

Landscape: Intermountain hills and low and intermediate mountains predominantly in the eastern part of the county
Elevation range: 2,000 to 3,600 feet
Landform: Hillslopes, mountain slopes, and ridges
Landform position: Side slopes and summits
Shape of areas: Irregular or long and narrow
Size of areas: 2 to 600 acres

## Composition

Edneytown soil and similar inclusions: 50 percent Pigeonroost soil and similar inclusions: 35 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Edneytown

Surface layer:
0 to 3 inches—dark yellowish brown fine sandy loam
Subsoil:
3 to 12 inches-strong brown sandy clay loam

12 to 32 inches-strong brown clay loam
32 to 43 inches-strong brown loam
Underlying material:
43 to 62 inches-strong brown sandy loam

## Pigeonroost

Surface layer:
0 to 2 inches—dark yellowish brown gravelly loam
Subsurface layer:
2 to 6 inches-yellowish brown gravelly loam
Subsoil:
6 to 20 inches-strong brown loam
20 to 32 inches-strong brown and dark yellowish brown loam

## Bedrock:

32 to 62 inches-soft weathered, moderately fractured gneiss

## Soil Properties and Qualities

Depth class: Edneytown—very deep; Pigeonroost— moderately deep
Drainage class:Well drained
General texture class: Loamy
Permeability: Moderate
Available water capacity: Edneytown—moderate; Pigeonroost-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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Edneytown-very strongly acid to moderately acid in the A and E horizons, except where the surface has been limed, and very strongly acid or strongly acid in the B and C horizons; Pigeonroost-extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: Edneytown-more than 60 inches; Pigeonroost-20 to 40 inches to soft bedrock

## Minor Components

## Dissimilar inclusions:

- Porters and Plott soils that have hard bedrock at a depth of 40 to more than 60 inches and have thicker surface layers with more organic matter than the Edneytown and Pigeonroost soils, at the higher elevations
- Saunook soils that have thicker surface layers with more organic matter than the Edneytown and
Pigeonroost soils and have bedrock at a depth of more than 60 inches, in concave areas at the head of drains, on footslopes, and on benches
- Cullasaja soils that have thicker surface layers with more organic matter than the Edneytown and Pigeonroost soils, contain high amounts of rock fragments, and have bedrock at a depth of more than 60 inches, in narrow drains
- Random areas of Chestnut, Buladean, and Edneyville soils that have less clay in the subsoil than the Edneytown and Pigeonroost soils and have soft bedrock at a depth of 20 to more 60 inches
- Random areas of soils that have more mica in the subsoil than the Edneytown and Pigeonroost soils
- Ashe soils that have less clay in the subsoil than the Edneytown and Pigeonroost soils and have hard bedrock at a depth of 20 to 40 inches, in areas of rock outcrops
- Widely scattered areas of rock outcrops


## Similar inclusions:

- Edneytown soils that have a surface layer of sandy loam or loam
- Pigeonroost soils that have a surface layer of sandy loam or fine sandy loam
- Random areas of Edneytown and Pigeonroost soils that have red subsoils
- Random areas of soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Woodland
Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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: Edneytown-equipment use, erodibility, and soil fertility; Pigeonroostequipment use, erodibility, soil fertility, rooting depth, and droughtiness
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.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Pigeonroost soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns: Edneytown-equipment use, erodibility, root disease, soil fertility, and plant shape; Pigeonroost-equipment use, erodibility, root disease, soil fertility, plant shape, rooting depth, and droughtiness
Management measures and considerations:

- These soils are marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- This map unit may be difficult to manage for 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 clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, 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.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Pigeonroost soil is difficult to manage for ornamental crops.


## Woodland Management and Productivity

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

## Suitability: Suited

Management concerns: Edneytown-equipment use and erodibility; Pigeonroost-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 watercontrol 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 when the soils are wet prevents rutting of the soil surface and damage to trees 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 restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns:Edneytown-slope, erodibility, and corrosivity; Pigeonroost-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 disturbed areas as soon as possible and
using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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:Edneytown-slope and restricted permeability; Pigeonroost-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 Edneytown soil may improve the performance of filter fields.


## Local roads and streets

Suitability: Poorly suited
Management concerns:Edneytown-slope, erodibility, and frost action; Pigeonroost-slope, erodibility, frost action, and depth to bedrock
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 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:Edneytown-slope, erodibility, soil compaction, soil fertility, and root disease; Pigeonroost-slope, erodibility, soil compaction, soil fertility, root disease, depth to bedrock, and droughtiness

Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 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 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

## EtE-Edneyville-Chestnut complex, 30 to 50 percent slopes, stony

## Setting

Landscape:Low and intermediate mountains throughout most of the county, except in the eastern part
Elevation range: 2,400 to 4,200 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Shape of areas: Irregular or long and narrow
Size of areas: 2 to more than 100 acres

## Composition

Edneyville soil and similar inclusions: 55 percent Chestnut soil and similar inclusions: 30 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Edneyville

Surface layer:
0 to 3 inches-very dark gray fine sandy loam

Subsoil:
3 to 10 inches-yellowish brown loam
10 to 17 inches-yellowish brown loam
17 to 25 inches-yellowish brown sandy loam
Underlying material:
25 to 40 inches-yellowish brown and brownish yellow gravelly sandy loam saprolite
40 to 62 inches-gravelly sandy loam saprolite that is multicolored in shades brown and yellow

## Chestnut

## Surface layer:

0 to 3 inches-dark brown gravelly sandy loam
Subsoil:
3 to 16 inches-yellowish brown loam
16 to 22 inches-yellowish brown sandy loam
Underlying material:
22 to 28 inches-brownish yellow gravelly fine sandy loam

## Bedrock:

28 to 62 inches-soft weathered, slightly fractured granite

## Soil Properties and Qualities

Depth class:Edneyville—very deep; Chestnutmoderately deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Edneyville-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:Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for 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: Edneyville-very strongly acid to moderately acid, except where the surface has been limed; Chestnut-extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the
upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: Edneyville—more than 60 inches;
Chestnut-20 to 40 inches to soft bedrock

## Minor Components

Dissimilar inclusions:

- Saunook soils that have thicker surface layers with more organic matter than the Edneyville 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, on footslopes, and in drainageways - Cullasaja soils that have thicker surface layers with more organic matter than the Edneyville and Chestnut soils, contain high amounts of rock fragments, and have bedrock at a depth of more than 60 inches, in narrow drains
- Porters and Plott soils that have hard bedrock at a depth of 40 to more than 60 inches and have thicker surface layers with more organic matter than the Edneyville and Chestnut soils, at the higher elevations
- Random areas of Edneytown and Pigeonroost soils that have more clay in the subsoil than the Edneyville and Chestnut soils
- Ashe soils that have less clay in the subsoil than the Edneyville and Chestnut soils and have hard bedrock at a depth of 20 to 40 inches, in areas of rock outcrops
- Widely scattered areas of rock outcrop
- Random areas of soils that have more mica in the subsoil than the Edneyville and Chestnut soils


## Similar inclusions:

- Edneyville soils that have a surface layer of sandy loam or loam
- Chestnut soils that have a surface layer of loam or fine sandy loam
- Random areas of Buladean soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Woodland
Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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:Edneytown-equipment use, erodibility, and soil fertility; Chestnut-equipment use, erodibility, soil fertility, rooting depth, and droughtiness
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.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy help to maintain pastures and increase productivity.
- Because of the low available water capacity caused
by the moderately deep rooting depth, the Chestnut soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns: Edneytown—equipment use, erodibility, soil fertility, and plant shape; Chestnut-equipment use, erodibility, soil fertility, plant shape, rooting depth, and droughtiness Management measures and considerations:

- These soils are marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- This map unit may be difficult to manage for ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Chestnut soil is difficult to manage for ornamental crops.
- 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
upland hardwoods and very high for eastern white pine
Suitability:Suited
Management concerns: Edneytown-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 watercontrol 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.
- 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 and windthrow hazard.


## Urban Development

## Dwellings

## Suitability: Poorly suited

Management concerns:Edneytown-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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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

[^1]- Installing distribution lines on the contour helps to improve the performance of septic tank absorption fields.
- Locating and using areas of the deeper Edneyville soil may improve the performance of filter fields.


## Local roads and streets

## Suitability: Poorly suited

Management concerns: Edneytown-slope, erodibility, and frost action; Chestnut-slope, erodibility, frost action, and depth to bedrock

## Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- The soft bedrock underlying these soils is not be difficult to excavate but is difficult to vegetate or pack if used in fill material.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns: Edneytown-slope, erodibility, and soil fertility; Chestnut-slope, erodibility, soil fertility, depth to bedrock, and droughtiness
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 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

## EtF—Edneyville-Chestnut complex, 50 to 80 percent slopes, stony

## Setting

Landscape: Low and intermediate mountains throughout most of the county, except in the eastern part
Elevation range: 2,400 to 4,200 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular or long and narrow
Size of areas: 5 to 200 acres

## Composition

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

## Typical Profile

## Edneyville

Surface layer:
0 to 3 inches-very dark gray fine sandy loam

## Subsoil:

3 to 10 inches-yellowish brown loam
10 to 17 inches-yellowish brown loam
17 to 25 inches-yellowish brown sandy loam
Underlying material:
25 to 40 inches-yellowish brown and brownish yellow gravelly sandy loam saprolite
40 to 62 inches-gravelly sandy loam saprolite that is multicolored in shades brown and yellow

## Chestnut

## Surface layer:

0 to 3 inches-dark brown gravelly sandy loam

## Subsoil:

3 to 16 inches-yellowish brown loam
16 to 22 inches-yellowish brown sandy loam

## Underlying material:

22 to 28 inches-brownish yellow gravelly fine sandy loam

Bedrock:
28 to 62 inches—soft weathered, slightly fractured granite

## Soil Properties and Qualities

Depth class:Edneyville—very deep; Chestnutmoderately deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity:Edneyville-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:Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for 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: Edneyville-very strongly acid to moderately acid, except where the surface has been limed; Chestnut-extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: Edneyville-more than 60 inches; Chestnut-20 to 40 inches to soft bedrock

## Minor Components

## Dissimilar inclusions:

- Saunook soils that have thicker surface layers with more organic matter than the Edneyville 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, on footslopes, and in drainageways - Cullasaja soils that have thicker surface layers with more organic matter than the Edneyville and Chestnut soils, contain high amounts of rock fragments, and have bedrock at a depth of more than 60 inches, in narrow drains
- Porters and Plott soils that have hard bedrock at a depth of 40 to more than 60 inches and have thicker surface layers with more organic matter than the Edneyville and Chestnut soils, at the higher elevations - Random areas of soils that have more mica in the subsoil than the Edneyville and Chestnut soils
- Cleveland and Ashe soils that have hard bedrock at a depth of 10 to 40 inches, in areas of rock outcrops
- Widely scattered areas of rock outcrop

Similar inclusions:

- Edneyville soils that have a surface layer of sandy loam or loam
- Chestnut soils that have a surface layer of loam or fine sandy loam
- Random areas of Buladean soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Woodland
Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for 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 very high for eastern white pine
Suitability: Poorly suited
Management concerns:Edneyville-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, 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 restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns:

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


## Interpretive Groups

Land capability classification:7e

## FaC-Fannin fine sandy loam, 8 to 15 percent slopes

## Setting

Landscape: Intermountain hills and low and intermediate mountains predominantly in the southwestern part of the county

Elevation range: 2,700 to 3,800 feet
Landform: Hill and mountain ridges
Landform position:Summits
Shape of areas: Oblong or irregular
Size of areas: 2 to 60 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 5 inches-strong brown fine sandy loam
Subsoil:
5 to 23 inches-yellowish red clay loam
23 to 30 inches-yellowish red loam
Underlying material:
30 to 38 inches-strong brown loam saprolite
38 to 62 inches-sandy loam saprolite that is multicolored in shades of red, yellow, and brown

## 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
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic rock that has 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:

- Soils that have soft bedrock at a depth of 20 to 60 inches, on shoulder slopes
- Udorthents, loamy, and areas associated with small mica mines
- Saunook soils that have thicker surface layers with more organic matter than the Fannin soil and have thicker subsoils, in saddles
- Random areas of Chandler soils that have less clay in the subsoil than the Fannin soil
- Random areas of Edneytown soils that have less mica in the subsoil than the Fannin soil
- Soils that are moderately eroded or severely eroded
- Random areas of soils that have more clay in the subsoil than the Fannin soil
Similar inclusions:
- Fannin soils that have a surface layer of loam or sandy loam
- Random areas of Watauga soils that have a brown subsoil


## Land Use

Dominant Uses: Pasture, hayland, and woodland Other Uses: Ornamental crops, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability: Suited
Management concerns: Equipment use, erodibility, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment 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 maximize crop productivity.


## Pasture and hayland

Suitability:Well suited
Management concerns: Equipment use, erodibility, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Preparing seedbeds on the contour or across the slope helps to minimize 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability: Suited

Management concerns: Equipment use, erodibility, soil fertility, root disease, and ball and burlap harvesting
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- 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.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.


## 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, 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 watercontrol 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 when the soil is wet prevents rutting of the soil surface.
- 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil
strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Suited

Management concerns: Erodibility, soil fertility, root disease, and soil compaction
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.


## Interpretive Groups

Land capability classification: 4e

## FaD—Fannin fine sandy loam, 15 to 30 percent slopes

## Setting

Landscape: Intermountain hills and low and intermediate mountains predominantly in the southwestern part of the county
Elevation range: 2,700 to 3,800 feet
Landform: Hillslopes, mountain slopes, and ridges
Landform position: Summits and side slopes Shape of areas: Long and narrow or irregular Size of areas: 2 to 150 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 5 inches-strong brown fine sandy loam

Subsoil:
5 to 23 inches-yellowish red clay loam
23 to 30 inches-yellowish red loam
Underlying material:
30 to 38 inches-strong brown loam saprolite
38 to 62 inches-sandy loam saprolite that is multicolored in shades of red, yellow, and brown

## 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
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic rock that has 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:

- Soils that have soft bedrock at a depth of 20 to 60 inches, on shoulder slopes
- Udorthents, loamy, and areas associated with small mica mines
- Saunook soils that have thicker surface layers with more organic matter than the Fannin soil and have thicker subsoils, in saddles
- Random areas of Chandler soils that have less clay in the subsoil than the Fannin soil
- Random areas of Edneytown soils that have less mica in the subsoil than the Fannin soil
- Soils that are moderately eroded or severely eroded

Similar inclusions:

- Fannin soils that have a surface layer of loam or sandy loam
- Random areas of Watauga soils that have a brown subsoil


## Land Use

Dominant Uses: Pasture, hayland, and woodland Other Uses: Ornamental crops, Fraser fir production, and building site development

## Agricultural Development

## Cropland

## Suitability: Poorly suited

Management concerns: Equipment use, erodibility, and soil fertility
Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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 maximize crop productivity.


## Pasture and hayland

## Suitability for pasture: Suited

Suitability for hayland: Poorly suited
Management concerns: Equipment use, erodibility, and soil fertility
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.


## Ornamental crops

Suitability: Suited
Management concerns: Equipment use, erodibility, soil
fertility, ball and burlap harvesting, root disease, and plant shape
Management measures and considerations:

- This map unit may be difficult to manage for 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.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- The slope affects the shape of low-growing ornamentals on the uphill side.


## 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, 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 watercontrol 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 when the soil is wet prevents rutting of the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, 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 helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Slope, erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited

Management concerns: Slope, erodibility, soil fertility, root disease, and soil compaction
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 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.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.


## Interpretive Groups

Land capability classification: 6e

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

## Setting

Landscape: Intermountain hills and low mountains in the southern part of the county
Elevation range: 2,700 to 2,800 feet
Landform: Hill and mountain ridges
Landform position: Summits
Shape of areas: Long and narrow
Size of areas: 3 to 10 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 2 inches-dark brown sandy clay loam
Subsoil:
2 to 9 inches-yellowish red sandy clay loam
9 to 22 inches-red clay loam
22 to 31 inches-yellowish red sandy clay loam

Underlying material:
31 to 79 inches-multicolored fine sandy loam saprolite

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderate
Available water capacity: Moderate
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential:Low
Slope class: Strongly sloping
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed
Hazard of water erosion: Severe
Organic matter content (surface layer): Low
Potential for frost action: Moderate
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock that has 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 Chandler soils that have less clay
in the subsoil than the Fannin soil
- Random areas of Edneytown soils that have less
mica in the subsoil than the Fannin soil
- Soils that 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 thicker surface layers with more organic matter than the Fannin soil and have thicker subsoils, in saddles
- Udorthents, loamy, and areas associated with small mica mines


## Similar inclusions:

- Fannin soils that have a clay loam surface layer
- Slightly eroded Fannin soils that have a surface layer of loam, fine sandy loam, or sandy loam
- Random areas of Watauga soils that have a brown loamy subsoil


## Land Use

Dominant Uses: Pasture, hayland, and woodland
Other Uses: Ornamental crops, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability: Suited
Management concerns: Equipment use, erodibility, tilth, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment 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 maximize crop productivity.


## Pasture and hayland

Suitability:Well suited
Management concerns: Equipment use, erodibility, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment 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.


## Ornamental crops

Suitability: Suited
Management concerns: Equipment use, erodibility, soil fertility, root disease, and ball and burlap harvesting

Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- 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.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.


## 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, 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 watercontrol 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 when the soil is wet prevents rutting of the soil surface.
- 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, 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 helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Slope, erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Suited
Management concerns: Slope, erodibility, soil fertility, root disease, and soil compaction
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.


## Interpretive Groups

Land capability classification: 4e

## FeD2—Fannin sandy clay loam, 15 to 30

 percent slopes, eroded
## Setting

Landscape: Intermountain hills and low mountains in the southern part of the county
Elevation range: 2,700 to 3,400 feet
Landform:Hillslopes, mountain slopes, and ridges
Landform position: Summits and side slopes
Shape of areas: Long and narrow or irregular
Size of areas: 3 to 20 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 2 inches-dark brown sandy clay loam

## Subsoil:

2 to 9 inches-yellowish red sandy clay loam 9 to 22 inches-red clay loam
22 to 31 inches-yellowish red sandy clay loam
Underlying material:
31 to 79 inches-multicolored fine sandy loam saprolite

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderate
Available water capacity: Moderate
Depth to seasonal high water table: More than 6.0 feet Hazard of flooding: None
Shrink-swell potential: Low

Slope class: Moderately steep
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed Hazard of water erosion:Very severe
Organic matter content (surface layer): Low
Potential for frost action: Moderate
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock that has 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:

- Soils that have soft bedrock at a depth of 20 to 60 inches, on shoulder slopes
- Random areas of severely eroded soils where the underlying material is exposed at the surface
- Saunook soils that have thicker surface layers with more organic matter than the Fannin soil and have thicker subsoils, in drainageways, on toeslopes, and in saddles
- Random areas of Chandler soils that have less clay in the subsoil than the Fannin soil
- Random areas of Edneytown soils that have less mica in the subsoil than the Fannin soil
- Udorthents, loamy, and areas associated with small mica mines


## Similar inclusions:

- Fannin soils that have a clay loam surface layer
- Slightly eroded Fannin soils that have a surface layer of loam, fine sandy loam, or sandy loam
- Random areas of Watauga soils that have a brown loamy subsoil


## Land Use

Dominant Uses: Pasture, hayland, and woodland Other Uses: Ornamental crops, Fraser fir production, 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 of erodibility and an equipment use limitation caused by the slope.
- 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 maximize crop productivity.


## Pasture and hayland

## Suitability for pasture: Suited

Suitability for hayland: Poorly 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.
- 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.


## Ornamental crops

Suitability: Suited
Management concerns: Equipment use, erodibility, soil fertility, ball and burlap harvesting, plant shape, and root disease
Management measures and considerations:

- This map unit may be difficult to manage for ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during extreme
moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is 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.


## 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, difficult to compact, and unstable due to the high mica content in the subsoil and underlying material.
- Designing roads on the contour, installing watercontrol 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 when the soil is wet prevents rutting of the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, 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 helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Slope, erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns: Slope, erodibility, soil fertility, root disease, and soil compaction
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 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.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.


## Interpretive Groups

Land capability classification:6e

## FeE2—Fannin sandy clay loam, 30 to 50 percent slopes, eroded

Setting<br>Landscape: Intermountain hills and low mountains in the southern part of the county<br>Elevation range: 2,600 to 3,400 feet<br>Landform:Hillslopes and mountain slopes<br>Landform position:Side slopes<br>Shape of areas: Irregular<br>Size of areas: 3 to 20 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 2 inches-dark brown sandy clay loam

## Subsoil:

2 to 9 inches-yellowish red sandy clay loam
9 to 22 inches-red clay loam
22 to 31 inches-yellowish red sandy clay loam
Underlying material:
31 to 79 inches-multicolored fine sandy loam saprolite

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderate
Available water capacity: Moderate
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential:Low
Slope class: Steep
Extent of erosion: Moderate, about 25 to 75 percent of the original surface layer has been removed

## Hazard of water erosion:Very severe

Organic matter content (surface layer): Low
Potential for frost action: Moderate
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock that has 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:

- Soils that have soft bedrock at a depth of 20 to 60 inches, on shoulder slopes
- Random areas of severely eroded soils where the underlying material is exposed at the surface
- Saunook soils that have thicker surface layers with more organic matter than the Fannin soil and have thicker subsoils, in drainageways, on toeslopes, and in saddles
- Random areas of Chandler soils that have less clay in the subsoil than the Fannin soil
- Random areas of Edneytown soils that have less mica in subsoil than the Fannin soil
- Udorthents, loamy, and areas associated with small mica mines


## Similar inclusions:

- Fannin soils that have a clay loam surface layer
- Slightly eroded Fannin soils that have a surface layer of loam, fine sandy loam, or sandy loam
- Random areas of Watauga soils that have a brown loamy subsoil


## Land Use

Dominant Uses: Pasture and woodland Other Uses: Ornamental crops, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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.
- 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.


## Ornamental crops

## Suitability: Poorly suited

Management concerns: Equipment use, erodibility, soil fertility, ball and burlap harvesting, plant shape, and root disease
Management measures and considerations:

- This soil is marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- This map unit may be difficult to manage for ornamental crops because the slope limits equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is 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.


## 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, 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 watercontrol 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 when the soil is wet prevents rutting of the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Slope, erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Slope, erodibility, soil fertility, root disease, and soil compaction
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 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.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.


## Interpretive Groups

Land capability classification:7e

## GrE-Greenlee very cobbly sandy loam, 30 to 50 percent slopes, extremely bouldery

Setting
Landscape:Low and intermediate mountains in the eastern and southeastern parts of the county
Elevation range: 1,600 to 3,600 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position:Head slopes, side slopes, and footslopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to 250 acres

## Composition

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

## Typical Profile

Organic layer:
1 inch to 0—partially decomposed leaf litter

## Surface layer:

0 to 4 inches-dark brown very cobbly sandy loam
Subsoil:
4 to 12 inches-yellowish brown very cobbly sandy loam
12 to 32 inches-light yellowish brown very cobbly sandy loam

Underlying material:
32 to 62 inches-light yellowish brown and very pale 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: 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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Low
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Parent material: Colluvium derived from felsic to 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; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land
- Random areas of rock outcrop
- Areas of Saunook soils that contain fewer rock fragments than the Greenlee soil, have a thicker surface layer with more organic matter, and have more clay in the subsoil
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Areas of Cullasaja soils that have thicker surface layers with more organic matter than the Greenlee soil, at the higher elevations
- Random areas that have slopes of less than 30 percent

Similar inclusions:

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


## Land Use

Dominant Uses: Woodland

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, erodibility, and extremely
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, and soil fertility
Management measures and considerations:

- This map unit is severely limited for hayland because of the extremely bouldery surface and the slope.
- 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.
- 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.


## Ornamental crops

Suitability:Unsuited Management concerns:

- This map unit is severely limited for ornamental crops because of an extremely bouldery surface and large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the 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: Poorly suited

Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface. - Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability:Unsuited

Management concerns: 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.


## Septic tank absorption fields

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for septic tank absorption fields because of the slope, extremely bouldery surface, seeps and springs, and poor filtering capacity.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns:Large stones, slope, erodibility, seeps and springs, and differential settling
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Unsuited
Management concerns: Large stones, slope, erodibility, soil fertility, root disease, and climate
Management measures and considerations:

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


## Interpretive Groups

Land capability classification: 7s

## M-W-Miscellaneous water

These areas are associated with quarries and mines. The water areas are a by-product of the separation and extraction process in mining or are excavations that become filled with water after operations have ceased. Impoundments range from 1 to 15 acres in size.

This map unit is not assigned a land capability classification.

## NkA—Nikwasi loam, 0 to 3 percent slopes, frequently flooded

## Setting

Landscape:Valleys of intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,800 to 4,100 feet
Landform: Flood plains
Landform position: Planar to slightly concave slopes
Shape of areas: Irregular
Size of areas: 1 to 100 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 10 inches-black loam
10 to 24 inches-black loam
Underlying material:
24 to 30 inches-dark gray gravelly sandy loam
30 to 62 inches-dark gray 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 with many rock fragments in the lower part
Permeability:Moderately rapid
Available water capacity: Low
Depth to seasonal high water table: 0 to 1.0 foot from November 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): High or very high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed; some part within the 10 - to 40 -inch section is moderately acid or slightly acid
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Parent material: Alluvium derived from felsic to mafic, low-grade to 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 moderate duration during wet periods throughout the year

## Minor Components

Dissimilar inclusions:

- Somewhat poorly drained Cullowhee and moderately well drained Reddies soils, along stream channels
- Well drained Saunook soils, on toeslopes and benches
- Well drained Statler soils, on low terraces
- Poorly drained soils that have more clay in the subsoil than the Nikwasi soil, on low-lying depressions in backwater areas
- Soils that are similar to the Nikwasi soil but are occasionally flooded, in the slightly higher positions
- Poorly drained soils that have strata with a high content of rock fragments at a depth of less than 20 inches
- Soils that have recent sandy overwash


## Similar inclusions:

- Nikwasi soils that have a surface layer of fine sandy loam or sandy loam
- Poorly drained soils that have a surface layer less
than or more than 24 inches thick


## Land Use

Dominant Uses: Pasture and hayland
Other Uses: Cropland and woodland

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Pasture and hayland

## Suitability: Poorly suited

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

- Because of the wetness and flooding, this map unit is difficult to manage for pasture and hayland.
- 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 root zone and into the water table.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.


## Ornamental crops

Suitability: Unsuited Management concerns:

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


## Interpretive Groups

Land capability classification: 6w

## NnE-Northcove very cobbly loam, 30 to

 50 percent slopes, extremely bouldery
## Setting

Landscape: Low and intermediate mountains in the eastern and southeastern parts of the county
Elevation range: 2,000 to 3,600 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes, side slopes, and footslopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to 500 acres

## Composition

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

## Typical Profile

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

## Subsoil:

4 to 8 inches-yellowish brown very cobbly sandy loam
8 to 36 inches-yellowish brown very cobbly sandy loam

Underlying material:
36 to 62 inches-yellowish brown extremely 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: 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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): Moderate or high
Potential for frost action: Low
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Parent material: Colluvium derived predominantly from low-grade metasedimentary rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land
- Random areas of rock outcrop
- Soils that have bedrock at a depth of less than 6.0
feet, in drainageways and on the outer edge of map unit delineations
- Soils that have seeps and springs or have a
seasonal high water table at a depth of less than 6.0
feet, on toeslopes, in depressions, and in drainageways
- Areas of Spivey soils that have thicker surface layers with more organic matter than the Northcove soil
- Random areas of Maymead soils that contain fewer rock fragments than the Northcove soil

Similar inclusions:

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


## Land Use

Dominant Uses: Woodland

## Agricultural Development

## Cropland

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, erodibility, and extremely 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 for pasture: Equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- This map unit is severely limited for hayland because of the extremely bouldery surface and the slope.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, extremely bouldery surface, and large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the soil. This soil occurs at elevations lower than what is typically considered productive for growing Fraser fir. A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Moderate for cove hardwoods and northern hardwoods
Suitability: Poorly suited
Management concerns: Equipment use and erodibility
Management measures and considerations:

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface. - Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns: Slope, large stones, erodibility, seeps and springs, cutbanks cave, and corrosivity Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for septic tank absorption fields because of the slope, extremely bouldery surface, seeps and springs, and poor filtering capacity.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Large stones, slope, erodibility,
seeps and springs, frost action, and differential settling
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Unsuited
Management concerns:Large stones, slope, erodibility,
soil fertility, root disease, and climate
Management measures and considerations:

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


## Interpretive Groups

Land capability classification: 7s

## NoC-Northcove-Maymead complex, 8 to 15 percent slopes, extremely stony

Setting<br>Landscape: Low and intermediate mountains in the eastern and southeastern parts of the county<br>Elevation range: 1,900 to 3,500 feet<br>Landform: Coves, colluvial fans, drainageways, and benches<br>Landform position: Footslopes and toeslopes Shape of areas: Long and narrow or irregular Size of areas: 2 to 30 acres

## Composition

Northcove soil and similar inclusions: 65 percent Maymead soil and similar inclusions: 25 percent Dissimilar inclusions: 10 percent

## Typical Profile

## Northcove

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

Subsoil:
4 to 8 inches-yellowish brown very cobbly sandy loam
8 to 36 inches-yellowish brown very cobbly sandy loam

Underlying material:
36 to 62 inches-yellowish brown extremely cobbly sandy loam

## Maymead

Surface layer:
0 to 4 inches-very dark grayish brown loam
Subsoil:
4 to 10 inches-yellowish brown loam
10 to 18 inches-yellowish brown gravelly loam
18 to 40 inches-yellowish brown cobbly loam

## Underlying material:

40 to 62 inches-yellowish brown very cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Northcove-loamy with many rock fragments; Maymead-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: Moderate
Rock fragments on the surface: About 10 percent stones and boulders that average about 10 to 24 inches in diameter and 1.5 to 3.5 feet apart
Organic matter content (surface layer): Moderate or high
Potential for frost action: Northcove—low; Maymead— moderate
Soil reaction: Northcove-extremely acid to moderately acid, except where the surface has been limed; Maymead-very strongly acid or strongly acid, except where the surface has been limed
Special climatic conditions: Soils subject to slow air
drainage, which allows late spring and early fall frosts
Parent material: Colluvium derived predominantly from low-grade metasedimentary rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; a high content of rock fragments in the Northcove soil; the potential for localized mass movement of soil material when the soils become saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land
- Random areas of Whiteoak soils that have fewer rock fragments and more clay in the subsoil than the Northcove and Maymead soils
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Areas of Spivey soils that have thicker surface layers with more organic matter than the Northcove and Maymead soils
- Areas that are occasionally to rarely flooded, in drainageways


## Similar inclusions:

- Northcove and Maymead soils that have surface
layers of fine sandy loam or 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 cultivated crops because of an extremely stony surface and the large amount of rock fragments in the Northcove soil. 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:

- Surface stones and boulders limit the use of equipment and may be hazardous.
- 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for ornamental crops because of an extremely stony surface and large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the soil. These soils occur at elevations lower than what is typically considered productive for growing Fraser fir. 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 watercontrol 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.
- 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:Northcove—unsuited; Maymead—suited Management concerns: Northcove-large stones, erodibility, seeps and springs, corrosivity, and
cutbanks cave; Maymead-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.
- Stones and boulders are a problem during excavation.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage from overland flow of storm water.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- 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: Northcove—unsuited; Maymead—suited Management concerns: Northcove-large stones, slope, seeps and springs, and poor filtering capacity; Maymead-stones, slope, and seeps and springs
Management measures and considerations:

- The local Health Department should be contacted for guidance on sanitary facilities.
- 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 Northcove soil readily absorbs but does not adequately filter effluent.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Northcove-large stones, erodibility, seeps and springs, frost action, and differential settling; Maymead-large stones, erodibility, seeps and springs, and frost action
Management measures and considerations:

- Stones and boulders may be a problem during excavation.
- Designing roads on the contour and installing water-
control structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- The Northcove soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability: Northcove—unsuited; Maymead—suited
Management concerns: Large stones, erodibility, soil fertility, root disease, and climate
Management measures and considerations:

- This map unit is limited for lawns and landscaping because of the extremely stony surface and high content of rock fragments in the Northcove soil.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.


## Interpretive Groups

Land capability classification: Northcove—7s; Maymead-4e

## NoD-Northcove-Maymead complex, 15 to 30 percent slopes, extremely stony

## Setting

Landscape: Low and intermediate mountains in the eastern and southeastern parts of the county
Elevation range: 1,900 to 3,500 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Head slopes and footslopes

Shape of areas: Long and narrow or irregular Size of areas: 2 to 65 acres

## Composition

Northcove soil and similar inclusions: 70 percent Maymead soil and similar inclusions: 20 percent Dissimilar inclusions: 10 percent

## Typical Profile

## Northcove

## Surface layer:

0 to 4 inches-very dark grayish brown very cobbly loam

Subsoil:
4 to 8 inches-yellowish brown very cobbly sandy loam
8 to 36 inches-yellowish brown very cobbly sandy loam

## Underlying material:

36 to 62 inches-yellowish brown extremely cobbly sandy loam

## Maymead

Surface layer:
0 to 4 inches-very dark grayish brown loam
Subsoil:
4 to 10 inches-yellowish brown loam
10 to 18 inches-yellowish brown gravelly loam
18 to 40 inches-yellowish brown cobbly loam
Underlying material:
40 to 62 inches-yellowish brown very cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Northcove—loamy with many rock fragments; Maymead-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 10 percent stones and boulders that average about 10 to 24 inches in diameter and 1.5 to 3.5 feet apart

Organic matter content (surface layer):Moderate or high
Potential for frost action: Northcove-low; Maymeadmoderate
Soil reaction: Northcove-extremely acid to moderately acid, except where the surface has been limed; Maymead-very strongly acid or strongly acid, except where the surface has been limed
Special climatic conditions: Soils subject to slow air drainage, which allows late spring and early fall frosts
Parent material: Colluvium derived predominantly from low-grade metasedimentary rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments in the Northcove soil; the potential for localized mass movement of soil material when the soils become saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land
- Random areas of Whiteoak soils that have fewer rock fragments and more clay in the subsoil than the Northcove and Maymead soils
- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Areas of Soco, Ditney, and Stecoah soils that have bedrock at a depth of less than 60 inches, along the edges of map unit delineations
- Areas of Spivey soils that have a thicker surface
layer with more organic matter than the Northcove and Maymead soils
- Areas that are rarely flooded, in drainageways


## Similar inclusions:

- Northcove and Maymead soils that have surface layers of fine sandy loam or 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 cultivated crops because of an extremely stony surface and the large amount of rock fragments in the Northcove soil. 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:

- The slope and surface stones and boulders limit the use of equipment and may be hazardous.
- 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for ornamental crops because of an extremely stony surface and the large amount of rock fragments in the Northcove soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the soil. These soils occur at elevations lower than what is typically considered productive for growing Fraser fir. 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 watercontrol 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.
- 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: Northcove—unsuited; Maymead—poorly suited
Management concerns:Northcove-large stones, slope, erodibility, seeps and springs, corrosivity, and cutbanks cave; Maymead-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.
- Stones and boulders are a problem during excavation.
- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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.
- Installing permanent retaining walls helps to improve soil stability.


## Septic tank absorption fields

Suitability:Northcove—unsuited; Maymead—poorly suited
Management concerns:Northcove-large stones, slope, seeps and springs, and poor filtering capacity; Maymead-large stones, slope, and seeps and spring
Management measures and considerations:

- The local Health Department should be contacted for guidance on sanitary facilities.
- 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 Northcove soil readily absorbs but does not adequately filter effluent.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Northcove-large stones, slope, erodibility, seeps and springs, frost action, and differential settling; Maymead-large stones, slope, erodibility, seeps and springs, and frost action
Management measures and considerations:

- Stones and boulders may be a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- The Northcove soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Northcove—unsuited; Maymead—poorly suited
Management concerns:Large stones, slope, erodibility, soil fertility, root disease, and climate
Management measures and considerations:

- This map unit is limited for lawns and landscaping because of the slope, extremely stony surface, and the high content of rock fragments in the Northcove soil.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.


## Interpretive Groups

Land capability classification: Northcove-7s; Maymead-6e

## OsB—Ostin cobbly fine sandy loam, 0 to 5 percent slopes, occasionally flooded

## Setting

Landscape:Mountain valleys
Elevation range: 1,600 to 3,600 feet
Landform: Flood plains dominantly at the upper end of mountain valleys or adjacent to streams and rivers on the larger flood plains
Landform position: Planar to slightly convex slopes
Shape of areas: Long and narrow
Size of areas: 2 to 175 acres
Composition
Ostin soil and similar inclusions: 85 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Surface layer:

0 to 4 inches-dark brown cobbly fine sandy loam
Underlying material:
4 to 17 inches-brown very cobbly loamy sand
17 to 62 inches-dark yellowish brown extremely cobbly loamy sand

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained or moderately well drained
General texture class: Loamy or sandy in the upper part and sandy with many rock fragments in the lower part
Permeability: Moderately rapid in the surface layer and rapid or very rapid in the underlying material
Available water capacity:Very low
Depth to seasonal high water table: 2.0 to 3.5 feet
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 to moderate
Organic matter content (surface layer): Moderate or high
Potential for frost action: Low
Soil reaction: Very strongly acid to neutral, except where the surface has been limed
Special climatic conditions: Soil subject to slow air
drainage, which allows late spring and early fall frosts
Parent material: Alluvium derived from felsic to mafic, high-grade metamorphic rock or igneous rock and low-grade metasedimentary rock
Depth to bedrock: More than 60 inches
Depth to contrasting material: 8 to 20 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:

- Somewhat poorly drained Cullowhee soils and poorly drained Nikwasi soils that have subsoils that are 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
- Poorly drained soils that have strata with a high content of rock fragments at a depth of less than 20 inches, in depressions, old stream channels, and backwater areas
- Reddies soils that have subsoils that are 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 the slightly higher areas
- Areas that are frequently or rarely flooded
- Random areas of Dellwood soils that have thicker surface layers with more organic matter than the Ostin soil
Similar inclusions:
- Ostin soils that have a loamy sand or sandy loam surface layer
- Ostin soils that have sandy overwash or are somewhat excessively drained


## Land Use

Dominant Uses:Woodland
Other Uses: Pasture, hayland, and recreation

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cropland because of the flooding, large amount of rock fragments in the soil, and nutrient leaching. A site on better suited soils should be selected.


## Pasture and hayland

Suitability: Poorly suited

Management concerns: Flooding, droughtiness, soil fertility, nutrient leaching, and erodibility Management measures and considerations:

- This map unit is difficult to manage for pasture and hayland because of the flooding, droughtiness, and large amount of rock fragments in the soil.
- 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.
- 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 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 helps to maintain pastures and increase productivity.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.


## Ornamental crops

Suitability: Unsuited
Management concerns: Flooding, droughtiness, root disease, climate, soil fertility, nutrient leaching, and ball and burlap harvesting
Management measures and considerations:

- This map unit is difficult to manage for ornamental crops because of the flooding, droughtiness, and large amount of rock fragments in the soil. A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods

## Suitability:Suited

Management concerns: Flooding
Management measures and considerations:

- The potential for flooding is a consideration in the placement of haul roads and log landings.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.


## Urban Development

## Dwellings

Suitability: 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, poor filtering capacity, and seasonal high water table.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
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, droughtiness, root disease, soil fertility, nutrient leaching, and climate Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because of the flooding, droughtiness, and large amount of rock fragments in the soil.
- This soil has a low available water capacity and becomes droughty during periods of low rainfall.
- 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 frequent and light applications of irrigation water and split applications of lime and fertilizer helps to increase their effectiveness and prevents the leaching of plant nutrients and pesticides below the root zone and into the water table.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.


## Interpretive Groups

Land capability classification: 4s

## PaB-Pineola gravelly loam, 2 to 8 percent slopes

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,600 to 4,200 feet

Landform: Mountain ridges
Landform position:Summits
Shape of areas: Oblong or irregular
Size of areas: 2 to 50 acres
Composition
Pineola soil and similar inclusions: 85 percent
Dissimilar inclusions: 15 percent

## Typical Profile

Surface layer:
0 to 7 inches-dark brown gravelly loam
Subsoil:
7 to 20 inches-yellowish brown clay loam
20 to 26 inches-brownish yellow loam
Underlying material:
26 to 32 inches-brownish yellow and very pale brown gravelly loam saprolite
Bedrock:
32 to 61 inches-soft weathered, multicolored metasiltstone bedrock

## Soil Properties and Qualities

Depth class:Moderately deep
Drainage class:Well drained
General texture class: Loamy
Available water capacity: Low
Permeability: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: None or slight
Organic matter content (surface layer):Moderate or high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
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 soft bedrock

## Minor Components

Dissimilar inclusions:

- Random areas of soils that have bedrock at a depth of less than 20 inches and more than 40 inches
- Whiteoak soils that have bedrock at a depth of more than 60 inches, in saddles and on toeslopes
- Crossnore soils that have less clay in the subsoil than the Pineola soil
- Soils that have thinner surface layers than the Pineola soil

Similar inclusions:

- Pineola soils that have a surface layer of fine sandy
loam or sandy loam
- Soils that have hard bedrock at a depth of 20 to 40 inches


## Land Use

Dominant Uses: Fraser fir production, pasture, and hayland
Other Uses: Ornamental crops and woodland

## Agricultural Development

## Cropland

Suitability:Well suited
Management concerns: Erodibility, tilth, soil fertility, pesticide retention, rooting depth, and droughtiness Management measures and considerations:

- Using conservation practices that include terraces and diversions, crop residue management, stripcropping, and contour tillage, help to control soil erosion and surface runoff and maximize the infiltration of rainfall.
- 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 maximize crop 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.
- Because of the low available water capacity caused by the moderately deep rooting depth, this soil is difficult to manage for cultivated crops.


## Pasture and hayland

## Suitability: Suited

Management concerns: Erodibility, soil fertility, pesticide retention, rooting depth, and droughtiness
Management measures and considerations:

- Preparing seedbeds on the contour or across the slope helps to minimize 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 plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Because of the low available water capacity caused by the moderately deep rooting depth, this soil is difficult to manage for 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability: Suited

Management concerns: Erodibility, root disease, pesticide retention, climate, ball and burlap harvesting, soil fertility, rooting depth, and droughtiness
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 silt and clay content of the subsoil (especially in the Pineola area of Avery County), there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- 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.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, this soil is difficult to manage for ornamental crops.


## Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods and northern hardwoods and high for eastern white pine
Suitability: Suited
Management concerns: Erodibility, equipment use, and windthrow hazard
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 high content of organic matter in the surface layer and the clay content of the subsoil.
- Livestock should not be allowed to graze in areas managed for woodland.
- Avoiding logging operations when the soil is wet prevents rutting of the soil surface and damage to trees roots from compaction.
- Productivity is limited because of the restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Erodibility, corrosivity, and depth to bedrock
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- The soft bedrock underlying this soil 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:

- 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: Suited

Management concerns: Erodibility, frost action, and depth to bedrock
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- The soft bedrock underlying this soil 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: Erodibility, soil compaction, soil fertility, pesticide retention, climate, root disease, depth to bedrock, and droughtiness Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- Because of the restricted movement of air and water caused by the silt and clay content of the subsoil (especially in the Pineola area of Avery County), there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of the moderately deep rooting depth, this soil is 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: 3e

## PnC—Pineola gravelly loam, 8 to 15 percent slopes, stony

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,400 to 4,400 feet
Landform: Mountain ridges
Landform position: Summits and the upper side slopes Shape of areas: Irregular
Size of areas: 2 to 150 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 7 inches-dark brown gravelly loam

## Subsoil:

7 to 20 inches-yellowish brown clay loam
20 to 26 inches-brownish yellow loam
Underlying material:
26 to 32 inches-brownish yellow and very pale brown gravelly loam saprolite
32 to 61 inches-soft weathered, multicolored metasiltstone bedrock

## Soil Properties and Qualities

Depth class:Moderately deep
Drainage class:Well drained

General texture class: Loamy
Permeability:Moderate
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: Moderate
Rock fragments on the surface:Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Moderate or high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
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 soft bedrock

## Minor Components

## Dissimilar inclusions:

- Random areas of soils that have bedrock at a depth of less than 20 inches or more than 40 inches
- Whiteoak soils that have bedrock at a depth of more than 60 inches, in saddles
- Crossnore soils that have less clay in the subsoil than the Pineola soil
- Soils that have thinner surface layers than the

Pineola soil

- Widely scattered areas of rock outcrops

Similar inclusions:

- Pineola soils that have a surface layer of fine sandy loam or sandy loam
- Soils that have hard bedrock at a depth of 20 to 40 inches


## Land Use

Dominant Uses: Woodland, Fraser fir production, and ornamental crops
Other Uses: Pasture, hayland, and building site development

## Agricultural Development

## Cropland

## Suitability: Poorly suited

Management concerns: Equipment use, erodibility, tilth, soil fertility, pesticide retention, rooting depth, and droughtiness

Management measures and considerations:

- The slope may limit the use of equipment 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 maximize crop 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.
- Because of the low available water capacity caused by the moderately deep rooting depth, this soil is difficult to manage for cultivated crops.


## Pasture and hayland

Suitability: Suited
Management concerns: Equipment use, erodibility, soil fertility, pesticide retention, rooting depth, and droughtiness
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- 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 plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Because of the low available water capacity caused
by the moderately deep rooting depth, this soil is difficult to manage for 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability: Suited

Management concerns: Equipment use, erodibility, root disease, pesticide retention, climate, ball and burlap harvesting, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- 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 silt and clay content of the subsoil (especially in the Pineola area of Avery County), there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- 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.
- 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 low available water capacity and windthrow hazard caused by the moderately deep rooting depth, this soil is difficult to manage for ornamental crops.


## Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods and northern hardwoods and high for eastern white pine
Suitability: Suited
Management concerns: Erodibility, equipment use, and windthrow hazard
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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.
- Livestock should not be allowed to graze in areas managed for woodland.
- Avoiding logging operations when the soil is wet prevents rutting of the soil surface and damage to trees roots from compaction.
- Productivity is limited because of the restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Erodibility, corrosivity, and depth to bedrock
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- The soft bedrock underlying this soil 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:

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


## Local roads and streets

Suitability: Poorly suited
Management concerns: Erodibility, frost action, and depth to bedrock
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing water-
control structures, such as 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 helps to minimize damage from frost heaving.
- The soft bedrock underlying this soil 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: Erodibility, compaction, soil fertility, pesticide retention, climate, root disease, depth to bedrock, and droughtiness
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- Because of the restricted movement of air and water caused by the silt and clay content of the subsoil (especially in the Pineola area of Avery County), there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of the moderately deep rooting depth, this
soil is 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: 4e

## PnD-Pineola gravelly loam, 15 to 30 percent slopes, stony

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,400 to 4,600 feet
Landform: Mountain ridges and slopes
Landform position: Summits and side slopes
Shape of areas: Irregular
Size of areas: 2 to 275 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 7 inches—dark brown gravelly loam
Subsoil:
7 to 20 inches-yellowish brown clay loam
20 to 26 inches-brownish yellow loam
Underlying material:
26 to 32 inches-brownish yellow and very pale brown gravelly loam saprolite
32 to 61 inches-soft weathered, multicolored metasiltstone bedrock

## Soil Properties and Qualities

Depth class: Moderately deep
Drainage class:Well drained
General texture class: Loamy
Permeability: Moderate
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
stones and cobbles that average about 10 to 24
inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Moderate or high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
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 soft bedrock

## Minor Components

Dissimilar inclusions:

- Random areas of soils that have bedrock at a depth of less than 20 inches and more than 40 inches
- Whiteoak soils that have bedrock at a depth of more than 60 inches, in saddles, in drainageways, and on toeslopes
- Crossnore soils that have less clay in the subsoil than the Pineola soil, on side slopes
- Soils that have thinner surface layers than the

Pineola soil

- Widely scattered areas of rock outcrops


## Similar inclusions:

- Pineola soils that have a surface layer of fine sandy loam or sandy loam
- Random areas of soils that have hard bedrock at a depth of 20 to 40 inches


## Land Use

Dominant Uses: Woodland, Fraser fir production, and ornamental crops
Other Uses: Pasture, hayland, and building site development

## Agricultural Development

## Cropland

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, tilth, soil fertility, pesticide retention, rooting depth, and droughtiness
Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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 maximize crop 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.
- Because of the low available water capacity caused by the moderately deep rooting depth, this soil is difficult to manage for cultivated crops.


## Pasture and hayland

## Suitability for pasture: Suited

Suitability for hayland: Poorly suited
Management concerns: Equipment use, erodibility, soil fertility, pesticide retention, rooting depth, and droughtiness
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 plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.
- Because of the low available water capacity caused by the moderately deep rooting depth, this soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Suited
Management concerns: Equipment use, erodibility, root disease, pesticide retention, climate, ball and burlap harvesting, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- This map unit may be difficult to manage for 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 silt and clay content of the subsoil (especially in the Pineola area of Avery County), there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of for 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.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- 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.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, this soil is difficult to manage for ornamental crops.


## Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods and northern hardwoods and high for eastern white pine
Suitability: Suited
Management concerns: Erodibility, equipment use, and windthrow hazard
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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.
- Livestock should not be allowed to graze in areas managed for woodland.
- Avoiding logging operations when the soil is wet
prevents rutting of the soil surface and damage to trees roots from compaction.
- Productivity is limited because of the restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, corrosivity, and depth to bedrock
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- The soft bedrock underlying this soil 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:

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


## Local roads and streets

## Suitability: Poorly suited

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

## Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- The soft bedrock underlying this soil 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, compaction, soil fertility, pesticide retention, climate, root disease, depth to bedrock, and droughtiness
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- Because of the restricted movement of air and water caused by the silt and clay content of the subsoil (especially in the Pineola area of Avery County), there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of the moderately deep rooting depth, this soil is 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

# PtD—Plott loam, 15 to 30 percent slopes, stony 

Setting<br>Landscape: Intermediate mountains predominantly in the southwestern and western parts of the county<br>Elevation range: 4,000 to 4,100 feet<br>Landform: Mountain ridges<br>Landform position:Summits and the upper side slopes<br>Shape of areas: Long and narrow<br>Size of areas: Less than 5 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 16 inches-very dark grayish brown loam
Subsoil:
16 to 37 inches-strong brown loam
37 to 43 inches-brown sandy loam
Underlying material:
43 to 62 inches-multicolored loamy sand saprolite

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Moderate
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class: Moderately steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion:Very severe
Rock fragments on the surface:Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; on prominent ridges, soil subject to rime ice in winter
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the
upper part, weathered from felsic to mafic, high-
grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches

## Minor Components

Dissimilar inclusions:

- Random areas of Porters soils that have hard bedrock at a depth of 40 to 60 inches
- Unaka soils that have hard bedrock at a depth of 20 to 40 inches, on shoulder slopes, nose slopes, and side slopes
- Chestnut and Buladean soils that have thinner surface layers than the Plott soil and have soft bedrock at a depth of less than 60 inches, at the lower elevations and on south- to west-facing shoulder slopes, nose slopes, and side slopes
- Saunook soils that have more clay in the subsoil than the Plott soil, in saddles and gaps and in concave areas at the head of drains
- Prominent summits and ridges at the higher elevations that are windswept


## Similar inclusions:

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


## Land Use

Dominant Uses: Woodland Other Uses: Building site development

## Agricultural Development

## Cropland

Suitability: Poorly suited
Management concerns:

- This map unit is not managed for cropland.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns:

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


## Ornamental crops

## Suitability: Suited

Management concerns:

- This map unit is not managed for ornamental crops.

Woodland Management and Productivity
Potential for commercial species: 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 watercontrol structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- 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 helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Slope
Management measures and considerations:

- The local Health Department should be contacted for guidance 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, erodibility, and frost action
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Slope, erodibility, soil fertility, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification: 6e

## PtE—Plott loam, 30 to 50 percent slopes, stony

## Setting

Landscape: Intermediate mountains predominantly in the southwestern and western parts of the county
Elevation range: 3,600 to 3,700 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Shape of areas: Irregular or oblong
Size of areas: Less than 5 acres

## Composition

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

## Typical Profile

Surface layer: 0 to 16 inches-very dark grayish brown loam
Subsoil:
16 to 37 inches-strong brown loam
37 to 43 inches-brown sandy loam

## Underlying material:

43 to 62 inches-multicolored loamy sand saprolite

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Moderate
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion:Very severe
Rock fragments on the surface:Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; on prominent ridges and upper side slopes, soil 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 to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: More than 60 inches

## Minor Components

## Dissimilar inclusions:

- Random areas of Porters soils that have hard bedrock at a depth of 40 to 60 inches
- Unaka soils that have hard bedrock at a depth of 20 to 40 inches, on shoulder slopes, nose slopes, and side slopes
- Chestnut and Buladean soils that have thinner surface layers than the Plott soil and have soft bedrock at a depth of less than 60 inches, at the lower elevations and on south- to west-facing shoulder slopes, nose slopes, and side slopes
- Saunook soils that have more clay in the subsoil than the Plott soil, on benches, in saddles and gaps, and in concave areas at the head of drains - Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Plott soil, on benches below rock outcrops and in drainageways
- Upper side slopes and prominent ridges at the higher elevations that are windswept
- Widely scattered areas of rock outcrop

Similar inclusions:

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


## Land Use

Dominant Uses: Woodland and wildlife habitat Other Uses: Building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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: Poorly suited
Management concerns:

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


## Ornamental crops

Suitability: Suited
Management concerns:

- This map unit is not managed for ornamental crops.


## Woodland Management and Productivity

Potential for commercial species: High for cove hardwoods and northern hardwoods
Suitability: Suited
Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Designing roads on the contour, installing water-
control structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Slope
Management measures and considerations:

- The local Health Department should be contacted for guidance 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, erodibility, and frost action
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as culverts, help to maintain road stability.
- Avoiding the diversion of water directly onto fill slopes and vegetating cut and fill slopes as soon as
possible help to prevent slippage and excessive soil erosion.
- Permanently surfacing roads or using suitable subgrade or base material allows year-round use and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Slope, erodibility, soil fertility, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification:7e

## PtF—Plott loam, 50 to 95 percent slopes, stony

Setting<br>Landscape: Intermediate mountains predominantly in the southwestern and western parts of the county<br>Elevation range: 3,400 to 4,600 feet<br>Landform:Mountain slopes<br>Landform position: Side slopes<br>Shape of areas: Irregular<br>Size of areas: Less than 53 acres

## Composition

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

## Typical Profile

Surface layer: 0 to 16 inches-very dark grayish brown loam
Subsoil:
16 to 37 inches-strong brown loam
37 to 43 inches-brown sandy loam
Underlying material:
43 to 62 inches-multicolored loamy sand saprolite

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Moderate
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class:Very steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion:Very severe
Rock fragments on the surface:Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; on prominent ridges and upper side slopes, soil subject to rime ice in winter
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock: More than 60 inches

## Minor Components

## Dissimilar inclusions:

- Random areas of Porters soils that have hard bedrock at a depth of 40 to 60 inches
- Unaka soils that have hard bedrock at a depth of 20
to 40 inches, on shoulder slopes, nose slopes, and side slopes
- Chestnut and Buladean soils that have thinner
surface layers than the Plott soil and have soft
bedrock at a depth of less than 60 inches, at the lower elevations and on south- to west-facing shoulder slopes, nose slopes, and side slopes
- Saunook soils that have more clay in the subsoil than the Plott soil, on benches, in saddles and gaps, and in concave areas at the head of drains - Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Plott soil, on benches below rock outcrops and in drainageways
- Upper side slopes at the higher elevations that are windswept
- Widely scattered areas of rock outcrop


## Similar inclusions:

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


## Land Use

Dominant Uses: Woodland and wildlife habitat

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

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


## Ornamental crops

Suitability: Unsuited
Management concerns:

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


## Woodland Management and Productivity

Potential for commercial species: High for cove hardwoods and northern hardwoods
Suitability: Poorly suited
Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, 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 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 erodibility.
- 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 and erodibility. 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

## PuC—Porters gravelly loam, 8 to 15 percent slopes, stony <br> Setting

Landscape: Intermediate mountains throughout most of the county, except in the easternmost part
Elevation range: 3,600 to 4,500 feet
Landform: Mountain ridges
Landform position: Summits
Shape of areas: Oblong or irregular
Size of areas: 2 to 35 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 2 inches-dark brown gravelly loam
2 to 9 inches-dark yellowish brown gravelly loam
Subsoil:
9 to 30 inches-dark yellowish brown loam

## Underlying material:

30 to 40 inches-dark yellowish brown fine sandy loam
40 to 54 inches-gravelly sandy loam saprolite that is multicolored in shades of brown

## Bedrock:

54 to 62 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class: 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
Rock fragments on the surface: Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; on prominent ridges, soil subject to rime ice in winter
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock Depth to bedrock: 40 to 60 inches to hard bedrock

## Minor Components

Dissimilar inclusions:

- Random areas of Plott soils that have bedrock at a depth of more than 60 inches
- Ashe and Unaka soils that have hard bedrock at a
depth of 20 to 40 inches, on knobs, shoulder slopes, and nose slopes
- Saunook soils that have more clay in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, in saddles and in concave areas at the head of drains
- Chestnut and Buladean soils that have thinner surface layers than the Porters soils and have soft bedrock at a depth of 20 to 60 inches, at the lower elevations
- Widely scattered areas of rock outcrops


## Similar inclusions:

- Porters soils that have a surface layer of sandy loam or fine sandy loam
- Porters soils that have more clay in the subsoil
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Fraser fir production, pasture, and hayland
Other Uses: Woodland, ornamental crops, and building site development

## Agricultural Development

## Cropland

## Suitability: Suited

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

- The slope may limit the use of equipment 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.
- 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.
- 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 crop productivity.


## Pasture and hayland

Suitability:Well suited

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

- The slope may limit the use of equipment in the steeper areas.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Well suited
Management concerns: Equipment use, erodibility, pesticide retention, climate, ball and burlap harvesting, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- 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.
- 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 low moisture and minimal clay contents.
- 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, equipment use, and depth to bedrock
Management measures and considerations:

- Designing roads on the contour, installing watercontrol structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- Blasting, shaping, and grading may be needed if roads are to be constructed on the contour.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability:Suited
Management concerns: Erodibility, depth to bedrock, seeps and springs, and corrosivity
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase soil depth.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

## Suitability: Suited

Management concerns: Slope, depth to bedrock, 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.
- This map unit may be difficult to manage for septic tank absorption fields because of the depth to hard bedrock.
- Excavations may cut into seeps and springs. These areas should be avoided.


## Local roads and streets

## Suitability: Suited

Management concerns: Erodibility, depth to bedrock, frost action, and seeps and springs
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 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, soil fertility, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification: 4e

# PuD—Porters gravelly loam, 15 to 30 percent slopes, stony 

Setting

Landscape: Intermediate mountains throughout most of the county, except in the easternmost part
Elevation range: 3,600 to 4,600 feet
Landform: Mountain ridges
Landform position:Summits and the upper side slopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to 200 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 2 inches-dark brown gravelly loam
2 to 9 inches-dark yellowish brown gravelly loam

## Subsoil:

9 to 30 inches-dark yellowish brown loam

## Underlying material:

30 to 40 inches-dark yellowish brown fine sandy loam
40 to 54 inches-gravelly sandy loam saprolite that is multicolored in shades of brown

## Bedrock:

54 to 62 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class: 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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring
and early fall frosts; on prominent ridges and upper side slopes, soil subject to rime ice in winter
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock Depth to bedrock: 40 to 60 inches to hard bedrock

## Minor Components

## Dissimilar inclusions:

- Unaka soils that have hard bedrock at a depth of 20 to 40 inches, on knobs, shoulder slopes, and nose slopes
- Saunook soils that have more clay in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, in saddles and gaps, in concave areas at the head of drains, and in drainageways - Chestnut and Buladean soils that have thinner surface layers than the Porters soil and have soft bedrock at a depth of 20 to 60 inches, at the lower elevations
- Random areas of Plott soils that have bedrock at a depth of more than 60 inches
- Widely scattered areas of rock outcrops


## Similar inclusions:

- Porters soils that have surface layers of sandy loam or fine sandy loam
- Porters soils that have more clay in the subsoil
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Fraser fir production, pasture, and hayland
Other Uses: Woodland, ornamental crops, and building site development

## Agricultural Development

## Cropland

## Suitability: Poorly suited

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

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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. - 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.
- 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 crop productivity.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Suited
Management concerns: Equipment use, erodibility, pesticide retention, climate, ball and burlap harvesting, and soil fertility
Management measures and considerations:

- This map unit may be difficult to manage for 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 plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- 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.
- 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 low moisture and minimal clay contents.
- 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: Suited

Management concerns: Erodibility, equipment use, and depth to bedrock
Management measures and considerations:

- Designing roads on the contour, installing watercontrol structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- 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.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, depth to bedrock, seeps and springs, and corrosivity Management measures and considerations:

- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase soil depth.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

## Suitability: Poorly suited

Management concerns: Slope, depth to bedrock, 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.
- This map unit may be difficult to manage for septic tank absorption fields because of the depth to hard bedrock.
- Excavations may cut into seeps and springs. These areas should be avoided.


## 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 watercontrol structures, such as 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 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, soil fertility, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification: 6e

## PuE-Porters gravelly loam, 30 to 50 percent slopes, stony

## Setting

Landscape: Intermediate mountains throughout most of the county, except in the easternmost part
Elevation range: 3,600 to 4,600 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits Shape of areas: Irregular or long and narrow Size of areas: 3 to more than 1,000 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 2 inches-dark brown gravelly loam
2 to 9 inches—dark yellowish brown gravelly loam

## Subsoil:

9 to 30 inches-dark yellowish brown loam

## Underlying material:

30 to 40 inches-dark yellowish brown fine sandy loam
40 to 54 inches-gravelly sandy loam saprolite that is multicolored in shades of brown

Bedrock:
54 to 62 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class: 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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; on prominent ridges and upper side slopes, soil subject to rime ice in winter
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: 40 to 60 inches to hard bedrock

## Minor Components

Dissimilar inclusions:

- Unaka soils that have hard bedrock at a depth of 20
to 40 inches, on shoulder slopes and nose slopes
- Saunook soils that have more clay in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, on benches, in concave areas at the head of drains, and in drainageways
- Chestnut and Buladean soils that have thinner surface layers than the Porters soil and have soft bedrock at a depth of 20 to 60 inches, on shoulder slopes
- Cullasaja soils that have more rock fragments in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, in drainageways
- Random areas of Plott soils that have bedrock at a depth of more than 60 inches
- Widely scattered areas of rock outcrops


## Similar inclusions:

- Porters soils that have a surface layer of sandy loam or fine sandy loam
- Porters soils that have a thicker surface layer
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Fraser fir production, pasture, and woodland
Other Uses: Ornamental crops and building site development

## Agricultural Development

## Cropland

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for cultivated crops 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.


## Ornamental crops

## Suitability: Suited

Management concerns: Equipment use, erodibility, pesticide retention, plant shape, climate, and soil fertility
Management measures and considerations:

- This soil is marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- This map unit may be difficult to manage for ornamental crops because the slope limits equipment use.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Woodland Management and Productivity

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

## Suitability: Suited

Management concerns: Equipment use, erodibility, and depth to bedrock
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 watercontrol 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.
- The slope increases equipment limitations.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- 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.


## Urban Development

## Dwellings

## Suitability: Poorly suited

Management concerns: Slope, erodibility, depth to bedrock, seeps and springs, 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase soil depth.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Slope, depth to bedrock, 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.
- This map unit may be difficult to manage for septic tank absorption fields because of the depth to hard bedrock.
- Excavations may cut into seeps and springs. These areas should be avoided.


## 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 watercontrol structures, such as 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 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, soil fertility, climate, and pesticide retention

Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification:7e

## PuF—Porters gravelly loam, 50 to 80 percent slopes, stony

## Setting

Landscape: Intermediate mountains throughout most of the county, except in the easternmost part
Elevation range: 3,600 to 4,600 feet
Landform: Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 3 to more than 125 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 2 inches-dark brown gravelly loam
2 to 9 inches-dark yellowish brown gravelly loam

Subsoil:
9 to 30 inches-dark yellowish brown loam
Underlying material:
30 to 40 inches-dark yellowish brown fine sandy loam
40 to 54 inches-gravelly sandy loam saprolite that is multicolored in shades of brown

Bedrock:
54 to 62 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class: 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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; on prominent ridges and upper side slopes, soil subject to rime ice in winter
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: 40 to 60 inches to hard bedrock

## Minor Components

Dissimilar inclusions:

- Unaka soils that have hard bedrock at a depth of 20
to 40 inches, on shoulder slopes and nose slopes
- Soils that have hard bedrock at a depth of 10 to 20 inches, on shoulder slopes, on knobs, and in areas of rock outcrops
- Saunook soils that have more clay in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, in drainageways and in concave areas at the head of drains
- Chestnut and Buladean soils that have thinner surface layers than the Porters soils and have soft
bedrock at a depth of 20 to 60 inches, at the lower elevations
- Cullasaja soils that have more rock fragments in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, in drainageways
- Random areas of Plott soils that have bedrock at a depth of more than 60 inches
- Widely scattered areas of rock outcrops

Similar inclusions:

- Porters soils that have a surface layer of sandy loam or fine sandy loam
- Random areas of similar soils that have soft bedrock at a depth of 40 to 60 inches
- Porters soils that have a thicker surface layer


## Land Use

Dominant Uses: Woodland
Other Uses: Fraser fir production and pasture

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for 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, erodibility, and depth to bedrock
Management measures and considerations:

- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, 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 depth to bedrock. 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, erodibility, and depth to bedrock.
- 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 and erodibility. A site on better suited soils should be selected.

Interpretive Groups
Land capability classification:7e

## PwD—Porters loam, 15 to 30 percent slopes, stony

## Setting

Landscape: Intermediate mountains in the northeastern part of the county
Elevation range: 3,600 to 4,600 feet
Landform: Mountain ridges
Landform position: Summits and the upper side slopes
Shape of areas: Long and narrow or irregular
Size of areas: Less than 15 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 7 inches-very dark grayish brown loam
7 to 10 inches-dark yellowish brown loam
Subsoil:
10 to 38 inches-dark yellowish brown loam
Underlying material:
38 to 45 inches-dark yellowish brown, yellowish brown, and olive brown gravelly loam
Bedrock:
45 to 54 inches-soft weathered, moderately fractured amphibolite
54 to 64 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class: 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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; on prominent ridges and upper side slopes, soil subject to rime ice in winter
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: 40 to 60 inches to hard bedrock

## Minor Components

Dissimilar inclusions:

- Unaka soils that have hard bedrock at a depth of 20
to 40 inches, on knobs, shoulder slopes, and nose slopes
- Saunook soils that have more clay in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, in saddles and gaps, in concave areas at the head of drains, and in drainageways
- Chestnut and Buladean soils that have thinner surface layers than the Porters soil and have soft bedrock at a depth of 20 to 60 inches, at the lower elevations
- Random areas of Plott soils that have bedrock at a depth of more than 60 inches
- Widely scattered areas of rock outcrops


## Similar inclusions:

- Porters soils that have a surface layer of sandy loam or fine sandy loam
- Porters soils that have more clay in the subsoil
- Random areas of soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Fraser fir production, pasture, and hayland
Other Uses: Woodland, ornamental crops, and building site development

## Agricultural Development

## Cropland

## Suitability: Poorly suited

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

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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.
- 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.
- 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 crop productivity.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability: Suited

Management concerns: Equipment use, erodibility, pesticide retention, climate, ball and burlap harvesting, and soil fertility
Management measures and considerations:

- This map unit may be difficult to manage for 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 plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- 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.
- 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 low moisture and minimal clay contents.
- 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: Suited

Management concerns: Erodibility, equipment use, and depth to bedrock
Management measures and considerations:

- Designing roads on the contour, installing watercontrol structures, such as broad-based dips, water bars, and culverts, and avoiding the diversion of water directly onto fill slopes help to stabilize logging roads, skid trails, and landings.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- 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.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, depth to bedrock, seeps and springs, and corrosivity Management measures and considerations:

- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the soil depth.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

Suitability: Poorly suited
Management concerns: Slope, depth to bedrock, 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.
- This map unit may be difficult to manage for septic tank absorption fields because of the depth to hard bedrock.
- Excavations may cut into seeps and springs. These areas should be avoided.


## 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 watercontrol structures, such as 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 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, soil fertility, climate, and pesticide retention Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as
drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification: 6e

## PwE—Porters loam, 30 to 50 percent slopes, stony

## Setting

Landscape: Intermediate mountains in the northeastern part of the county
Elevation range: 3,600 to 4,600 feet
Landform:Mountain slopes and ridges
Landform position: Side slopes and summits
Shape of areas: Irregular or long and narrow
Size of areas: Less than 65 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 7 inches-very dark grayish brown loam
7 to 10 inches-dark yellowish brown loam
Subsoil:
10 to 38 inches-dark yellowish brown loam
Underlying material:
38 to 45 inches-dark yellowish brown, yellowish brown, and olive brown gravelly loam

## Bedrock:

45 to 54 inches-soft weathered, moderately fractured amphibolite
54 to 64 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class: 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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to cooler annual air temperatures, which allow late spring and early fall frosts; on prominent ridges and upper side slopes, soil subject to rime ice in winter
Soil reaction: Very strongly acid to slightly acid, except where the surface has been limed
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: 40 to 60 inches to hard bedrock

## Minor Components

Dissimilar inclusions:

- Unaka soils that have hard bedrock at a depth of 20
to 40 inches, on shoulder slopes and nose slopes
- Saunook soils that have more clay in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, on benches, in concave areas at the head of drains, and in drainageways
- Chestnut and Buladean soils that have thinner surface layers than the Porters soil and have soft bedrock at a depth of 20 to 60 inches, on shoulder slopes
- Cullasaja soils that have more rock fragments in the subsoil than the Porters soil and have bedrock at a depth of more than 60 inches, in drainageways
- Random areas of Plott soils that have bedrock at a depth of more than 60 inches
- Widely scattered areas of rock outcrops


## Similar inclusions:

- Porters soils that have a surface layer of sandy loam or fine sandy loam
- Porters soils that have a thicker surface layer
- Random areas of soils that have soft bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Fraser fir production, pasture, and woodland
Other Uses: Ornamental crops and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops
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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.


## Ornamental crops

Suitability: Suited
Management concerns: Equipment use, erodibility, pesticide retention, plant shape, climate, and soil fertility
Management measures and considerations:

- This soil is marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- This map unit may be difficult to manage for ornamental crops because the slope limits equipment use.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the cooler air temperatures associated with the north- to east-facing aspects of this map unit, late spring frost may damage new growth in some years.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are
susceptible to phytophthora root disease. These areas should be avoided.


## Woodland Management and Productivity

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

## Suitability:Suited

Management concerns: Equipment use, erodibility, and depth to bedrock
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 watercontrol 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.
- The slope increases equipment limitations.
- When the soil is wet, skid trails and unsurfaced roads are highly erodible and very slick due to the slope and the high content of organic matter in the surface layer.
- 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.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, depth to bedrock, seeps and springs, 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase soil depth.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

## Suitability: Poorly suited

Management concerns: Slope, depth to bedrock, 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.
- This map unit may be difficult to manage for septic tank absorption fields because of the depth to hard bedrock.
- Excavations may cut into seeps and springs. These areas should be avoided.


## 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 watercontrol structures, such as 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 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, soil fertility, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- The use of native, winter-hardy landscape plants is recommended.
- This soil may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification:7e

## Px—Pits, quarries

This map unit consists of open excavations from which soil and underlying material has been removed (fig. 8). The underlying material consists of mica, clay, or crushed gravel. These areas essentially have little or no soil remaining and support sparse vegetation. Some areas could become productive again, but only after major reclamation efforts. Pits and quarries are scattered throughout the county, but the largest areas are in the southern part, where mica is being mined. Areas range from 2 to 150 acres in size.

This map unit is not assigned a land capability classification.

## ReA—Reddies fine sandy loam, 0 to 3 percent slopes, frequently flooded

Setting<br>Landscape: Mountain valleys<br>Elevation range: 1,600 to 3,800 feet<br>Landform: Flood plains (fig. 9)<br>Landform position: Planar to slightly convex slopes<br>Shape of areas: Long and narrow or oblong<br>Size of areas: 2 to 65 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 11 inches-very dark grayish brown fine sandy loam


Figure 8.—An area of Pits, quarries. Mining has been an important industry in Avery County for more than a century. Most of the currently mined areas are in the southern part of the county.

Subsoil:
11 to 24 inches-dark yellowish brown sandy loam

## Underlying material:

24 to 62 inches-dark yellowish brown very cobbly sand

## Soil Properties and Qualities

Depth class:Very deep
Drainage class: Moderately well drained
General texture class: Loamy in the upper part and sandy or sandy with many rock fragments in the lower part
Permeability: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: 2.0 to 3.5 feet from December through April
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): High
Potential for frost action: Low
Soil reaction:Very strongly acid to neutral, except where the surface has been limed
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Parent material: Alluvium derived from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary 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:

- Well drained Rosman soils that have strata with a high content rock fragments at a depth of more than 40 inches, in the slightly higher positions
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi soils that have subsoils that are 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
- Moderately well drained Dellwood soils that have strata with a high content of rock fragments at a depth of 8 to 20 inches, next to stream channels or in old stream channels where scouring has occurred
- Soils that are occasionally flooded, in the slightly higher areas
- Soils that have sandy overwash or thinner surface layers than the Reddies soil


## Similar inclusions:

- Reddies soils that have a sandy loam or loam surface layer
- Reddies soils that are well drained


## Land Use

Dominant Uses: Pasture and hayland
Other Uses: Ornamental crops, cropland, and woodland

## Agricultural Development

Cropland
Suitability:Well suited (where protected from flooding


Figure 9.-An area of Reddies fine sandy loam, 0 to 3 percent slopes, frequently flooded, that was recently flooded by the Toe River. This map unit has severe limitations affecting use and management.
or not frequently flooded during the growing season)
Management concerns: Flooding, droughtiness, soil fertility, nutrient leaching, pesticide retention, and climate
Management measures and considerations:

- Because of the potential for flooding during the growing season, this soil is difficult to manage for cropland.
- This soil has a low available water capacity and becomes droughty during periods of low rainfall.
- Conservation tillage, winter cover crops, crop residue management, and crop rotations which include grasses and legumes help 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 maximize crop productivity.
- Using split applications of 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 root zone 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.
- Because of slow air drainage, late spring frost may damage new growth in some years.


## Pasture and hayland

Suitability:Well suited (where protected from flooding or not frequently flooded during the growing season)
Management concerns: Flooding, droughtiness, soil fertility, nutrient leaching, pesticide retention, and erodibility
Management measures and considerations:

- Although most flooding occurs during winter, 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.
- 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 and pesticides helps to increase their effectiveness and prevent the leaching of plant nutrients below the root zone and into the water table.
- Using plant-applied herbicides and other pesticides
instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.


## Ornamental crops

Suitability: Poorly suited
Management concerns: Flooding, droughtiness, root disease, soil fertility, nutrient leaching, pesticide retention, climate, and ball and burlap harvesting Management measures and considerations:

- This map unit is 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.
- 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.
- Because of slow air drainage and frost pockets, 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.
- Using split applications of fertilizer and pesticides helps to increase their effectiveness.
- Using frequent and light applications of irrigation water helps to prevent the leaching of plant nutrients below the root zone and into the water table.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by low moisture and minimal clay contents.


## Woodland Management and Productivity

Potential for commercial species: Moderately high for cove hardwoods
Suitability: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 herbicideorganic matter bonding, and they may damage tree seedlings when cropland is converted to woodland.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns:

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


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Flooding, droughtiness, root disease, soil fertility, nutrient leaching, pesticide retention, and climate
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because of the flooding.
- This soil has a low available water capacity and becomes 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 ornamentals. - In areas that flood and 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 frequent and light applications of irrigation water and split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients and pesticides below the root zone 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 landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.


## Interpretive Groups

Land capability classification: 3w

## RoA-Rosman loam, 0 to 3 percent slopes, occasionally flooded

Setting<br>Landscape: Mountain valleys<br>Elevation range: 2,200 to 3,700 feet<br>Landform: Larger flood plains<br>Landform position: Planar to slightly convex slopes<br>Shape of areas: Long and narrow or oblong<br>Size of areas: 2 to 50 acres

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

## Typical Profile

## Surface layer:

0 to 14 inches-dark brown loam
Subsoil:
14 to 35 inches-yellowish brown loam

## Underlying material:

35 to 40 inches-yellowish brown sandy loam
40 to 55 inches-yellowish brown loamy sand
55 to 62 inches-yellowish brown loamy sand that has yellowish red iron accumulations and pale brown iron depletions

## 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: 2.5 to 5.0 feet
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
Potential for frost action: Moderate
Soil reaction: Strongly acid to neutral in upper part and strongly acid to slightly acid in the lower part
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Parent material: Alluvium derived from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary 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:

- 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 and old stream channels where scouring has occurred
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi soils that have subsoils that are 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
- Statler soils that have more clay in the subsoil than the Rosman soil, on low stream terraces and toeslopes - Rosman soils that are rarely flooded, in the slightly higher areas
- Excessively drained or somewhat excessively drained soils that have sandy subsoils, along streambanks and in sharp river bends


## Similar inclusions:

- Rosman soils that have a surface layer of sandy loam or fine sandy loam
- Random areas of soils that are similar to the Rosman soil but have less organic matter in the surface layer


## Land Use

Dominant Uses: Pasture and hayland

Other Uses: Ornamental crops, cropland, and woodland

## 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 winter, 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.
- Conservation tillage, winter cover crops, crop residue management, and crop rotations which include grasses and legumes help 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 maximize crop productivity.
- Using split applications of 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 root zone 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.
- Because of slow air drainage, late spring frost may damage new growth in some years.


## Pasture and hayland

## Suitability:Well suited

Management concerns: Flooding, droughtiness, soil fertility, nutrient leaching, pesticide retention, and erodibility
Management measures and considerations:

- Although most flooding occurs during winter, 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.
- 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 root zone and into the water table.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.


## Ornamental crops

Suitability: Poorly suited to Fraser fir production; suited to other ornamentals
Management concerns: Flooding, droughtiness, root disease, soil fertility, nutrient leaching, pesticide retention, climate, and ball and burlap harvesting
Management measures and considerations:

- This map unit is 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. - In areas that flood and where water concentrates, such as toeslopes and drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage and frost pockets, 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.
- Using split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients below the root zone and into the water table.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Avoiding ball and burlap harvesting during dry periods helps to prevent fracture of the ball and separation of the soil from the roots caused by low moisture and minimal clay contents.


## 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 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 herbicideorganic matter bonding, and they may damage tree seedlings when cropland is converted to woodland.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.


## Urban Development

## Dwellings

Suitability: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: Poorly suited

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, root disease, and climate
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because of the flooding.
- This soil has a low available water capacity and becomes droughty during periods of low 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 landscape plants. Using pesticides that
are applied to the plant rather than the soil may increase their effectiveness.
- Using frequent and light applications of irrigation water and split applications of lime and fertilizer helps to increase their effectiveness and prevent the leaching of plant nutrients and pesticides below the root zone and into the water table.
- In areas that flood and where water concentrates, such as toeslopes and drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.


## Interpretive Groups

Land capability classification:2w

## RsB-Rosman sandy loam, 0 to 5 percent slopes, frequently flooded

Setting<br>Landscape: Mountain valleys<br>Elevation range: 1,600 to 3,700 feet<br>Landform: Flood plains<br>Landform position: Planar to slightly convex slopes<br>Shape of areas: Long and narrow<br>Size of areas: 2 to 25 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 10 inches-dark brown sandy loam
Underlying material:
10 to 25 inches-yellowish brown sandy loam
25 to 62 inches-yellowish brown loamy 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: 2.5 to 5.0 feet
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): Moderate
Potential for frost action: Moderate
Soil reaction: Strongly acid to neutral in the upper part and strongly acid to slightly acid in the lower part
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Parent material: Alluvium derived from felsic to mafic, high-grade metamorphic or igneous rock and lowgrade metasedimentary 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; the soil has sandy overwash and an uneven, hummocky surface

## Minor Components

Dissimilar inclusions:

- Moderately well drained Dellwood and Reddies soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 8 to 40 inches, next to stream channels where scouring has occurred
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi soils that have subsoils that are 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
Similar inclusions:
- Rosman soils that have a surface layer of loam or fine sandy loam
- Random areas of soils that are similar to the Rosman soil but that have less organic matter in the surface layer
- Rosman soils that have sandy overwash


## Land Use

Dominant Uses: Pasture and hayland
Other Uses: Ornamental crops, cropland, and woodland

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cropland because of the frequent flooding, sandy overwash, and an uneven, hummocky surface. A site on better suited soils should be selected.


## Pasture and hayland

Suitability: Poorly suited
Management concerns:

- This map unit is severely limited for pasture and hayland because of the frequent flooding, sandy overwash, and an uneven, hummocky surface. A site on better suited soils should be selected.


## Ornamental crops

Suitability:Unsuited Management concerns:

- This map unit is severely limited for ornamental crops because of the frequent flooding, sandy overwash, and an uneven, hummocky surface. A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Moderately high for yellow-poplar and high for eastern white pine Suitability: Poorly 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 herbicideorganic matter bonding, and they may damage tree seedlings when cropland is converted to woodland. - Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.


## Urban Development

## Dwellings

Suitability:Unsuited Management concerns:

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


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:

- This map unit is severely limited for lawns and landscaping because of the frequent flooding, droughtiness, sandy overwash, and nutrient leaching. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification: 3w

## SaB—Saunook loam, 2 to 8 percent slopes

Setting<br>Landscape: Intermountain hills and low and intermediate mountains throughout the county<br>Elevation range: 2,200 to 4,000 feet<br>Landform: Coves, colluvial fans, and benches<br>Landform position: Footslopes and toeslopes<br>Shape of areas: Irregular or oblong<br>Size of areas: 2 to 40 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 5 inches-dark brown loam
5 to 8 inches-dark yellowish brown loam

## Subsoil:

8 to 26 inches-dark yellowish brown clay loam 26 to 41 inches-dark yellowish brown gravelly loam

## Underlying material:

41 to 62 inches-cobbly fine sandy loam that is multicolored in shades of brown

## 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: 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 for frost action: Moderate
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Extremely acid to moderately acid in the surface layer, except in limed areas, and very strongly acid to slightly acid in the rest of the profile
Parent material: Colluvium derived from felsic to 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:

- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Saunook soil, on toeslopes and in drainageways
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Saunook soils that have a surface layer of fine sandy loam or sandy loam
- Random areas of soils that have a surface layer with less organic matter and that have a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, Fraser fir production, ornamental crops, and cropland
Other Uses: Woodland

## 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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 increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Well suited
Management concerns: Erodibility, climate, pesticide retention, 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.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years. - Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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 northern hardwoods Suitability:Well suited
Management concerns: Erodibility and equipment use Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees 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 disturbed areas as soon as possible and
using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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.
- 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.
- Stones and boulders may be a problem during excavation.


## Local roads and streets

Suitability:Well suited
Management concerns: Low strength, erodibility, frost action, and seeps and springs
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve 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:Well suited
Management concerns: Erodibility, soil compaction,
soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


## Interpretive Groups

Land capability classification: 2 e

## SaC-Saunook loam, 8 to 15 percent slopes

## Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 1,600 to 4,200 feet
Landform: Coves, drainageways, saddles, colluvial fans, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Irregular or long and narrow
Size of areas: 2 to 150 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 5 inches-dark brown loam
5 to 8 inches-dark yellowish brown loam
Subsoil:
8 to 26 inches—dark yellowish brown clay loam
26 to 41 inches-dark yellowish brown gravelly loam
Underlying material:
41 to 62 inches-cobbly fine sandy loam that is multicolored in shades of brown

## 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
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Extremely acid to moderately acid in the surface layer, except in limed areas, and very strongly acid to slightly acid in the rest of the profile
Parent material: Colluvium derived from felsic to 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:

- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Saunook soil, on toeslopes and in drainageways
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Saunook soils that have a surface layer of fine sandy loam or sandy loam
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, Fraser fir production, ornamental crops, and cropland
Other Uses: Woodland

## Agricultural Development

## Cropland

## Suitability: Suited

Management concerns: Equipment use, erodibility, tilth, pesticide retention, soil fertility, and climate
Management measures and considerations:

- The slope may limit the use of equipment 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.
- 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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 the use of equipment in the steeper areas.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Well suited
Management concerns: Equipment use, erodibility, climate, pesticide retention, root disease, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion. - Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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 northern hardwoods Suitability:Well suited
Management concerns: Erodibility and equipment use

Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees 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: Erodibility, seeps and springs, corrosivity, and large stones
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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.
- 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.
- Stones and boulders may be a problem during excavation.


## Local roads and streets

Suitability:Suited
Management concerns: Erodibility, low strength, frost action, and seeps and springs
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve 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, soil compaction, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


## Interpretive Groups

Land capability classification: 4e

## SbD-Saunook loam, 15 to 30 percent slopes, very stony

## Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,200 to 4,200 feet
Landform: Coves, drainageways, saddles, colluvial fans, and benches
Landform position: Footslopes and toeslopes Shape of areas: Irregular or long and narrow Size of areas: 2 to 150 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 5 inches-dark brown loam
5 to 8 inches—dark yellowish brown loam

## Subsoil:

8 to 26 inches-dark yellowish brown clay loam
26 to 41 inches-dark yellowish brown gravelly loam
Underlying material:
41 to 62 inches-cobbly fine sandy loam that is multicolored in shades of brown

## 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: About 3 percent
stones and cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Extremely acid to moderately acid in the surface layer, except in limed areas, and very strongly acid to slightly acid in the rest of the profile
Parent material: Colluvium derived from felsic to 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:

- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Saunook soil, on toeslopes and in drainageways
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Saunook soils that have a surface layer of fine sandy loam or sandy loam
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, Fraser fir production, ornamental crops, and cropland
Other Uses: Woodland

## Agricultural Development

## Cropland

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, tilth, pesticide retention, soil fertility, and climate Management measures and considerations:

- This map unit is difficult to manage for cultivated
crops because the slope and very stony surface limit 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.
- 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may damage new growth in some years.


## Pasture and hayland

## Suitability for pasture: Suited

Suitability for hayland: Poorly suited
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.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability: Suited
Management concerns: Equipment use, erodibility,
climate, pesticide retention, root disease, soil fertility, and plant shape
Management measures and considerations:

- This map unit may be difficult to manage for ornamental crops because the slope and very stony surface limit equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years. - Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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.
- The slope affects the shape of low-growing ornamentals on the uphill side.


## 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 watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees 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: Erodibility, slope, seeps and springs, corrosivity, and large stones
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Designing structures that conform to the natural slope helps to improve soil performance.
- 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.
- Stones and boulders may be a problem during excavation.


## Septic tank absorption fields

## Suitability: Poorly suited

Management concerns: Slope, restricted permeability, 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.
- 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.
- Stones and boulders may be a problem during excavation.


## Local roads and streets

## Suitability: Poorly suited

Management concerns: Slope, erodibility, low strength, frost action, seeps and springs, and large stones
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve 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.
- Stones and boulders may be a problem during excavation.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns:Large stones, slope, erodibility, soil compaction, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because the slope and very stony surface limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


## Interpretive Groups

Land capability classification: 6e

# ScB—Saunook silt loam, 2 to 8 percent slopes 

## Setting

Landscape: Intermountain hills and low mountains throughout the county
Elevation range: 2,500 to 2,700 feet
Landform: Coves and colluvial fans
Landform position: Footslopes and toeslopes
Shape of areas: Irregular or oblong
Size of areas: Less than 5 acres

## Composition

Saunook soil and similar inclusions: 75 percent
Dissimilar inclusions: 25 percent
Typical Profile
Surface layer:
0 to 10 inches-very dark brown silt loam
Subsoil:
10 to 15 inches-dark yellowish brown loam
15 to 38 inches-dark yellowish brown silt loam
38 to 50 inches-dark yellowish brown gravelly loam
50 to 99 inches-dark yellowish brown very cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderate
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 for frost action: Moderate
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Extremely acid to moderately acid in the surface layer, except in limed areas, and very strongly acid to slightly acid in the rest of the profile
Parent material: Colluvium derived from felsic to 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:

- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Saunook soil, on toeslopes and in drainageways
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels
Similar inclusions:
- Saunook soils that have a surface layer of fine sandy loam or sandy loam
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Cropland, pasture, hayland, and ornamental crops
Other Uses: Building site development and woodland

## 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase
the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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 increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Well suited
Management concerns: Erodibility, climate, pesticide retention, 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. - Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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 northern hardwoods
Suitability:Well suited
Management concerns: Erodibility and equipment use
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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.
- Stones and boulders may be a problem during excavation.


## Septic tank absorption fields

Suitability: Suited

Management concerns: Restricted permeability, 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.
- 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.
- Stones and boulders may be a problem during excavation.


## Local roads and streets

Suitability:Well suited
Management concerns:Low strength, erodibility, frost action, and seeps and springs
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve 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:Well suited

Management concerns: Erodibility, soil compaction, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


## Interpretive Groups

Land capability classification: 2e

## SdC—Saunook silt loam, 8 to 15 percent slopes, stony

## Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,600 to 2,900 feet
Landform: Coves, colluvial fans, and drainageways
Landform position: Footslopes and toeslopes
Shape of areas: Irregular or oblong
Size of areas: Less than 25 acres
Composition
Saunook soil and similar inclusions: 80 percent Dissimilar inclusions: 20 percent

## Typical Profile

Surface layer:
0 to 10 inches-very dark brown silt loam
Subsoil:
10 to 15 inches-dark yellowish brown loam
15 to 38 inches-dark yellowish brown silt loam
38 to 50 inches-dark yellowish brown gravelly loam
50 to 99 inches-dark yellowish brown very cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderate

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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Extremely acid to moderately acid in the surface layer, except in limed areas, and very strongly acid to slightly acid in the rest of the profile
Parent material: Colluvium derived from felsic to 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:

- Thunder and Cullasaja soils that have more rock fragments in the subsoil than the Saunook soil, on toeslopes and in drainageways
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Soils that have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Saunook soils that have a surface layer of fine sandy loam or sandy loam
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, Fraser fir production, ornamental crops, and cropland
Other Uses: Woodland

## Agricultural Development

## Cropland

## Suitability: Suited

Management concerns: Equipment use, erodibility, tilth, pesticide retention, soil fertility, and climate Management measures and considerations:

- The slope may limit the use of equipment 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.
- 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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 the use of equipment in the steeper areas.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Well suited
Management concerns: Equipment use, erodibility, climate, pesticide retention, root disease, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion. - Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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 northern hardwoods

## Suitability:Well suited

Management concerns: Erodibility and equipment use Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 when the soil is wet
prevents rutting of the soil surface and damage to trees 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: Erodibility, seeps and springs, corrosivity, and large stones
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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.
- 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.
- Stones and boulders may be a problem during excavation.


## Local roads and streets

Suitability: Suited
Management concerns: Erodibility, low strength, frost action, and seeps and springs

Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve 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, soil compaction, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


## Interpretive Groups

Land capability classification: 4e

# SgC—Saunook-Nikwasi complex, 2 to 15 percent slopes 

Setting<br>Landscape:Valleys of intermountain hills and low and intermediate mountains throughout the county<br>Elevation range: 2,000 to 4,200 feet<br>Landform: Coves, colluvial fans, benches, and flood plains<br>Landform position: Concave footslopes, toeslopes, and narrow drainageways<br>Shape of areas: Long and narrow or irregular<br>Size of areas: 3 to 60 acres

## Composition

Saunook soil and similar inclusions: 60 percent Nikwasi soil and similar inclusions: 30 percent
Dissimilar inclusions: 10 percent

## Typical Profile

## Saunook

Surface layer:
0 to 5 inches-dark brown loam
5 to 8 inches-dark yellowish brown loam
Subsoil:
8 to 26 inches-dark yellowish brown clay loam
26 to 41 inches-dark yellowish brown gravelly loam
Underlying material:
41 to 62 inches-cobbly fine sandy loam that is multicolored in shades of brown

Nikwasi
Surface layer:
0 to 10 inches-black loam
10 to 24 inches-black loam
Underlying material:
24 to 30 inches-dark gray gravelly sandy loam
30 to 62 inches-dark gray very gravelly sand

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Saunook-well drained; Nikwasipoorly drained
General texture class: Saunook—loamy; Nikwasiloamy in the upper part and sandy with many rock fragments in the lower part
Permeability:Saunook-moderate;Nikwasimoderately rapid
Available water capacity: Saunook—moderate; Nikwasi-low

Depth to seasonal high water table: Saunook—more than 6.0 feet; Nikwasi-0 to 1.0 foot
Hazard of flooding: Saunook-none; Nikwasi-frequent

## Shrink-swell potential: Low

Slope class: Gently sloping to strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion: Slight to severe
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soils subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Saunook—extremely acid to moderately acid in the surface layer, except in limed areas, and very strongly acid to slightly acid in the rest of the profile; Nikwasi-very strongly acid to slightly acid, except where the surface has been limed, with some part within the 10 -inch to 40 -inch section being moderately acid or slightly acid
Parent material: Colluvium and alluvium derived from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Depth to contrasting material: In areas of the Nikwasi soil, 20 to 40 inches to deposits of cobbles and gravel that are stratified with sandy or loamy material
Other distinctive properties: Random areas of seeps and springs in areas of the Saunook soil; the Nikwasi soil is subject to ponding for moderate duration during wet periods throughout the year

## Minor Components

## Dissimilar inclusions:

- Somewhat poorly drained Cullowhee soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Moderately well drained Dellwood and Reddies soils that have strata with a high content of rock fragments at a depth of 8 to 40 inches, along stream channels or in the slightly higher positions
- Statler soils that are rarely flooded for very brief periods, on toeslopes


## Similar inclusions:

- Nikwasi soils that have a surface layer of fine sandy loam or sandy loam
- Saunook soils that have a surface layer of fine sandy loam or sandy loam
- Random areas of Saunook soils that have a surface layer with less organic matter and a thinner dark
surface layer, in cropped fields or those with a cropping history
- Poorly drained soils that have strata with a high content of rock fragments at a depth of less than 20 inches


## Land Use

Dominant Uses: Woodland, pasture, hayland, and ornamental crops
Other Uses: Building site development and cropland

## Agricultural Development

## Cropland

Suitability: Saunook—suited; Nikwasi-unsuited Management concerns: Saunook—equipment use, erodibility, pesticide retention, soil fertility, climate, and tilth; Nikwasi-equipment use, erodibility, pesticide retention, soil fertility, climate, flooding, and wetness
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. - 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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.
- The Nikwasi soil is severely limited for cultivated crops because of the wetness and flooding.


## Pasture and hayland

Suitability: Saunook—well suited; Nikwasi—poorly suited
Management concerns: Saunook—equipment use, erodibility, pesticide retention, and soil fertility; Nikwasi-equipment use, erodibility, pesticide retention, soil fertility, flooding, and wetness
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Preparing seedbeds on the contour or across the
slope helps to minimize soil erosion and increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.
- The Nikwasi soil is severely limited for pasture and hayland because of the wetness and flooding.
- Maintaining existing drainageways and ditches helps to remove excess water.


## Ornamental crops

Suitability: Saunook—suited; Nikwasi-unsuited Management concerns: Saunook-erodibility, equipment use, root disease, climate, pesticide retention, and soil fertility; Nikwasi-erodibility, equipment use, root disease, climate, pesticide retention, soil fertility, flooding, and wetness Management measures and considerations:

- The Nikwasi soil is severely limited for ornamental crops because of the wetness and flooding. A site on better suited soils should be selected.
- Because of the restricted movement of air and water caused by the clay content in the subsoil of the Saunook soil, 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 drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- 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: Saunookmoderately high for cove hardwoods and northern hardwoods; Nikwasi-not used
Suitability:Saunook—well suited; Nikwasi-unsuited
Management concerns: Saunook-equipment use, erodibility, and compaction; Nikwasi-equipment use, erodibility, flooding, and wetness
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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.
- The Nikwasi soil is severely limited for timber production because of the wetness and flooding. - 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: Saunook—suited; Nikwasi-unsuited Management concerns: Saunook—erodibility, seeps and springs, corrosivity, and large stones; Nikwasi-erodibility, seeps and springs, corrosivity, flooding, and wetness
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- Stones and boulders may be a problem during excavation.
- The Nikwasi soil 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: Saunook—suited; Nikwasi-unsuited
Management concerns:Saunook-restricted permeability, seeps and springs, slope, and large stones; Nikwasi-restricted permeability, seeps and springs, slope, flooding, and wetness
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 in areas of the Saunook soil.
- 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.
- Stones and boulders may be a problem during excavation.
- The Nikwasi soil is severely limited for septic tank absorption fields because of the flooding and wetness. A site on better suited soils should be selected.


## Local roads and streets

Suitability:Saunook—suited; Nikwasi-unsuited Management concerns: Saunook—erodibility, low strength, frost action, and seeps and springs; Nikwasi-erodibility, low strength, frost action, flooding, and wetness
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- The Nikwasi soil is severely limited for local roads and streets because of the flooding and wetness. A site on better suited soils should be selected.


## Lawns and landscaping

Suitability:Saunook—suited; Nikwasi-unsuited Management concerns: Saunook-erodibility, soil compaction, soil fertility, climate, root disease, and pesticide retention; Nikwasi-erodibility, soil compaction, soil fertility, climate, root disease, pesticide retention, flooding, and wetness

Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of slow air drainage, late spring frost may damage new growth in some years.
- Because of the restricted movement of air and water caused by the clay content in the subsoil of the Saunook soil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- 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.
- The Nikwasi soil is severely limited for lawns and landscaping because of the flooding and wetness. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification:Saunook-3e; Nikwasi6 w

## ShC—Saunook-Thunder complex, 8 to 15 percent slopes, very stony

## Setting

Landscape: Intermountain hills and low and intermediate mountains throughout most of the county, except in the east-central and eastern parts
Elevation range: 2,800 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: 2 to 100 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 5 inches-dark brown loam
5 to 8 inches-dark yellowish brown loam
Subsoil:
8 to 26 inches-dark yellowish brown clay loam 26 to 41 inches-dark yellowish brown gravelly loam

## Underlying material:

41 to 62 inches-cobbly fine sandy loam that is multicolored in shades of brown

## Thunder

Surface layer:
0 to 12 inches-dark brown cobbly loam
Subsoil:
12 to 25 inches-dark yellowish brown very cobbly loam
25 to 51 inches-dark yellowish brown extremely cobbly loam

Underlying material:
51 to 62 inches-yellowish brown extremely cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class: Well drained
General texture class: Saunook-loamy;Thunderloamy with many rock fragments
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: Saunook-severe;Thundermoderate
Rock fragments on the surface: About 3 percent stones and cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soils subject to slow air
drainage, which allows late spring and early fall frosts
Soil reaction: Saunook-extremely acid to moderately acid in the surface layer, except in limed areas, and very strongly acid to slightly acid in the rest of the profile; Thunder-strongly acid to slightly acid, except where the surface has been limed
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments in the Thunder soil; the potential for localized mass movement of soil material when the soils become saturated with water

## Minor Components

## Dissimilar inclusions:

- Soils that have seeps and springs or have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Random areas of rubble land
- Areas that are rarely flooded for very brief periods, along stream channels
- Somewhat poorly drained Cullowhee soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Saunook and Thunder soils that have bouldery or very bouldery surfaces


## Similar inclusions:

- Saunook and Thunder soils that have surface layers of fine sandy loam or sandy loam
- Saunook and Thunder soils that have fewer surface stones
- Random areas of Saunook soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, and woodland Other Uses: Fraser fir production, ornamental crops, cropland, and building site development

## Agricltural Development

## Cropland

Suitability:Saunook—poorly suited; Thunder—unsuited Management concerns:Saunook-equipment use, erodibility, soil fertility, pesticide retention, climate, and tilth;Thunder-equipment use, erodibility, soil
fertility, pesticide retention, climate, and high content of rock fragments
Management measures and considerations:

- This map unit is limited for cultivated crops because of the slope and the very stony surface.
- 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.
- 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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.
- Because of the high content of rock fragments in the surface layer, the Thunder soil is difficult to till.


## Pasture and hayland

## Suitability for pasture: Suited

Suitability for hayland: Poorly suited
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.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability: Saunook—suited;Thunder-unsuited Management concerns: Saunook-equipment use, erodibility, climate, pesticide retention, root disease, and soil fertility; Thunder-equipment use, erodibility, climate, pesticide retention, root disease, soil fertility, and ball and burlap harvesting
Management measures and considerations:

- This map unit may be difficult to manage for ornamental crops because the slope and very stony surface limit equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of slow air drainage, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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.
- The Thunder soil is severely limited for ball and burlap harvesting because of the high amount of rock fragments in the root zone.


## 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 watercontrol 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 when the soils are wet prevents rutting of the soil surface and damage to trees 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:Saunook—suited;Thunder-poorly suited Management concerns: Saunook-erodibility, seeps and springs, and corrosivity;Thunder-erodibility, seeps and springs, and cutbanks cave Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage from overland flow of storm water.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.
- Stones and boulders are a problem during excavation.
- Installing permanent retaining walls helps to improve soil stability.


## Septic tank absorption fields

Suitability:Saunook—suited;Thunder—unsuited Management concerns: Saunook-slope, seeps and springs, and restricted permeability;Thunderslope, 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.
- Stones and boulders are a problem during excavation.


## Local roads and streets

Suitability: Suited
Management concerns: Saunook—erodibility, seeps and springs, frost action, and low strength; Thunder-erodibility, seeps and springs, frost action, and differential settling
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve soil strength, 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.
- Stones and boulders are a problem during excavation.


## Lawns and landscaping

Suitability: Saunook—suited;Thunder—poorly suited Management concerns:Large stones, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- This map unit is limited for lawns and landscaping because of the very stony surface and the high content of rock fragments in the Thunder soil.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a
potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- 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.

Interpretive Groups
Land capability classification:Saunook-4e;Thunder$6 s$

## ShD—Saunook-Thunder complex, 15 to 30 percent slopes, very stony

## Setting

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Elevation range: 2,800 to 4,600 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to 300 acres

## Composition

Saunook soil and similar inclusions: 55 percent
Thunder soil and similar inclusions: 35 percent Dissimilar inclusions: 10 percent

## Typical Profile

## Saunook

Surface layer:
0 to 5 inches-dark brown loam
5 to 8 inches-dark yellowish brown loam
Subsoil:
8 to 26 inches-dark yellowish brown clay loam
26 to 41 inches-dark yellowish brown gravelly loam

## Underlying material:

41 to 62 inches-cobbly fine sandy loam that is multicolored in shades of brown

## Thunder

Surface layer:
0 to 12 inches-dark brown cobbly loam

Subsoil:
12 to 25 inches-dark yellowish brown very cobbly loam
25 to 51 inches-dark yellowish brown extremely cobbly loam
Underlying material:
51 to 62 inches-yellowish brown extremely cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Saunook-loamy;Thunderloamy with many rock fragments
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: About 3 percent stones and cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Special climatic conditions: Soils subject to slow air drainage, which allows late spring and early fall frosts
Soil reaction: Saunook—extremely acid to moderately acid in the surface layer, except in limed areas, and very strongly acid to slightly acid in the rest of the profile; Thunder-strongly acid to slightly acid, except where the surface has been limed
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments in the Thunder soil; the potential for localized mass movement of soil material when the soils become saturated with water

## Minor Components

Dissimilar inclusions:

- Soils that have seeps and springs or a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Random areas of rubble land
- Areas that are rarely flooded for very brief periods, along stream channels
- Somewhat poorly drained Cullowhee soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
Similar inclusions:
- Saunook and Thunder soils that have surface layers of fine sandy loam or sandy loam
- Saunook and Thunder soils that have fewer surface stones
- Cullasaja soils that have less clay in the subsoil than the Saunook and Thunder soils
- Soils that are similar to the Saunook soil but have less clay in the subsoil
- Random areas of Saunook soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, and woodland Other Uses: Fraser fir production, ornamental crops, and building site development

## Agricultural Development

## Cropland

Suitability:Saunook—poorly suited;Thunder—unsuited Management concerns: Saunook-equipment use, erodibility, soil fertility, pesticide retention, climate, and tilth; Thunder-equipment use, erodibility, soil fertility, pesticide retention, climate, and high content of rock fragments Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because the slope and very stony surface limit 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. - 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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.
- Because of the high content of rock fragments in the surface layer, the Thunder soil is difficult to till.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
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.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Saunook—suited;Thunder-unsuited
Management concerns: Saunook-equipment use, erodibility, climate, pesticide retention, root disease, and soil fertility; Thunder-equipment use, erodibility, climate, pesticide retention, root disease, soil fertility, and ball and burlap harvesting
Management measures and considerations:

- This map unit may be difficult to manage for ornamental crops because the slope and very stony surface limit equipment use.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of slow air drainage, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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.
- The Thunder soil is severely limited for ball and burlap harvesting because of the high amount of rock fragments in the root zone.


## 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 watercontrol 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 when the soils are wet prevents rutting of the soil surface and damage to trees 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, and corrosivity;Thunderslope, erodibility, seeps and springs, and cutbanks cave
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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.
- Stones and boulders are a problem during excavation.
- 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; Thunderslope, 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.
- Stones and boulders are a problem during excavation.


## Local roads and streets

## Suitability: Poorly suited

Management concerns: Saunook—slope, erodibility, seeps and springs, frost action, and low strength; Thunder-slope, erodibility, seeps and springs, frost action, and differential settling
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve soil strength, 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.
- Stones and boulders are a problem during excavation.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- This map unit is limited for lawns and landscaping because of the slope, very stony surface, and the high content of rock fragments in the Thunder soil.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- 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.

Interpretive Groups
Land capability classification:Saunook-6e;Thunder$6 s$

## SoD—Soco-Ditney complex, 15 to 30 percent slopes, very stony

Setting<br>Landscape:Low and intermediate mountains in the eastern and southeastern parts of the county Elevation range: 1,900 to 3,800 feet<br>Landform: Mountain ridges<br>Landform position:Summits and the upper side slopes<br>Shape of areas: Long and narrow or irregular<br>Size of areas: 2 to 60 acres

## Composition

Soco soil and similar inclusions: 60 percent
Ditney soil and similar inclusions: 25 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Soco

Surface layer:
0 to 3 inches-brown channery loam
Subsurface layer:
3 to 7 inches-yellowish brown channery loam
Subsoil:
7 to 15 inches-yellowish brown loam
15 to 28 inches-yellowish brown channery loam
Underlying material:
28 to 35 inches-yellowish brown channery fine sandy loam
Bedrock:
35 to 62 inches-soft weathered, moderately fractured, low-grade feldspathic metasandstone

## Ditney

Surface layer:
0 to 2 inches-brown gravelly sandy loam

## Subsurface layer:

2 to 8 inches-light yellowish brown gravelly sandy loam
Subsoil:
8 to 20 inches-yellowish brown gravelly sandy loam

## Underlying material:

20 to 30 inches-yellowish brown and light yellowish brown gravelly loamy sand

Bedrock:
30 to 35 inches-hard unweathered, moderately fractured, low-grade feldspathic metasandstone

## Soil Properties and Qualities

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: 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 cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: Soco-20 to 40 inches to soft bedrock; Ditney-20 to 40 inches to hard bedrock
Other distinctive properties: Low natural fertility; water movement along bedrock contacts in areas of the Ditney soil

## Minor Components

Dissimilar inclusions:

- Stecoah soils that have soft bedrock at a depth of 40 to 60 inches and soils that have soft bedrock at a depth of more than 60 inches, on the smoother parts of the landscape
- Unicoi soils that have hard bedrock at a depth of 10 to 20 inches, on nose slopes and in areas of rock outcrops
- Crossnore and Jeffrey soils that have thicker surface layers with more organic matter than the Soco and Ditney soils and that have soft or hard bedrock at a depth of 20 to 40 inches, at the higher elevations - Whiteoak soils that have thicker surface layers with more organic matter than the Soco and Ditney 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
- Widely scattered areas of rock outcrops


## Similar inclusions:

- Soco soils that have a surface layer of sandy loam or fine sandy loam
- Ditney soils that have a surface layer of loam or fine sandy loam
- Soco and Ditney soils that have higher amounts of clay in the subsoil


## Land Use

Dominant Uses: Woodland
Other Uses: Pasture, hayland, and ornamental crops

## Agricultural Development

## Cropland

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for cultivated crops 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, erodibility, rooting depth, droughtiness, and soil fertility
Management measures and considerations:

- Because of the slope and a very stony surface, this map unit is difficult to manage for pasture and hayland.
- Because of the low available water capacity caused by the moderately deep rooting depth, these soils are difficult to manage for 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 helps to maintain pastures and 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.


## Ornamental crops

Suitability:Unsuited
Management concerns: Equipment use, erodibility, soil fertility, ball and burlap harvesting, plant shape, rooting depth and droughtiness
Management measures and considerations:

- Because of the lower elevations and low natural soil fertility, the production of Fraser fir is difficult.
- This map unit is severely limited for ornamental crops because the slope and very stony surface limit equipment use.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, these soils are difficult to manage for ornamental crops.
- A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Low for upland hardwoods and moderately high for eastern white pine
Suitability: Poorly suited
Management concerns: Equipment use, erodibility, depth to bedrock, and windthrow hazard
Management measures and considerations:

- Productivity is limited because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to minimize road and trail construction.
- Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, depth to hard bedrock, 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 on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of hard rock or the use of special earthmoving equipment is needed to increase the depth of the Ditney soil.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

Suitability: Poorly suited
Management concerns:

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


## Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, erodibility, slippage, depth to bedrock, and frost action

## Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing watercontrol structures, such as 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.
- The soft bedrock underlying the Soco soil 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Slope, erodibility, large stones, soil fertility, droughtiness, and depth to bedrock
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because the slope and very stony surface limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- Because of the moderately deep rooting depth, these soils are difficult to manage for lawns and landscaping, especially if the soils have been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.
- 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

## SoE-Soco-Ditney complex, 30 to 50 percent slopes, very stony

## Setting

Landscape:Low and intermediate mountains in the eastern and southeastern parts of the county
Elevation range: 1,900 to 3,800 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Shape of areas: Irregular
Size of areas: 2 to 200 acres

## Composition

Soco soil and similar inclusions: 50 percent Ditney soil and similar inclusions: 35 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Soco

Surface layer:
0 to 3 inches-brown channery loam
Subsurface layer:
3 to 7 inches-yellowish brown channery loam
Subsoil:
7 to 15 inches-yellowish brown loam
15 to 28 inches-yellowish brown channery loam
Underlying material:
28 to 35 inches-yellowish brown channery fine sandy loam

## Bedrock:

35 to 62 inches-soft weathered, moderately fractured, low-grade feldspathic metasandstone

## Ditney

Surface layer:
0 to 2 inches-brown gravelly sandy loam
Subsurface layer:
2 to 8 inches-light yellowish brown gravelly sandy loam

Subsoil:
8 to 20 inches-yellowish brown gravelly sandy loam

## Underlying material:

20 to 30 inches-yellowish brown and light yellowish brown gravelly loamy sand

## Bedrock:

30 to 35 inches-hard unweathered, moderately
fractured, low-grade feldspathic metasandstone

## Soil Properties and Qualities

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: 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 cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: Soco-20 to 40 inches to soft bedrock; Ditney-20 to 40 inches to hard bedrock
Other distinctive properties: Low natural fertility; water movement along bedrock contacts in areas of the Ditney soil

## Minor Components

Dissimilar inclusions:

- Stecoah soils that have soft bedrock at a depth of 40 to 60 inches and soils that have soft bedrock at a depth of more than 60 inches, on the smoother parts of the landscape
- Crossnore and Jeffrey soils that have thicker surface layers with more organic matter than the Soco and Ditney soils and that have soft or hard bedrock at a depth of 20 to 40 inches, at the higher elevations - Whiteoak soils that have thicker surface layers with more organic matter than the Soco and Ditney soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the heads of drains, in drainageways, and on footslopes - Spivey soils that have thicker surface layers with more organic matter than the Soco and Ditney soils, contain more rock fragments, and have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Northcove and Maymead soils that contain more rock fragments than the Soco and Ditney soils and have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Unicoi soils that have hard bedrock at a depth of 10 to 20 inches, on nose slopes and in areas of rock outcrops
- Widely scattered areas of rock outcrops

Similar inclusions:

- Soco soils that have a surface layer of sandy loam or fine sandy loam
- Ditney soils that have a surface layer of loam or fine sandy loam
- Soco and Ditney soils that have higher amounts of clay in the subsoil


## Land Use

Dominant Uses:Woodland
Other Uses: Pasture, recreation, and ornamental crops

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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: Equipment use, erodibility, rooting depth, droughtiness, and soil fertility
Management measures and considerations:

- Because of the slope and a very stony surface, this map unit is difficult to manage for pasture and hayland.
- Because of the low available water capacity caused by the moderately deep rooting depth, these soils are difficult to manage for 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.


## Ornamental crops

## Suitability:Unsuited

Management concerns: Equipment use, erodibility, soil fertility, plant shape, rooting depth, and droughtiness

Management measures and considerations:

- Because of the lower elevations and the low natural soil fertility, the production of Fraser fir is difficult.
- This map unit is severely limited for ornamental crops because the slope and very stony surface limit equipment use.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, these soils are difficult to manage for ornamental crops.
- A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Low for upland hardwoods and moderately high for eastern white pine
Suitability: Poorly suited
Management concerns: Equipment use, erodibility, depth to bedrock, and windthrow hazard
Management measures and considerations:

- Productivity is limited because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to minimize road and trail construction, especially in areas where slope exceeds 40 percent.
- Blasting, shaping, and grading are needed if roads are to be constructed on the contour.
- Reseeding all disturbed areas with adapted grasses and legumes helps to prevent soil erosion.
- 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, depth to hard bedrock, 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 on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of hard rock or the use of special
earthmoving equipment is needed to increase the depth of the Ditney soil.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

Suitability: Poorly suited
Management concerns:

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


## Local roads and streets

## Suitability: Poorly suited

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

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing watercontrol structures, such as 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.
- The soft bedrock underlying the Soco soil 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Slope, erodibility, large stones, soil fertility, droughtiness, and depth to bedrock
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because the slope and very stony surface limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- Because of the moderately deep rooting depth, these soils are difficult to manage for lawns and landscaping, especially if the soils have been disturbed.
- If excavated material is to be used for landscaping, soft bedrock needs to be crushed or removed.
- 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

## SoF-Soco-Ditney complex, 50 to 95 percent slopes, very stony

## Setting

Landscape:Low and intermediate mountains in the eastern and southeastern parts of the county
Elevation range: 1,900 to 3,800 feet
Landform:Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 2 to 250 acres

## Composition

Soco soil and similar inclusions: 45 percent
Ditney soil and similar inclusions: 40 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Soco

Surface layer:
0 to 3 inches-brown channery loam
Subsurface layer:
3 to 7 inches-yellowish brown channery loam
Subsoil:
7 to 15 inches-yellowish brown loam
15 to 28 inches-yellowish brown channery loam
Underlying material:
28 to 35 inches-yellowish brown channery fine sandy loam

## Bedrock:

35 to 62 inches-soft weathered, moderately fractured, low-grade metasandstone

## Ditney

Surface layer:
0 to 2 inches-brown gravelly sandy loam

## Subsurface layer:

2 to 8 inches-light yellowish brown gravelly sandy loam
Subsoil:
8 to 20 inches-yellowish brown gravelly sandy loam

## Underlying material:

20 to 30 inches-yellowish brown and light yellowish brown gravelly loamy sand

Bedrock:
30 to 35 inches-hard unweathered, moderately fractured, low-grade feldspathic metasandstone

## Soil Properties and Qualities

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 cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: Soco-20 to 40 inches to soft bedrock; Ditney-20 to 40 inches to hard bedrock
Other distinctive properties: Low natural fertility; water movement along bedrock contacts in areas of the Ditney soil

## Minor Components

Dissimilar inclusions:

- Stecoah soils that have soft bedrock at a depth of 40 to 60 inches, on the smoother parts of the landscape - Crossnore and Jeffrey soils that have thicker surface layers with more organic matter than the Soco and

Ditney soils and have soft or hard bedrock at a depth of 20 to 40 inches, at the higher elevations

- Spivey soils that have thicker surface layers with more organic matter than the Soco and Ditney soils, contain more rock fragments, and have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Northcove and Maymead soils that contain more rock fragments than the Soco and Ditney soils and have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Unicoi soils that have hard bedrock at a depth of 10 to 20 inches, on nose slopes and in areas of rock outcrops
- Widely scattered areas of rock outcrops

Similar inclusions:

- Soco soils that have a surface layer of sandy loam or fine sandy loam
- Ditney soils that have a surface layer of loam or fine sandy loam


## Land Use

## Dominant Uses: Woodland <br> Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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 pasture and hayland because of the slope, erodibility, depth to bedrock, and very stony surface. A site on better suited soils should be selected.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for 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: Low for upland
hardwoods and moderately high for eastern white pine
Suitability: Poorly suited
Management concerns: Equipment use, erodibility, depth to bedrock, and windthrow hazard
Management measures and considerations:

- Productivity is limited because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to overcome equipment limitations and prevents the acceleration of erosion caused by road construction, 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 depth to bedrock. 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, erodibility, and depth to bedrock.
- 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 depth to bedrock. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification: 7e

## SpD—Spivey cobbly loam, 15 to 30 percent slopes, extremely bouldery

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,400 to 4,600 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to 150 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 11 inches-very dark grayish brown cobbly loam
Subsoil:
11 to 17 inches-brown very cobbly loam
17 to 34 inches-yellowish brown very cobbly loam
Underlying material:
34 to 62 inches-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
Available water capacity: Low
Permeability: Moderately rapid
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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Spivey—extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts


Figure 10.—An area of Spivey cobbly loam, 15 to 30 percent slopes, extremely bouldery. This soil can produce merchantable timber, but boulders limit harvesting equipment.

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; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

## Dissimilar inclusions:

- Random areas of rubble land
- Whiteoak soils that have more clay and fewer rock fragments than the Spivey soil, on the smoother parts of the landscape
- Soils that have seeps and springs or 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 occasionally to rarely flooded for very brief periods, along stream channels
Similar inclusions:
- Spivey soils that have a surface layer of fine sandy loam or sandy loam
- Spivey soils that have more clay in the subsoil


## Land Use

Dominant Uses: Woodland (fig. 10)
Other Uses: Pasture, Fraser fir production, ornamental crops, and building site development

## Agricultural Development

## Cropland

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, erodibility, and an extremely 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 for pasture: Equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- This map unit is severely limited for hayland because of the extremely bouldery surface and the slope.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, the extremely bouldery surface, and the large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the 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: Poorly suited

Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to overcome
limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns: Slope, large stones, erodibility, seeps and springs, slope, cutbanks cave, and corrosivity

## Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

## Suitability:Unsuited

## Management concerns:

- This map unit is severely limited for septic tank absorption fields because of the slope, extremely bouldery surface, seeps and springs, and poor filtering capacity.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns:Large stones, slope, erodibility, seeps and springs, frost action, and differential settling
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Unsuited
Management concerns:Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

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


## Interpretive Groups

Land capability classification: 7s

SpE—Spivey cobbly loam, 30 to 50 percent slopes, extremely bouldery

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,400 to 4,600 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes, side slopes, and toeslopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to 250 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 11 inches-very dark grayish brown cobbly loam

## Subsoil:

11 to 17 inches-brown very cobbly loam
17 to 34 inches-yellowish brown very cobbly loam

## Underlying material:

34 to 62 inches-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: 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 10 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
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; high content of rock fragments; the potential for localized mass movement of soil material when the soil becomes saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land
- Whiteoak soils that have more clay and fewer rock fragments than the Spivey soil, on the smoother parts of the landscape
- Soils that have seeps and springs or that have a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
Similar inclusions:
- Spivey soils that have a surface layer of fine sandy loam or sandy loam
- Spivey soils that have more clay in the subsoil


## Land Use

## Dominant Uses:Woodland

Other Uses: Pasture, Fraser fir production, ornamental crops, and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of the slope, erodibility, and an extremely 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 for pasture: Equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- This map unit is severely limited for hayland because of the extremely bouldery surface and the slope.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, the extremely bouldery surface, and the large amount of rock fragments in the soil. Removing surface stones and boulders would do little to decrease the limitations caused by the large amount of rock fragments in the 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: Poorly suited

Management concerns: Equipment use and erodibility Management measures and considerations:

- Using cable logging methods helps to overcome limited road and trail construction caused by the large number of stones and boulders on the soil surface.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.


## Urban Development

## Dwellings

Suitability:Unsuited
Management concerns: Slope, large stones, erodibility, seeps and springs, cutbanks cave, and corrosivity
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

## Suitability:Unsuited

Management concerns:

- This map unit is severely limited for septic tank absorption fields because of the slope, extremely bouldery surface, seeps and springs, and poor filtering capacity.
- The local Health Department should be contacted for additional guidance.


## Local roads and streets

Suitability: Poorly suited
Management concerns:Large stones, slope, erodibility, seeps and springs, frost action, and differential settling
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- This soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Unsuited
Management concerns:Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

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


## Interpretive Groups <br> Land capability classification: 7s <br> SrC—Spivey-Whiteoak complex, 8 to 15 percent slopes, very bouldery

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,400 to 4,200 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes and toeslopes
Shape of areas:Long and narrow or irregular
Size of areas: 2 to 300 acres

## Composition

Spivey soil and similar inclusions: 45 percent Whiteoak soil and similar inclusions: 40 percent Dissimilar inclusions: 15 percent

## Typical Profile

## Spivey

Surface layer:
0 to 11 inches-very dark grayish brown cobbly loam

## Subsoil:

11 to 17 inches-brown very cobbly loam
17 to 34 inches-yellowish brown very cobbly loam
Underlying material:
34 to 62 inches-yellowish brown very cobbly sandy loam

Whiteoak

## Surface layer:

0 to 9 inches-very dark grayish brown fine sandy loam

Subsoil:
9 to 12 inches-dark yellowish brown loam
12 to 30 inches-yellowish brown clay loam
30 to 55 inches-yellowish brown loam
55 to 62 inches-yellowish brown loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class: Spivey-loamy with many rock fragments; Whiteoak-loamy
Permeability: Spivey—moderately rapid;Whiteoak— moderate

Available water capacity: Spivey-low; Whiteoakmoderate
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 24 to 48 inches in diameter and 10 to 65 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Spivey-extremely acid to moderately acid, except where the surface has been limed; Whiteoak-very strongly acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to slow air drainage, which allows late spring and early fall frosts
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; high content of rock fragments in the Spivey soil; the potential for localized mass movement of soil material when the soils become saturated with water

## Minor Components

Dissimilar inclusions:

- Random areas of rubble land
- Somewhat poorly drained Cullowhee soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Moderately well drained Dellwood soils that are occasionally or frequently flooded and that have a high content of rock fragments, along stream channels
- Soils that have seeps and springs or 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 occasionally to rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Spivey soils that have a surface layer of fine sandy loam or sandy loam
- Whiteoak soils that have a surface layer of sandy loam or loam
- Spivey soils that have more clay in the subsoil


## Land Use

Dominant Uses: Woodland
Other Uses: Pasture, Fraser fir production, ornamental crops, and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops because of a very bouldery surface and the large amount of rock fragments in the Spivey soil. 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.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability: Spivey—unsuited; Whiteoak—suited Management concerns: Equipment use, ball and burlap harvesting, erodibility, soil fertility, climate, root disease, and pesticide retention
Management measures and considerations:

- This map unit is severely limited for ornamental crops because of the very bouldery surface and the high amount of rock fragments in the root zone of the Spivey 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.
- Because of slow air drainage, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.


## 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 watercontrol 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.
- 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: Spivey—unsuited; Whiteoak—suited Management concerns: Spivey-large stones, erodibility, seeps and springs, corrosivity, and cutbanks cave; Whiteoak-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.
- Stones and boulders are a problem during excavation.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment
fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage from overland flow of storm water.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- 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:Spivey—unsuited;Whiteoak—suited
Management concerns: Spivey-large stones, slope, seeps and springs, and poor filtering capacity; Whiteoak-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.
- 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 Spivey soil readily absorbs but does not adequately filter effluent.
- Raking trench walls helps to prevent the sealing of soil pores, which may occur during the excavation of septic tank absorption fields.


## Local roads and streets

## Suitability: Poorly suited

Management concerns: Spivey-large stones, erodibility, seeps and springs, and differential settling;Whiteoak-large stones, erodibility, seeps and springs, frost action, and low strength Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- The Spivey soil is subject to uneven settling and may be unstable if not properly compacted.


## Lawns and landscaping

Suitability:Spivey—unsuited; Whiteoak—suited Management concerns:Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention

## Management measures and considerations:

- This map unit is limited for lawns and landscaping because of the extremely bouldery surface and the high content of rock fragments in the Spivey soil.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage and frost pockets, late spring frost may 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.


## Interpretive Groups

Land capability classification: Spivey—7s;Whiteoak— 4 e

## SsB—Statler loam, 0 to 6 percent slopes, rarely flooded

Setting<br>Landscape:Valleys of intermountain hills and low and intermediate mountains throughout the county<br>Elevation range: 2,600 to 3,800 feet<br>Landform: Low stream terraces on the larger flood plains<br>Landform position: Planar to slightly convex slopes<br>Shape of areas: Irregular or oblong<br>Size of areas: 2 to 30 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 9 inches—dark brown loam

## Subsoil:

9 to 30 inches-yellowish brown clay loam
30 to 38 inches-dark yellowish brown sandy clay loam

Underlying material:
38 to 62 inches-dark yellowish brown fine sandy loam

## 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: Rare
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 to moderate
Organic matter content (surface layer): High
Potential for frost action: Moderate
Soil reaction: Strongly acid or moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
Parent material: Alluvium derived from felsic to mafic, high-grade metamorphic or igneous rock to lowgrade metasedimentary rock
Depth to bedrock: More than 60 inches

## 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 in drainageways
- Areas that are occasionally flooded for very brief periods, along stream channels
- Somewhat poorly drained Cullowhee soils that are loamy
- Non-flooded Saunook soils on the adjacent toeslopes
- Moderately well drained Dellwood and Reddies soils that have strata with a high content of rock fragments at a depth of 8 to 40 inches, along stream channels


## Similar inclusions:

- Statler soils that have a surface layer of fine sandy loam or sandy loam
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, cropland, Fraser fir production, and ornamental crops
Other Uses: Woodland

## 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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 increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability: Suited

Management concerns: Flooding, erodibility, climate, pesticide retention, soil fertility, and root disease Management measures and considerations:

- The possibility of flooding, although rare, should be considered when creating a management plan.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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 yellow-poplar and very high for eastern white pine Suitability:Well suited
Management concerns: Erodibility and equipment use Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees 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: Flooding, seeps and springs, and corrosivity
Management measures and considerations:

- 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: Poorly suited
Management concerns: Flooding, restricted permeability, and seeps and springs
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.


## Local roads and streets

Suitability: Suited
Management concerns: Flooding, low strength, erodibility, frost action, and seeps and springs
Management measures and considerations:

- Constructing roads on raised, well-compacted soil material helps to elevate the road above the level of flooding.
- Permanently surfacing roads or using suitable subgrade or base material helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.
- Installing water-control structures, such as culverts, helps 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.


## Lawns and landscaping

## Suitability: Suited

Management concerns: Flooding, erodibility, soil fertility, soil compaction, root disease, climate, and pesticide retention,
Management measures and considerations:

- The possibility of flooding, although rare, should be considered when creating a management plan.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


## Interpretive Groups

Land capability classification: 2e

## StD—Stecoah-Soco complex, 15 to 30 percent slopes, stony

## Setting

Landscape: Low and intermediate mountains in the eastern and southeastern parts of the county
Elevation range: 1,900 to 3,800 feet
Landform: Mountain ridges
Landform position: Summits and the upper side slopes

Shape of areas: Long and narrow or irregular
Size of areas: 2 to 200 acres

## Composition

Stecoah soil and similar inclusions: 60 percent
Soco soil and similar inclusions: 30 percent Dissimilar inclusions: 10 percent

## Typical Profile

## Stecoah

Surface layer:
0 to 4 inches-dark grayish brown channery loam
Subsoil:
4 to 9 inches-yellowish brown channery fine sandy loam
9 to 22 inches-brownish yellow sandy loam
22 to 28 inches-brownish yellow and very pale brown sandy loam

## Underlying material:

28 to 40 inches-brownish yellow and very pale brown channery loamy sand
40 to 50 inches-very pale brown channery loamy sand

Bedrock:
50 to 62 inches-soft weathered, moderately fractured low-grade feldspathic metasandstone

## Soco

Surface layer:
0 to 3 inches-brown channery loam
Subsurface layer:
3 to 7 inches-yellowish brown channery loam
Subsoil:
7 to 15 inches-yellowish brown loam
15 to 28 inches-yellowish brown channery loam
Underlying material:
28 to 35 inches-yellowish brown channery fine sandy loam

## Bedrock:

35 to 62 inches-soft weathered, moderately fractured low-grade feldspathic metasandstone

## Soil Properties and Qualities

Depth class: Stecoah—deep; Soco—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: 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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: Stecoah-40 to 60 inches to soft bedrock; Soco-20 to 40 inches to soft bedrock
Other distinctive properties: Low natural fertility

## Minor Components

Dissimilar inclusions:

- Pineola soils that have more clay in the subsoil than the Stecoah and Soco soils, have thicker surface layers with more organic matter, and have soft bedrock at a depth of 20 to 40 inches, at the higher elevations - Crossnore and Jeffrey soils that have thicker surface layers with more organic matter than the Stecoah and Soco soils and that have soft or hard bedrock at a depth of 20 to 40 inches, at the higher elevations - Whiteoak soils that have thicker surface layers with more organic matter than the Stecoah and Soco 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
- Soils that have soft bedrock at a depth of more than 60 inches, on the smoother parts of the landscape
- Random areas of soils that have more clay in the subsoil than the Stecoah and Soco soils
- Ditney soils that have hard bedrock at a depth of 20 to 40 inches and soils that have hard bedrock at a depth of 40 to 60 inches, on shoulder slopes and in areas of rock outcrops
- Widely scattered areas of rock outcrops

Similar inclusions:

- Stecoah and Soco soils that have surface layers of sandy loam or fine sandy loam


## Land Use

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

## Agricultural Development

## Cropland

## Suitability: Poorly suited

Management concerns: Stecoah-equipment use, erodibility, and soil fertility; Soco-equipment use, erodibility, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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 maximize crop productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Soco soil is difficult to manage for cultivated crops.


## Pasture and hayland

## Suitability for pasture: Suited

Suitability for hayland: Poorly suited
Management concerns: Stecoah-equipment use, erodibility, and soil fertility; Soco-equipment use, erodibility, soil fertility, rooting depth, and droughtiness
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 helps to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Soco soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns: Stecoah-equipment use, erodibility, soil fertility, ball and burlap harvesting, and plant shape; Soco-equipment use, erodibility,
soil fertility, ball and burlap harvesting, plant
shape, rooting depth, and droughtiness
Management measures and considerations:

- Because of the slope, lower elevations, and low natural soil fertility, the production of Fraser fir is difficult.
- 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 low moisture and minimal clay contents.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Soco soil is difficult to manage for ornamental crops.
- 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: Low for upland hardwoods and high for eastern white pine

## Suitability: Suited

Management concerns: Stecoah—equipment use and erodibility; Soco—equipment use, erodibility, and windthrow hazard
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Soco soil because of the restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, corrosivity, and depth to bedrock

Management measures and considerations:

- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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:Stecoah—slope; Soco—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 Stecoah soil may improve the performance of filter fields.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, erodibility, slippage, depth to bedrock, and frost action
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Stecoah—slope, erodibility, soil fertility, and droughtiness; Soco—slope, erodibility, soil fertility, droughtiness, and depth to bedrock
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- Because of the moderately deep rooting depth, the Soco soil is 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.
- 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

## StE—Stecoah-Soco complex, 30 to 50 percent slopes, stony

## Setting

Landscape:Low and intermediate mountains in the eastern and southeastern parts of the county
Elevation range: 1,900 to 3,800 feet
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Shape of areas: Irregular
Size of areas: 2 to 250 acres

## Composition

Stecoah soil and similar inclusions: 65 percent Soco soil and similar inclusions: 25 percent Dissimilar inclusions: 10 percent

## Typical Profile

## Stecoah

Surface layer:
0 to 4 inches-dark grayish brown channery loam
Subsoil:
4 to 9 inches-yellowish brown channery fine sandy loam
9 to 22 inches-brownish yellow sandy loam 22 to 28 inches-brownish yellow and very pale brown sandy loam

Underlying material:
28 to 40 inches-brownish yellow and very pale brown channery loamy sand
40 to 50 inches-very pale brown channery loamy sand

## Bedrock:

50 to 62 inches-soft weathered, moderately fractured low-grade feldspathic metasandstone

## Soco

Surface layer:
0 to 3 inches-brown channery loam
Subsurface layer:
3 to 7 inches-yellowish brown channery loam

## Subsoil:

7 to 15 inches-yellowish brown loam
15 to 28 inches-yellowish brown channery loam
Underlying material:
28 to 35 inches-yellowish brown channery fine sandy loam

## Bedrock:

35 to 62 inches-soft weathered, moderately fractured low-grade feldspathic metasandstone

## Soil Properties and Qualities

Depth class:Stecoah—deep; Soco—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: 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 cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: Stecoah-40 to 60 inches to soft bedrock; Soco-20 to 40 inches to soft bedrock
Other distinctive properties: Low natural fertility

## Minor Components

Dissimilar inclusions:

- Pineola soils that have more clay in the subsoil than the Stecoah and Soco soils, have thicker surface layers with more organic matter, and have soft bedrock at a depth of 20 to 40 inches, at the higher elevations - Crossnore and Jeffrey soils that have thicker surface layers with more organic matter than the Stecoah and Soco soils and have soft or hard bedrock at a depth of 20 to 40 inches, at the higher elevations
- Whiteoak soils that have thicker surface layers with more organic matter than the Stecoah and Soco soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the heads of drains, in drainageways, and on footslopes - Soils that have soft bedrock at a depth of more than 60 inches, on the smoother parts of the landscape - Spivey soils that have thicker surface layers with more organic matter than the Stecoah and Soco soils, contain more rock fragments, and have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Northcove and Maymead soils that contain more rock fragments than the Stecoah and Soco soils and that have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Random areas of soils that have more clay in the subsoil than the Stecoah and Soco soils
- Ditney soils that have hard bedrock at a depth of 20 to 40 inches and soils that have hard bedrock at a depth of 40 to 60 inches, on shoulder slopes, on nose slopes, and in areas of rock outcrops
- Widely scattered areas of rock outcrops


## Similar inclusions:

- Stecoah and Soco soils that have surface layers of sandy loam or fine sandy loam


## Land Use

Dominant Uses:Woodland Other Uses: Pasture and ornamental crops

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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: Stecoah-equipment use, erodibility, and soil fertility; Soco-equipment use, erodibility, soil fertility, rooting depth, and droughtiness
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.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Soco soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns: Stecoah-equipment use, erodibility, soil fertility, and plant shape; Socoequipment use, erodibility, soil fertility, plant shape, rooting depth, and droughtiness
Management measures and considerations:

- Because of the slope, lower elevations, and low natural soil fertility, the production of Fraser fir is difficult.
- Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize productivity.
- The slope affects the shape of low-growing ornamentals on the uphill side.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Soco soil is difficult to manage for ornamental crops.
- 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: Low for upland hardwoods and high for eastern white pine Suitability:Suited
Management concerns: Steocah-equipment use and
erodibility; Soco-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 watercontrol 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.
- Leaving a buffer zone of trees and shrubs adjacent to streams helps to minimize siltation and provides shade for the aquatic habitat.
- Livestock should not be allowed to graze in areas managed for woodland.
- Productivity is limited in areas of the Soco soil because of the restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Stecoah—slope; Soco—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 Stecoah soil may improve the performance of filter fields.


## Local roads and streets

## Suitability: Poorly suited

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

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns: Stecoah—slope, erodibility, soil fertility, and droughtiness; Soco-slope, erodibility, soil fertility, droughtiness, and depth to bedrock
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, irrigating, and planting 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.
- Because of the moderately deep rooting depth, the Soco soil is 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.
- 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

## StF—Stecoah-Soco complex, 50 to 80 percent slopes, stony

## Setting

Landscape: Low and intermediate mountains in the eastern and southeastern parts of the county
Elevation range: 1,900 to 3,800 feet
Landform:Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 2 to 100 acres

## Composition

Stecoah soil and similar inclusions: 50 percent Soco soil and similar inclusions: 35 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Stecoah

Surface layer:
0 to 4 inches-dark grayish brown channery loam
Subsoil:
4 to 9 inches-yellowish brown channery fine sandy loam
9 to 22 inches-brownish yellow sandy loam
22 to 28 inches-brownish yellow and very pale brown sandy loam
Underlying material:
28 to 40 inches-brownish yellow and very pale brown channery loamy sand
40 to 50 inches-very pale brown channery loamy sand

## Bedrock:

50 to 62 inches-soft weathered, moderately fractured low-grade feldspathic metasandstone

## Soco

Surface layer:
0 to 3 inches-brown channery loam
Subsurface layer:
3 to 7 inches-yellowish brown channery loam
Subsoil:
7 to 15 inches-yellowish brown loam
15 to 28 inches-yellowish brown channery loam

## Underlying material:

28 to 35 inches-yellowish brown channery fine sandy loam
Bedrock:
35 to 62 inches-soft weathered, moderately fractured low-grade feldspathic metasandstone

## Soil Properties and Qualities

Depth class:Stecoah—deep; Soco—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:Widely scattered stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: Stecoah-40 to 60 inches to soft bedrock; Soco-20 to 40 inches to soft bedrock
Other distinctive properties: Low natural fertility in the Soco soil

## Minor Components

Dissimilar inclusions:

- Ditney soils that have hard bedrock at a depth of 20
to 40 inches and soils that have hard bedrock at a depth of 40 to 60 inches, on shoulder slopes, on nose slopes, and in areas of rock outcrops
- Crossnore and Jeffrey soils that have thicker surface layers with more organic matter than the Stecoah and Soco soils and that have soft or hard bedrock at a depth of 20 to 40 inches, at the higher elevations - Whiteoak soils that have thicker surface layers with more organic matter than the Stecoah and Soco soils, have more clay in the subsoil, and have bedrock at a depth of more than 60 inches, in concave areas at the heads of drains, in drainageways, and on footslopes
- Spivey soils that have thicker surface layers with more organic matter than the Stecoah and Soco soils, contain more rock fragments, and have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Northcove and Maymead soils that contain more rock fragments than the Stecoah and Soco soils and that have bedrock at a depth of more than 60 inches, in narrow drains and on footslopes
- Widely scattered areas of rock outcrops

Similar inclusions:

- Stecoah and Soco soils that have surface layers of sandy loam or fine sandy loam


## Land Use

Dominant Uses: Woodland

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited Management concerns:

- This map unit is severely limited for 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: Low for upland hardwoods and high for eastern white pine Suitability: Poorly suited
Management concerns: Stecoah-equipment use and erodibility; Soco-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, 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 Soco soil because of the restricted rooting depth and windthrow hazard.


## Urban Development

## Dwellings

Suitability: Unsuited
Management concerns:

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


## Interpretive Groups

Land capability classification:7e

## TsC—Thunder-Saunook complex, 8 to 15 percent slopes, very bouldery

## Setting

Landscape: Intermountain hills and low and intermediate mountains in the southern and southwestern parts of the county
Elevation range: 3,400 feet
Landform: Coves, colluvial fans, drainageways, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Long and narrow or irregular
Size of areas: Less than 4 acres

## Composition

Thunder soil and similar inclusions: 50 percent Saunook soil and similar inclusions: 30 percent Dissimilar inclusions: 20 percent

## Typical Profile

## Thunder

Surface layer:
0 to 8 inches-dark brown cobbly loam
Subsoil:
8 to 21 inches-strong brown very cobbly loam 21 to 52 inches-strong brown very cobbly sandy clay loam

Underlying material:
52 to 80 inches-strong brown extremely cobbly loamy sand

## Saunook

Surface layer:
0 to 10 inches-very dark brown silt loam
Subsoil:
10 to 15 inches-dark yellowish brown loam
15 to 38 inches-dark yellowish brown silt loam
38 to 50 inches-dark yellowish brown gravelly loam
50 to 99 inches-dark yellowish brown very cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class:Thunder-loamy with many rock fragments; Saunook-loamy
Permeability:Moderate in the surface layer and subsoil and moderately rapid in the underlying material
Available water capacity:Moderate
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion: Severe
Rock fragments on the surface: About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart
Organic matter content (surface layer): High or very high
Potential for 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 to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments in the Thunder soil; the potential for localized mass movement of soil material when the soils become saturated with water

## Minor Components

## Dissimilar inclusions:

- Soils that have seeps and springs or a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Random areas of rubble land
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels
- Somewhat poorly drained Cullowhee soils that are loamy in the upper part and that have strata with a high content of rock fragments at a depth of 20 to 40 inches, along stream channels
- Random areas of soils that have surface layers with less organic matter than the Thunder and Saunook soils and that have a thinner dark surface layer, in cropped fields or those with a cropping history
- Thunder and Saunook soils that have fewer stones and boulders on the surface
Similar inclusions:
- Thunder soils that have a surface layer of fine sandy loam or sandy loam
- Saunook soils that have a surface layer of fine 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 cultivated crops because of the very bouldery surface and the large amount of rock fragments in the Thunder soil. 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.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is not managed for ornamental crops.


## 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 watercontrol 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.
- 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-unsuited; 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.
- Stones and boulders are a problem during excavation.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Locating structures away from intermittent and perennial drainageways helps to minimize structural damage from overland flow of storm water.
- Installing a subsurface drainage system around
foundations helps to intercept water from seeps and springs.
- 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.
- 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.
- 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, and differential settling; Saunook-large stones, erodibility, seeps and springs, frost action, and low strength
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 Thunder soil is subject to uneven settling and may be unstable if not properly compacted.
- Permanently surfacing roads or using suitable subgrade or base material helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability:Thunder—unsuited; Saunook—suited
Management concerns: Large stones, erodibility, soil fertility, root disease, 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 Thunder soil.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 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 slow air drainage and frost pockets, late spring frost may 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.


## Interpretive Groups

Land capability classification:Thunder-6s; Saunook4 e

## TsD-Thunder-Saunook complex, 15 to 30 percent slopes, very bouldery

Setting<br>Landscape: Intermountain hills and low and intermediate mountains in the southern and southwestern parts of the county<br>Elevation range: 3,400 to 3,700 feet<br>Landform: Coves, colluvial fans, drainageways, and benches

Landform position:Head slopes, footslopes, and toeslopes
Shape of areas: Irregular or long and narrow
Size of areas: Less than 23 acres

## Composition

Thunder soil and similar inclusions: 50 percent
Saunook soil and similar inclusions: 30 percent
Dissimilar inclusions: 20 percent

## Typical Profile

## Thunder

Surface layer:
0 to 8 inches-dark brown cobbly loam
Subsoil:
8 to 21 inches-strong brown very cobbly loam
21 to 52 inches-strong brown very cobbly sandy clay loam
Underlying material:
52 to 80 inches-strong brown extremely cobbly loamy sand

## Saunook

Surface layer:
0 to 10 inches-very dark brown silt loam
Subsoil:
10 to 15 inches-dark yellowish brown loam
15 to 38 inches-dark yellowish brown silt loam
38 to 50 inches-dark yellowish brown gravelly loam
50 to 99 inches-dark yellowish brown very cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class:Thunder-loamy with many rock fragments; Saunook-loamy
Permeability:Moderate in the surface layer and subsoil and moderately rapid in the underlying material
Available water capacity:Moderate
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class: Strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion: Severe
Rock fragments on the surface: About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart
Organic matter content (surface layer): High or very high

Potential for 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 to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments in the Thunder soil; the potential for localized mass movement of soil material when the soils become saturated with water

## Minor Components

Dissimilar inclusions:

- Soils that have seeps and springs or a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Random areas of rubble land
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history
- Thunder and Saunook soils that have fewer stones and boulders on the surface
Similar inclusions:
- Thunder soils that have a surface layer of fine sandy loam or sandy loam
- Saunook soils that have a surface layer of fine 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 cultivated crops because of the very bouldery surface and the large amount of rock fragments in the Thunder soil. 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.


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is not managed for ornamental crops.


## 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 watercontrol 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.
- 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—unsuited; 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.
- Stones and boulders are a problem during excavation.
- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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-stones, slope, seeps and springs, and poor filtering capacity; Saunooklarge stones, slope, seeps and springs, and restricted permeability
Management measures and considerations:

- The local Health Department should be contacted for guidance on sanitary facilities.
- 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.
- 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, and differential settling; Saunook—large stones, slope, erodibility, seeps and springs, frost action, and low strength
Management measures and considerations:

- Stones and boulders are a problem during excavation.
- Designing roads on the contour and installing watercontrol structures, such as 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 Thunder soil is subject to uneven settling and may be unstable if not properly compacted.
- Permanently surfacing roads or using suitable subgrade or base material helps to improve soil
strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability:Thunder—unsuited; Saunook—suited
Management concerns:Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- This map unit is limited for lawns and landscaping because of the slope, very bouldery surface, and the high content of rock fragments in the Thunder soil. - Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 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 slow air drainage and frost pockets, late spring frost may 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.


## Interpretive Groups

Land capability classification:Thunder-6s; Saunook6 e

## TsE-Thunder-Saunook complex, 30 to 50 percent slopes, very bouldery

## Setting

Landscape: Intermountain hills and low and intermediate mountains in the southern and southwestern parts of the county
Elevation range: 2,700 to 3,800 feet

Landform: Coves, colluvial fans, drainageways, and benches
Landform position:Head slopes, footslopes, and toeslopes
Shape of areas: Oblong or irregular
Size of areas: Less than 8 acres

## Composition

Thunder soil and similar inclusions: 50 percent Saunook soil and similar inclusions: 30 percent Dissimilar inclusions: 20 percent

## Typical Profile

## Thunder

Surface layer:
0 to 8 inches-dark brown cobbly loam

## Subsoil:

8 to 21 inches-strong brown very cobbly loam
21 to 52 inches-strong brown very cobbly sandy clay loam

Underlying material:
52 to 80 inches-strong brown extremely cobbly loamy sand

## Saunook

Surface layer:
0 to 10 inches-very dark brown silt loam

## Subsoil:

10 to 15 inches-dark yellowish brown loam
15 to 38 inches-dark yellowish brown silt loam
38 to 50 inches-dark yellowish brown gravelly loam
50 to 99 inches-dark yellowish brown very cobbly sandy loam

## Soil Properties and Qualities

Depth class:Very deep
Drainage class:Well drained
General texture class:Thunder-loamy with many rock fragments; Saunook-loamy
Permeability:Moderate in the surface layer and subsoil and moderately rapid in the underlying material
Available water capacity: Moderate
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential:Low
Slope class: Strongly sloping
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion: Severe
Rock fragments on the surface: About 3 percent stones and boulders that average about 10 to 48 inches in diameter and 10 to 65 feet apart

Organic matter content (surface layer): High or very high
Potential for 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 to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: More than 60 inches
Other distinctive properties: Random areas of seeps and springs; high content of rock fragments in the Thunder soil; the potential for localized mass movement of soil material when the soils become saturated with water

## Minor Components

## Dissimilar inclusions:

- Soils that have seeps and springs or a seasonal high water table at a depth of less than 6.0 feet, on toeslopes, in depressions, and in drainageways
- Random areas of rubble land
- Thunder and Saunook soils that have fewer stones and boulders on the surface


## Similar inclusions:

- Thunder soils that have a surface layer of fine sandy
loam or sandy loam
- Saunook soils that have a surface layer of fine 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 cultivated crops 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.


## Ornamental crops

Suitability: Unsuited
Management concerns:

- This map unit is not managed for ornamental crops.


## 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 watercontrol 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.
- 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—unsuited; Saunook—poorly suited Management concerns:Thunder-slope, erodibility, large stones, seeps and springs, and cutbanks cave; Saunook-slope, erodibility, large stones, 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 on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Stones and boulders are a problem during excavation.
- 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-slope, large stones, seeps and springs, and poor filtering capacity; Saunook-slope, large stones, seeps and springs, 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.
- 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.
- 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, and differential setting; Saunook—slope, erodibility, large stones, seeps and springs, frost action, and low strength
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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.
- 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 Thunder soil is subject to uneven settling and may be unstable if not properly compacted.
- Permanently surfacing roads or using suitable subgrade or base material helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

Suitability:Thunder—unsuited; Saunook—poorly suited Management concerns: Large stones, slope, erodibility, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- This map unit is limited for lawns and landscaping because of the slope, very bouldery surface, and the high content of rock fragments in the Thunder soil. - Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 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 slow air drainage and frost pockets, late spring frost may 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.


## Interpretive Groups

Land capability classification:Thunder-7s; Saunook7 e

## Ua-Udorthents, loamy

## Setting

Landscape: Intermountain hills and low and intermediate mountains dominantly in the central and southern parts of the county
Elevation range: 2,400 to 4,600 feet
Landform:Hillslopes, mountain slopes, ridges, coves, stream terraces, and flood plains
Landform position: Summits, side slopes, footslopes, toeslopes, and bottomland

Shape of areas: Irregular
Size of areas: 3 to 351 acres

## Composition

Udorthents: 85 percent
Dissimilar inclusions: 15 percent

## Typical Profile

Udorthents, loamy, consists of cut and fill areas where soil and underlying material has been removed and placed on an adjacent site. Areas include highway right-of-way corridors, building sites, landfills, borrow pits, recreational areas such as ball fields, and small mica and feldspar mines. A typical pedon is not given due to the variable nature of the soil.

## Soil Properties and Qualities

Note: Properties are variable and dependent on the type of fill material used or the type of material exposed in the cut area.
Depth class: Deep or very deep
Drainage class: Somewhat excessively drained to moderately well drained
General texture class: Loamy
Permeability:Very rapid to slow
Available water capacity:Low or moderate
Depth to seasonal high water table:Variable, commonly more than 6.0 feet from January through December
Hazard of flooding:Variable, commonly none or rare throughout the year with standing water for less than 2 days
Shrink-swell potential: Low
Slope class: Nearly level to moderately steep; sides of excavations can be very steep to nearly vertical
Hazard of water erosion: Moderate to very severe
Rock fragments on the surface: Widely scattered cobbles and stones that average about 3 to 24 inches in diameter and more than 100 feet apart Organic matter content (surface layer):Very low or low
Potential for 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 or when material becomes saturated with rainwater or runoff; soils are highly erosive and subject to differential settling if not properly compacted, vegetated, and protected from surface runoff

## Minor Components

Dissimilar inclusions:

- Urban land
- Areas that contain asphalt, wood, glass, and other waste material
- Areas of undisturbed soils around the edge of map unit delineations
- Areas 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 along stream channels that are frequently to rarely flooded
- Areas that are somewhat poorly drained or poorly drained


## 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 cultivated crops because of the highly variable soil properties. A site on better suited soils should be selected.


## Pasture and hayland

Suitability: Poorly suited
Management concerns: Highly disturbed soils Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Ornamental crops

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of the highly variable soil properties. A site on better suited soils should be selected.


## Woodland Management and Productivity

## Potential for commercial species: Undetermined Suitability: Poorly suited

Management concerns: Highly disturbed soils
Management measures and considerations:

- An onsite investigation is needed to determine the
suitability and limitations of any area within this map unit.
- Planting the appropriate species, as recommended by a forester, helps to achieve maximum productivity and ensure planting success.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Erodibility and highly disturbed soils
Management measures and considerations:

- This map unit is severely limited for dwellings and small commercial buildings because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

## Suitability: Unsuited

Management concerns:

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


## Local roads and streets

Suitability: Poorly suited
Management concerns: Erodibility and highly disturbed soils
Management measures and considerations:

- This map unit is severely limited for roads and streets because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns: Erodibility and highly disturbed soils
Management measures and considerations:

- This map unit is severely limited for lawns and landscaping because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are
susceptible to phytophthora root disease. These areas should be avoided.


## Interpretive Groups

Land capability classification:7e

## UdC—Udorthents-Urban land complex, 2 to 15 percent slopes

## Setting

Landscape:Intermountain hills and low, intermediate, and high mountains throughout the county
Elevation range: 2,700 to 5,000 feet
Landform:Variable
Landform position:Variable
Shape of areas: Irregular
Size of areas: 2 to 100 acres
Composition
Udorthents: 60 percent
Urban land: 30 percent
Dissimilar inclusions: 10 percent

## Typical Profile

## Udorthents

Udorthents consists of borrow areas and cut and fill areas where the soil and underlying material have been removed and placed on an adjacent site. A typical pedon is not given due to the variable nature of the soil.

## Urban land

Urban land consists of impervious areas created by the construction of buildings, roads, and parking lots.

## Soil Properties and Qualities

Note: Properties are variable and dependent on the type of fill material used or the type of material exposed in cut areas.

Depth class:Variable, predominantly very deep
Drainage class: Predominantly well drained, ranging to poorly drained
General texture class: Loamy
Permeability:Very rapid to slow
Depth to seasonal high water table:Variable, commonly more than 6.0 feet
Hazard of flooding:Variable, commonly none
Shrink-swell potential:Low
Slope class: Nearly level to moderately steep; sides of excavations can be very steep to nearly vertical
Hazard of water erosion: Moderate to very severe

Rock fragments on the surface:Variable, commonly none
Organic matter content (surface layer):Very low or low
Potential for frost action: Low or moderate
Soil reaction: Extremely acid to slightly acid, except where the surface has been limed
Parent material: Loamy fill material
Depth to bedrock: Predominantly more than 60 inches
Other distinctive properties: Udorthents are subject to downslope movement when lateral support is removed or when material becomes saturated with rainwater or runoff; soils are highly erosive and subject to differential settling if not properly compacted, vegetated, and protected from surface runoff; Urban land is subject to very rapid runoff

## Minor Components

Dissimilar inclusions:

- Areas that contain asphalt, wood, glass, and other waste material
- Areas of undisturbed soils around the edge of map unit delineations
- Areas that have bedrock at a depth of less than 60 inches
- Areas that have slopes of more than 15 percent
- Areas that have high water tables at a depth of less than 60 inches
- Pits or excavations that are filled with water
- Areas along stream channels that are frequently to rarely flooded


## Land Use

Dominant Uses: Buildings with parking lots, schools, highway right-of-way corridors, and abandoned or active mines

## Agricultural Development

## Cropland

Suitability:Unsuited Management concerns:

- This map unit is severely limited for cultivated crops because of the highly variable soil properties. A site on better suited soils should be selected.


## Pasture and hayland

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for pasture and hayland because of the highly variable soil properties. A site on better suited soils should be selected.


## Ornamental crops

Suitability:Unsuited

## Management concerns:

- This map unit is severely limited for ornamental crops because of the highly variable soil properties. A site on better suited soils should be selected.


## Woodland Management and Productivity

Potential for commercial species: Not used Suitability: Unsuited to commercial production Management concerns:

- This map unit is severely limited for commercial woodland management because of urban land use and highly variable soil properties. A site on better suited soils should be selected.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns:

- This map unit is severely limited for dwellings because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Septic tank absorption fields

Suitability:Unsuited
Management concerns:

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


## Local roads and streets

Suitability: Poorly suited

## Management concerns:

- This map unit is severely limited for local roads and streets because of the highly variable soil properties. - An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:

- This map unit is severely limited for lawns and landscaping because of the highly variable soil properties.
- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.


## Interpretive Groups

Land capability classification:Udorthents-7e; Urban land-8s

## UnD—Unaka-Porters complex, 15 to 30 percent slopes, very rocky

## Setting

Landscape: Intermediate mountains throughout the county
Elevation range: 3,600 to 4,600 feet
Landform: Mountain ridges
Landform position: Summits and upper side slopes
Shape of areas:Long and narrow or irregular
Size of areas: 2 to 50 acres

## Composition

Unaka soil and similar inclusions: 60 percent
Porters soil and similar inclusions: 25 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Unaka

Surface layer:
0 to 7 inches-dark brown gravelly fine sandy loam
Subsoil:
7 to 14 inches—dark yellowish brown gravelly sandy loam

## Underlying material:

14 to 21 inches-gravelly sandy loam that is multicolored in shades of brown and yellow

## Bedrock:

21 to 25 inches-soft weathered, moderately fractured gneiss
25 to 30 inches-hard unweathered, slightly fractured gneiss

## Porters

Surface layer:
0 to 2 inches-dark brown gravelly loam
2 to 9 inches-dark yellowish brown gravelly loam
Subsoil:
9 to 30 inches-dark yellowish brown loam
Underlying material:
30 to 40 inches-dark yellowish brown fine sandy loam
40 to 54 inches-gravelly sandy loam saprolite that is multicolored in shades of brown

## Bedrock:

54 to 62 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class:Unaka-moderately deep; Porters—deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity:Unaka-low;Portersmoderate
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 cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Extent of rock outcrop: About 3 percent rock outcrop on the soil surface; rocks are highly variable in size
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Unaka-very strongly acid or strongly acid, except where the surface has been limed; Porters-very strongly acid to slightly acid, except where the surface has been limed
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
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: Unaka-20 to 40 inches to hard bedrock; Porters-40 to 60 inches to hard bedrock
Other distinctive properties:Water movement along bedrock contacts in areas of the Unaka soil

## Minor Components

Dissimilar inclusions:

- Saunook soils that have bedrock at a depth of more than 60 inches, in saddles and gaps and in concave areas at the head of drains
- Plott soils that have bedrock at a depth of more than

60 inches, on the smoother parts of the landscape

- Chestnut and Buladean soils that have thinner surface layers than the Unaka and Porters soils and
have soft bedrock at a depth of 20 to 60 inches, on south- to west-facing slopes
- Ashe soils that have thinner surface layers than the

Unaka and Porters soils and have hard bedrock at a depth of 20 to 40 inches, on south- to west-facing slopes

- Random areas of soils that have more mica in the subsoil than the Unaka and Porters soils
- Prominent areas at the higher elevations that are windswept


## Similar inclusions:

- Unaka soils that have a sandy loam or loam surface layer
- Porters soils that have a surface layer of sandy loam or fine sandy loam


## Land Use

Dominant Uses: Woodland
Other Uses: Fraser fir production and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns:Unaka-equipment use, erodibility, pesticide retention, soil fertility, and rooting depth; Porters-equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- This map unit is difficult to manage for pasture and hayland because the rock outcrops, surface stones, and slope limit equipment use.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Unaka soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns:Unaka-equipment use, erodibility, pesticide retention, climate, ball and burlap harvesting, soil fertility, rooting depth, and droughtiness; Porters-equipment use, erodibility, pesticide retention, climate, ball and burlap harvesting, and soil fertility
Management measures and considerations:

- This map unit may be difficult to manage for ornamental crops because the rock outcrops, surface stones, and slope limit equipment use.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Unaka soil is difficult to manage for ornamental crops.
- 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:Unaka-erodibility, equipment use, rock outcrops, and windthrow hazard; Porters-erodibility, equipment use, and rock outcrops
Management measures and considerations:

- Productivity is limited in areas of the Unaka soil because of the restricted rooting depth and windthrow hazard.
- Designing roads on the contour, installing watercontrol 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.
- 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.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, depth to
bedrock, rock outcrops, 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 on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Unaka soil.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

## Suitability: Poorly suited

## 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: Poorly suited
Management concerns: Slope, erodibility, depth to bedrock, rock outcrops, frost action, and seeps and springs
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing watercontrol structures, such as 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 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:Unaka-slope, erodibility, soil fertility, climate, pesticide retention, depth to bedrock, and droughtiness; Porters-slope, erodibility, soil fertility, climate, and pesticide retention
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because the rock outcrops, surface stones, and slope limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- 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.
- 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

## UnE-Unaka-Porters complex, 30 to 50 percent slopes, very rocky

## Setting

Landscape: Intermediate mountains throughout the county
Elevation range: 3,600 to 4,600 feet
Landform: Mountain slopes and ridges

Landform position: Side slopes and summits
Shape of areas: Irregular
Size of areas: 2 to 250 acres

## Composition

Unaka soil and similar inclusions: 70 percent
Porters soil and similar inclusions: 15 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Unaka

Surface layer:
0 to 7 inches-dark brown gravelly fine sandy loam
Subsoil:
7 to 14 inches—dark yellowish brown gravelly sandy loam

Underlying material:
14 to 21 inches-gravelly sandy loam that is multicolored in shades of brown and yellow

## Bedrock:

21 to 25 inches-soft weathered, moderately fractured gneiss
25 to 30 inches-hard unweathered, slightly fractured gneiss

## Porters

Surface layer:
0 to 2 inches-dark brown gravelly loam
2 to 9 inches-dark yellowish brown gravelly loam
Subsoil:
9 to 30 inches-dark yellowish brown loam

## Underlying material:

30 to 40 inches-dark yellowish brown fine sandy loam
40 to 54 inches-gravelly sandy loam saprolite that is multicolored in shades of brown

## Bedrock:

54 to 62 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class:Unaka—moderately deep; Porters—deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Unaka-low; Portersmoderate
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 cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Extent of rock outcrop: About 5 percent rock outcrop on the soil surface; rocks are highly variable in size
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Unaka-very strongly acid or strongly acid, except where the surface has been limed; Porters-very strongly acid to slightly acid, except where the surface has been limed
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
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: Unaka-20 to 40 inches to hard bedrock; Porters-40 to 60 inches to hard bedrock
Other distinctive properties:Water movement along bedrock contacts in areas of the Unaka soil

## Minor Components

Dissimilar inclusions:

- Saunook soils that have bedrock at a depth of more than 60 inches, in saddles, in drainageways, and in concave areas at the head of drains
- Cullasaja soils that have more rock fragments in the subsoil than the Unaka and Porters soils and have bedrock at a depth of more than 60 inches, in drainageways and below rock outcrops
- Plott soils that have bedrock at a depth of more than 60 inches, on the smoother parts of the landscape - Chestnut and Buladean soils that have thinner surface layers than the Unaka and Porters soils and have soft bedrock at a depth of 20 to 60 inches, on south- to west-facing slopes
- Ashe soils that have thinner surface layers than the Unaka and Porters soils and have hard bedrock at a depth of 20 to 40 inches, on south- to west-facing slopes
- Random areas of soils that have more mica in the subsoil than the Unaka and Porters soils
- Prominent areas at the higher elevations that are windswept

Similar inclusions:

- Unaka soils that have a sandy loam or loam surface layer
- Porters soils that have a surface layer of sandy loam or fine sandy loam


## Land Use

Dominant Uses: Woodland (fig. 11)
Other Uses: Fraser fir production and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Pasture and hayland

Suitability for pasture: Poorly suited Suitability for hayland: Unsuited
Management concerns:Unaka-equipment use, erodibility, pesticide retention, soil fertility, rooting depth, and droughtiness; Porters-equipment use, erodibility, pesticide retention, and soil fertility Management measures and considerations:

- This map unit is difficult to manage for pasture and hayland because the rock outcrops, surface stones, and slope limit equipment use.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Unaka soil is difficult to manage for pasture and hayland.


## Ornamental crops

## Suitability: Poorly suited

Management concerns:Unaka-slope, equipment use, erodibility, pesticide retention, climate, soil fertility, rooting depth, and droughtiness; Porters-slope,


Figure 11.-An area of Unaka-Porters complex, 30 to 50 percent slopes, very rocky. This map unit is primarily managed for woodland. Careful planning and selecting routes around rock outcrops and stones are needed when harvesting trees.
equipment use, erodibility, pesticide retention, climate, and soil fertility
Management measures and considerations:

- This map unit is difficult to manage for ornamental crops because the rock outcrops, surface stones, and slope limit equipment use.
- These soils are marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.
- Because of the low available water capacity and windthrow hazard caused by the moderately deep rooting depth, the Unaka soil is difficult to manage for ornamental crops.
- 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: Unaka-equipment use, rock outcrops, erodibility, and windthrow hazard; Porters-equipment use, rock outcrops, and erodibility
Management measures and considerations:

- Productivity is limited in areas of the Unaka soil because of the restricted rooting depth and windthrow hazard.
- 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 watercontrol 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.
- 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.


## Urban Development

## Dwellings

Suitability: Poorly suited
Management concerns: Slope, erodibility, depth to bedrock, rock outcrops, 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 on the contour with the natural slope or building in the less sloping areas helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Drilling and blasting of rock or special earthmoving equipment is needed to increase the depth of the Unaka soil.
- Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Using corrosion-resistant materials helps to reduce the risk of damage to concrete.


## Septic tank absorption fields

## Suitability: Poorly suited

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: Poorly suited
Management concerns: Slope, erodibility, depth to bedrock, rock outcrops, frost action, and seeps and springs
Management measures and considerations:

- An onsite investigation is needed to determine the suitability and limitations of any area within this map unit.
- Designing roads on the contour and installing water-
control structures, such as 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 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:Unaka-slope, erodibility, soil fertility, climate, pesticide retention, depth to bedrock, and droughtiness; Porters-slope, erodibility, soil fertility, climate, and pesticide retention
Management measures and considerations:

- This map unit is difficult to manage for lawns and landscaping because the rock outcrops, surface stones, and slope limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating help to establish lawns and landscape plants.
- Topsoil should be stockpiled from disturbed areas and replaced before landscaping.
- 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.
- 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.
- 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

## UnF—Unaka-Porters complex, 50 to 95 percent slopes, very rocky

## Setting

Landscape: Intermediate mountains throughout the county
Elevation range: 3,600 to 4,600 feet
Landform:Mountain slopes
Landform position: Side slopes
Shape of areas: Irregular
Size of areas: 2 to 500 acres

## Composition

Unaka soil and similar inclusions: 70 percent Porters soil and similar inclusions: 15 percent
Dissimilar inclusions: 15 percent

## Typical Profile

## Unaka

Surface layer:
0 to 7 inches-dark brown gravelly fine sandy loam

## Subsoil:

7 to 14 inches-dark yellowish brown gravelly sandy loam

## Underlying material:

14 to 21 inches-gravelly sandy loam that is multicolored in shades of brown and yellow

## Bedrock:

21 to 25 inches-soft weathered, moderately fractured gneiss
25 to 30 inches-hard unweathered, slightly fractured gneiss

## Porters

## Surface layer:

0 to 2 inches-dark brown gravelly loam
2 to 9 inches-dark yellowish brown gravelly loam

## Subsoil:

9 to 30 inches-dark yellowish brown loam

## Underlying material:

30 to 40 inches-dark yellowish brown fine sandy loam
40 to 54 inches-gravelly sandy loam saprolite that is multicolored in shades of brown

## Bedrock:

54 to 62 inches-hard unweathered, slightly fractured amphibolite

## Soil Properties and Qualities

Depth class:Unaka-moderately deep;Porters—deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity: Unaka-low; Portersmoderate
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 cobbles that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Extent of rock outcrop: About 5 percent rock outcrop on the soil surface; rocks are highly variable in size
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction:Unaka-very strongly acid or strongly acid, except where the surface has been limed; Porters-very strongly acid to slightly acid, except where the surface has been limed
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
Parent material: Residuum weathered from felsic to mafic, high-grade metamorphic or igneous rock
Depth to bedrock: Unaka-20 to 40 inches to hard bedrock; Porters-40 to 60 inches to hard bedrock
Other distinctive properties:Water movement along bedrock contacts in areas of the Unaka soil

## Minor Components

## Dissimilar inclusions:

- Cullasaja soils that have more rock fragments in the subsoil than the Unaka and Porters soils and have bedrock at a depth of more than 60 inches, in drainageways and below rock outcrops
- Plott soils that have bedrock at a depth of more than 60 inches, on the smoother parts of the landscape
- Chestnut and Buladean soils that have thinner
surface layers than the Unaka and Porters soils and have soft bedrock at a depth of 20 to 60 inches, on south- to west-facing slopes
- Ashe soils that have thinner surface layers than the Unaka and Porters soils and have hard bedrock at a depth of 20 to 40 inches, on south- to west-facing slopes
- Prominent areas at the higher elevations that are windswept


## Similar inclusions:

- Unaka soils that have a sandy loam or loam surface layer
- Porters soils that have a surface layer of sandy loam or fine sandy loam


## Land Use

Dominant Uses: Woodland

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

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


## Ornamental crops

Suitability: Unsuited

## Management concerns:

- This map unit is severely limited for 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: Unaka-equipment use, rock outcrops, erodibility, and windthrow hazard; Porters-equipment use, rock outcrops, and erodibility
Management measures and considerations:

- Productivity is limited in areas of the Unaka soil because of the restricted rooting depth and windthrow hazard.
- Using cable logging methods helps to overcome
equipment limitations and prevents the acceleration of erosion caused by road construction, 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, 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, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Interpretive Groups
Land capability classification: 7e

## UoF-Unicoi-Rock outcrop complex, 30 to 95 percent slopes, extremely bouldery

## Setting

Landscape: Low and intermediate mountains in the east-central part of the county

Elevation range: 2,400 to 3,600 feet
Landform: Mountain ridges and slopes
Landform position: Summits and side slopes
Shape of areas: Irregular
Size of areas: 20 to 100 acres

## Composition

Unicoi soil and similar inclusions: 60 percent
Rock outcrop: 30 percent
Dissimilar inclusions: 10 percent

## Typical Profile

## Unicoi

Surface layer:
0 to 2 inches-very dark gray gravelly fine sandy loam
2 to 5 inches-dark brown gravelly fine sandy loam

## Subsoil:

5 to 19 inches-brownish yellow very cobbly sandy loam

Bedrock:
19 to 24 inches-hard unweathered, moderately fractured feldspathic metasandstone

## Rock outcrop

This part of the map unit predominantly consists of feldspathic metasandstone.

## Properties and Qualities of the Unicoi Soil

Depth class: Shallow
Drainage class: Excessively drained
General texture class: 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 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 5 percent stones and boulders that average about 24 to 48 inches in diameter and 3 to 10 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Extremely acid to strongly acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Depth to bedrock: 7 to 20 inches to hard bedrock

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

## Minor Components

Dissimilar inclusions:

- Random areas of Ditney soils that have hard bedrock at a depth of 20 to 40 inches
- Spivey and Northcove soils that have many rock fragments in the subsoil and have hard bedrock at a depth of more than 60 inches, in drainageways and on benches below rock outcrops
- Rubbly areas below rock outcrops and in drainageways


## Similar inclusions:

- Unicoi soils that have a sandy loam or loam surface layer
- Soils that have hard bedrock at a depth of less than 10 inches


## Land Use

Dominant Uses: Wildlife habitat
Other Uses: Recreation

## Agricultural Development

## Cropland

Suitability:Unsuited
Management concerns:

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


## Ornamental crops

Suitability: Unsuited
Management concerns:

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


## Woodland Management and Productivity

Potential for commercial species: Not used

Suitability: Unsuited to commercial production Management concerns:

- This map unit is severely limited for timber production because of the slope, depth to bedrock, windthrow hazard, 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, 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, depth to bedrock, and extent of rock outcrops. A site on better suited soils should be selected.

Interpretive Groups
Land capability classification: Unicoi-7s; Rock outcrop-8s

## W-Water

This map unit consists of ponds, lakes, and rivers. Depth and size of surface area vary. Examples of use
and management are recreation and municipal water sources.

This map unit is not assigned a land capability classification.

## WaC-Watauga sandy loam, 8 to 15 percent slopes, stony

Setting<br>Landscape: Intermountain hills and low and intermediate mountains predominantly in the southwestern part of the county<br>Elevation range: 2,700 to 3,800 feet<br>Landform: Hill and mountain ridges<br>Landform position: Summits<br>Shape of areas: Oblong or irregular<br>Size of areas: 2 to 30 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 5 inches-dark yellowish brown sandy loam
Subsoil:
5 to 20 inches-strong brown clay loam
20 to 26 inches-strong brown loam
Underlying material:
26 to 45 inches-brownish yellow sandy loam saprolite
45 to 62 inches-yellowish brown and dark yellowish brown 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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart

Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction:Very strongly acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic rock that has 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:

- Soils that have soft bedrock at a depth of 20 to 60 inches, occurring randomly and on shoulder slopes
- Udorthents, loamy, and areas associated with small mica mines
- Saunook soils that have thicker surface layers with more organic matter and thicker subsoils than the Watauga soil, in saddles
- Random areas of Chandler soils that have less clay in the subsoil than the Watauga soil
- Random areas of Edneytown soils that have less mica in the subsoil than the Watauga soil
- Soils that are moderately eroded or severely eroded
- Random areas of soils that have more clay in the subsoil than the Watauga soil


## Similar inclusions:

- Watauga soils that have a surface layer of loam or fine sandy loam
- Random areas of Fannin soils that have red subsoils


## Land Use

Dominant Uses: Pasture, hayland, Fraser fir production, and woodland
Other Uses: Ornamental crops and building site development

## Agricultural Development

## Cropland

## Suitability: Suited

Management concerns: Equipment use, erodibility, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment 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 maximize crop productivity.


## Pasture and hayland

Suitability:Well suited
Management concerns: Equipment use, erodibility, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability: Suited

Management concerns: Equipment use, erodibility,
soil fertility, root disease, and ball and burlap harvesting
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- 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.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Avoiding ball and burlap harvesting during extreme moisture conditions helps to prevent fracture or deformation of the ball and tearing of the roots.


## Woodland Management and Productivity

Potential for commercial species: Moderate for upland hardwoods and high for eastern white pine
Suitability:Well suited
Management concerns: Erodibility and equipment use Management measures and considerations:

- This soil is highly erodible, 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 watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees roots 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Suited

Management concerns: Erodibility, soil fertility, root disease, and soil compaction
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.


## Interpretive Groups

Land capability classification: 4e

## WaD—Watauga sandy loam, 15 to 30 percent slopes, stony

Setting

Landscape: Intermountain hills and low and intermediate mountains predominantly in the southwestern part of the county
Elevation range: 2,700 to 3,800 feet
Landform: Hillslopes, mountain slopes, and ridges
Landform position: Summits and side slopes
Shape of areas: Long and narrow or irregular
Size of areas: 2 to 300 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 5 inches-dark yellowish brown sandy loam
Subsoil:
5 to 20 inches-strong brown clay loam
20 to 26 inches-strong brown loam
Underlying material:
26 to 45 inches-brownish yellow sandy loam saprolite
45 to 62 inches-yellowish brown and dark yellowish brown 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 stones and cobbles that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): Low to high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to moderately acid, except where the surface has been limed
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic rock that has 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:

- Soils that have soft bedrock at a depth of 20 to 60 inches, occurring randomly and on shoulder slopes
- Udorthents, loamy, and areas associated with small mica mines
- Saunook soils that have more clay in the subsoil than the Watauga soil 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 Chandler soils that have less clay
in the subsoil than the Watauga soil
- Random areas of Edneytown soils that have less mica in the subsoil than the Watauga soil
- Soils that are moderately eroded or severely eroded
- Random areas of soils that have more clay in the subsoil than the Watauga soil


## Similar inclusions:

- Watauga soils that have a surface layer of loam or fine sandy loam
- Random areas of Fannin soils that have a red subsoil


## Land Use

Dominant Uses: Pasture, hayland, Fraser fir production, and woodland
Other Uses: Ornamental crops and building site development

## Agricultural Development

## Cropland

Suitability: Poorly suited
Management concerns: Equipment use, erodibility, and soil fertility
Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because of erodibility and an equipment use limitation caused by the slope.
- 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 maximize crop productivity.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Equipment use, erodibility, and soil fertility
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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability: Suited

Management concerns: Equipment use, erodibility, soil fertility, ball and burlap harvesting, root disease, and plant shape
Management measures and considerations:

- This map unit may be difficult to manage for 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.
- Because of the restricted movement of air and water caused by the clay content of the subsoil, there is a potential for phytophthora root disease. As a result, this map unit is limited for the production of Fraser fir and other ornamentals.
- In areas where water concentrates, such as drainageways, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- The slope affects the shape of low-growing ornamentals on the uphill side.


## Woodland Management and Productivity

Potential for commercial species: Moderate for upland hardwoods and high for eastern white pine Suitability: Suited
Management concerns: Equipment use and erodibility Management measures and considerations:

- This soil is highly erodible, 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 watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees 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, 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 helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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: Slope, erodibility, low strength, 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 watercontrol structures, such as 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 helps to improve soil strength, allows year-round use, and helps to minimize damage from frost heaving.


## Lawns and landscaping

## Suitability: Poorly suited

Management concerns: Slope, erodibility, soil fertility, root disease, and soil compaction
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Using lime and fertilizer, mulching, and irrigating 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 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.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.


## Interpretive Groups

Land capability classification: 6e

# WbD-Wayah-Burton complex, windswept, 15 to 30 percent slopes, stony 

Setting<br>Landscape: High mountains in the western part of the county<br>Elevation range: 4,800 to 6,000 feet<br>Landform: Mountain ridges<br>Landform position: Summits and the upper side slopes<br>Shape of areas: Long and narrow or irregular<br>Size of areas: 5 to 50 acres

## Composition

Wayah soil and similar inclusions: 60 percent
Burton soil and similar inclusions: 20 percent
Dissimilar inclusions: 20 percent

## Typical Profile

## Wayah

## Surface layer:

0 to 4 inches-very dark brown clay loam
4 to 18 inches-black loam

## Subsoil:

18 to 26 inches-brown loam
26 to 41 inches-strong brown gravelly fine sandy loam
41 to 63 inches-strong brown fine sandy loam

## Underlying material:

63 to 77 inches-multicolored fine sandy loam saprolite

## Burton

Surface layer:
0 to 10 inches-very dark gray gravelly sandy loam 10 to 18 inches-black gravelly loam
Subsoil:
18 to 26 inches-yellowish brown gravelly loam
26 to 30 inches-yellowish brown cobbly loam

## Bedrock:

30 to 41 inches-unweathered, moderately fractured biotite hornblende gneiss

## Soil Properties and Qualities

Depth class:Wayah—very deep; Burton—moderately deep

Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity:Wayah—moderate; Burtonvery 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 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to high winds, frigid climatic conditions, and rime ice in winter; high amounts of rainfall; and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock:Wayah-more than 60 inches; Burton-20 to 40 inches to hard bedrock
Other distinctive properties: Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

## Minor Components

## Dissimilar inclusions:

- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas of 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
- Colluvial soils that have loamy subsoils and have bedrock at a depth of more than 60 inches, in concave areas at the heads of drains and in saddles


## Similar inclusions:

- Wayah soils that have a surface layer of sandy loam or fine sandy loam
- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Random areas of soils that have bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Woodland, wildlife habitat, and recreation

Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability: Unsuited
Management concerns:

- This map unit is severely limited for cultivated crops 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: Suited
Suitability for hayland: Poorly suited
Management concerns:Wayah-equipment use, erodibility, climate, pesticide retention, and soil fertility; Burton-equipment use, erodibility, climate, pesticide retention, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- This map unit is limited for pasture and hayland because of the slope, erodibility, damaging high winds, and short growing season.
- 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 helps to maintain pastures and increase productivity.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Burton soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns:

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


## Woodland Management and Productivity

Potential for commercial species: Not used

Suitability:Unsuited to commercial production Management concerns:

- This map unit is severely limited for timber production because of damaging high winds, a short growing season, 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:Wayah—slope, erodibility, climate, corrosivity, seeps and springs, and cutbanks cave; Burton-slope, erodibility, climate, corrosivity, seeps and springs, and depth to bedrock
Management measures and considerations:

- Designing structures on the contour with the natural slope helps to improve soil performance.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Design modifications may be needed to overcome high winds and frigid climatic conditions.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete. - Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Installing permanent retaining walls helps to improve soil stability.
- 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, climate, and seeps and springs; Burton-slope, climate, 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 may be needed to overcome frigid climatic conditions.
- 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, frost action, and seeps and springs; Burton-slope, erodibility, frost action, seeps and springs, and depth to bedrock
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from
seeps and springs helps to stabilize cut and fill slopes.
- Blasting or special grading equipment may be needed for the construction of roads in areas of the Burton soil.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:Wayah—slope, erodibility, climate, pesticide retention, and soil fertility; Burton-slope, erodibility, climate, pesticide retention, soil fertility, and depth to bedrock Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Because of a short growing season, the use of native, winter-hardy landscape plants is recommended. - This map unit is subject to damaging high winds and may be unsuitable for some types of landscaping.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness. - Using lime and fertilizer, mulching, and irrigating 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

## WcE-Wayah-Burton complex, windswept, 30 to 50 percent slopes, very stony

Setting<br>Landscape: High mountains in the western part of the county<br>Elevation range: 4,200 to 6,000 feet<br>Landform: Mountain slopes<br>Landform position: Side slopes<br>Shape of areas: Irregular<br>Size of areas: Less than 14 acres

## Composition

Wayah soil and similar inclusions: 60 percent Burton soil and similar inclusions: 20 percent Dissimilar inclusions: 20 percent

## Typical Profile

## Wayah

Surface layer:
0 to 4 inches-very dark brown clay loam
4 to 18 inches-black loam
Subsoil:
18 to 26 inches-brown loam
26 to 41 inches—strong brown gravelly fine sandy
loam
41 to 63 inches-strong brown fine sandy loam
Underlying material:
63 to 77 inches-multicolored fine sandy loam saprolite

## Burton

Surface layer:
0 to 10 inches-very dark gray gravelly sandy loam
10 to 18 inches-black gravelly loam
Subsoil:
18 to 26 inches-yellowish brown gravelly loam
26 to 30 inches-yellowish brown cobbly loam
Bedrock:
30 to 41 inches-unweathered, moderately fractured biotite hornblende gneiss

## Soil Properties and Qualities

Depth class:Wayah—very deep; Burton—moderately deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity:Wayah—moderate; Burtonvery low
Depth to seasonal high water table: More than 6.0 feet
Hazard of flooding: None
Shrink-swell potential: Low
Slope class: Steep
Extent of erosion: Slight, less than 25 percent of the original surface layer has been removed
Hazard of water erosion:Very severe
Rock fragments on the surface: About 3 percent stones and boulders that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to high winds, frigid climatic conditions, and rime ice in winter; high amounts of rainfall; and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock:Wayah—more than 60 inches; Burton-20 to 40 inches to hard bedrock
Other distinctive properties: Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

## Minor Components

## Dissimilar inclusions:

- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas of 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
- Soils that formed in colluvium, have loamy subsoils, 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
- Random areas that are protected from high winds


## Similar inclusions:

- Wayah soils that have a surface layer of fine sandy loam or sandy loam
- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Random areas of soils that have bedrock at a depth of 40 to 60 inches


## Land Use

Dominant Uses: Woodland, wildlife habitat, and recreation
Other Uses: Pasture, Fraser fir production, and building site development

## Agricultural Development

## Cropland

Suitability:Unsuited Management concerns:

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


## Pasture and hayland

Suitability for pasture: Poorly suited Suitability for hayland: Unsuited
Management concerns:Wayah-equipment use, erodibility, climate, pesticide retention, and soil fertility; Burton-equipment use, erodibility, climate, pesticide retention, soil fertility, rooting depth, and droughtiness
Management measures and considerations:

- This map unit is limited for pasture and hayland because of the slope, erodibility, very stony surface, damaging high winds, and short growing season. - Using a rotational grazing system and removing livestock in time to allow forage plants to recover before winter dormancy helps to maintain pastures and increase productivity.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases their effectiveness.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximizes productivity.
- Because of the low available water capacity caused by the moderately deep rooting depth, the Burton soil is difficult to manage for pasture and hayland.


## Ornamental crops

Suitability: Poorly suited
Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, erodibility, very stony surface, damaging high winds, short growing season,
and the depth to bedrock and droughtiness in areas of the Burton soil. A site on better suited soils should be selected.
- These soils are marginally suited to Fraser fir production. Clearing and converting forestland to Fraser fir production would create a severe erosion potential, reduces suitability, and is not recommended.


## Woodland Management and Productivity

## Potential for commercial species: Not used Suitability:Unsuited to commercial production Management concerns: <br> - This map unit is severely limited for timber production because of damaging high winds, a short growing season, 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:Wayah—slope, erodibility, climate, corrosivity, seeps and springs, large stones, and cutbanks cave; Burton-slope, erodibility, climate, corrosivity, seeps and springs, large stones, 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Design modifications may be needed to overcome high winds and frigid climatic conditions.
- Using corrosion-resistant materials helps to reduce the risk of damage to uncoated steel and concrete. - Installing a subsurface drainage system around foundations helps to intercept water from seeps and springs.
- Installing permanent retaining walls helps to improve soil stability.
- 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, climate, and seeps and springs; Burton-slope, climate, 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 may be needed to overcome frigid climatic conditions.
- 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, frost action, and seeps and springs;Burton-slope, erodibility, frost action, seeps and springs, and depth to bedrock
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to minimize damage from frost heaving.
- Intercepting and diverting underground water from seeps and springs helps to stabilize cut and fill slopes.
- Blasting or special grading equipment may be needed for the construction of roads in areas of the Burton soil.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:Wayah—slope, erodibility, climate, pesticide retention, and soil fertility; Burton-slope, erodibility, climate, pesticide retention, soil fertility, depth to bedrock, and droughtiness
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Because of a short growing season, the use of native, winter-hardy landscape plants is recommended. - This map unit is subject to damaging high winds and may be unsuitable for some types of landscaping.
- These soils may retain soil-applied herbicides and other pesticides due to the high content of organic matter in the surface layer. The concentration of pesticides may be damaging to landscape plants. Using pesticides that are applied to the plant rather than the soil may increase their effectiveness.
- Using lime and fertilizer, mulching, and irrigating 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

## WcF-Wayah-Burton complex, windswept, 50 to 95 percent slopes, very stony

Setting<br>Landscape: High mountains in the western part of the county<br>Elevation range: 4,200 to 5,200 feet<br>Landform: Mountain slopes<br>Landform position: Side slopes<br>Shape of areas: Irregular<br>Size of areas: Less than 113 acres

## Composition

Wayah soil and similar inclusions: 60 percent Burton soil and similar inclusions: 20 percent
Dissimilar inclusions: 20 percent

## Typical Profile

## Wayah

Surface layer:
0 to 4 inches-very dark brown clay loam
4 to 18 inches-black loam
Subsoil:
18 to 26 inches-brown loam
26 to 41 inches-strong brown gravelly fine sandy loam
41 to 63 inches-strong brown fine sandy loam
Underlying material:
63 to 77 inches-multicolored fine sandy loam saprolite

## Burton

Surface layer:
0 to 10 inches-very dark gray gravelly sandy loam
10 to 18 inches-black gravelly loam

## Subsoil:

18 to 26 inches-yellowish brown gravelly loam
26 to 30 inches-yellowish brown cobbly loam

## Bedrock:

30 to 41 inches-unweathered, moderately fractured biotite hornblende gneiss

## Soil Properties and Qualities

Depth class:Wayah—very deep; Burton—moderately deep
Drainage class:Well drained
General texture class: Loamy
Permeability:Moderately rapid
Available water capacity:Wayah—moderate;Burtonvery 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 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer):Very high
Potential for frost action: Moderate
Soil reaction: Extremely acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soils subject to high winds, frigid climatic conditions, and rime ice in winter; high amounts of rainfall; and a short growing season
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Depth to bedrock:Wayah-more than 60 inches; Burton-20 to 40 inches to hard bedrock
Other distinctive properties: Random areas of seeps and springs; water movement along bedrock contacts in areas of the Burton soil

## Minor Components

## Dissimilar inclusions:

- Craggey soils that have hard bedrock at a depth of 10 to 20 inches, in areas of 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, in drainageways, and below rock outcrops
- Rubble land below rock outcrops

Similar inclusions:

- Wayah soils that have a surface layer of fine sandy
loam or sandy loam
- Burton soils that have a surface layer of sandy loam or fine sandy loam
- Random areas of 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 cultivated crops because of the slope, erodibility, very stony surface, damaging high winds, and short growing season. A site on better suited soils should be selected.


## Pasture and hayland

Suitability:Unsuited
Management concerns:

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


## Ornamental crops

Suitability:Unsuited
Management concerns:

- This map unit is severely limited for ornamental crops because of the slope, erodibility, very stony surface, damaging high winds, and short growing season and the depth to bedrock and droughtiness in areas 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 to commercial production Management concerns:

- This map unit is severely limited for timber production because of the slope, damaging high winds, short growing season, and the depth to bedrock in the Burton soil. 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, depth to bedrock, damaging high winds, and frigid climatic conditions. 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 in the Burton 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 the depth to bedrock in the Burton soil. 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, damaging high winds, short growing season, and the depth to bedrock in the Burton soil. A site on better suited soils should be selected.


## Interpretive Groups

Land capability classification:7e

## WhB—Whiteoak fine sandy loam, 2 to 8 percent slopes

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,000 to 4,200 feet
Landform: Coves, colluvial fans, and benches
Landform position: Footslopes, toeslopes, and saddles
Shape of areas: Irregular
Size of areas: 2 to 100 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 9 inches-very dark grayish brown fine sandy loam

## Subsoil:

9 to 12 inches-dark yellowish brown loam
12 to 30 inches-yellowish brown clay loam
30 to 55 inches-yellowish brown loam
55 to 62 inches-yellowish brown loam

## 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: 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 for frost action: Moderate
Soil reaction: Very strongly acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
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

## Minor Components

Dissimilar inclusions:

- Spivey soils that have a very stony surface and more rock fragments in the subsoil than the Whiteoak soil, occurring randomly and in drainageways
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi 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 have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Whiteoak soils that have a sandy loam or loam surface layer
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, Fraser fir production, and ornamental crops
Other Uses: Woodland and cropland

## 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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 increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides
instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

## Suitability:Well suited

Management concerns: Erodibility, climate, pesticide retention, 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.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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 northern hardwoods Suitability:Well suited
Management concerns: Erodibility and equipment use
Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 high content of organic matter in the surface layer and the clay content of the subsoil.
- Avoiding logging operations when the soil is wet prevents rutting of the soil surface and damage to trees 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 disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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.
- Stones and boulders are 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.
- Stones and boulders may be a problem during excavation.


## Local roads and streets

Suitability:Well suited
Management concerns: Low strength, erodibility, frost action, and seeps and springs
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve 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:Well suited
Management concerns: Erodibility, soil compaction, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


# Interpretive Groups <br> Land capability classification: $2 e$ <br> <br> WkC-Whiteoak fine sandy loam, 8 to 15 <br> <br> WkC-Whiteoak fine sandy loam, 8 to 15 percent slopes, stony 

 percent slopes, stony}

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,000 to 4,200 feet
Landform: Coves, colluvial fans, saddles, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Irregular
Size of areas: 2 to 50 acres

## Composition

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

## Typical Profile

Surface layer:
0 to 9 inches-very dark grayish brown fine sandy loam
Subsoil:
9 to 12 inches-dark yellowish brown loam
12 to 30 inches-yellowish brown clay loam
30 to 55 inches-yellowish brown loam
55 to 62 inches-yellowish brown loam

## 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 stones and boulders that average about 10 to 24 inches in diameter and 25 to 75 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction:Very strongly acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to slow air
drainage, which allows late spring and early fall frosts
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

## Minor Components

## Dissimilar inclusions:

- Spivey soils that have a very stony surface and have more rock fragments in the subsoil than the Whiteoak soil, in drainageways
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi 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 have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Whiteoak soils that have a sandy loam or loam surface layer
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, Fraser fir production, ornamental crops, and cropland
Other Uses: Building site development and woodland

## Agricultural Development

## Cropland

## Suitability: Suited

Management concerns: Equipment use, erodibility, tilth, pesticide retention, soil fertility, and climate Management measures and considerations:

- The slope may limit the use of equipment 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.
- 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may 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 the use of equipment in the steeper areas.
- Preparing seedbeds on the contour or across the slope helps to minimize soil erosion and increases germination.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 helps to maintain pastures and increase productivity.


## Ornamental crops

Suitability:Well suited
Management concerns: Equipment use, erodibility, climate, pesticide retention, root disease, and soil fertility
Management measures and considerations:

- The slope may limit the use of equipment in the steeper areas.
- Establishing and maintaining sod between rows and on access roads helps to reduce the hazard of erosion.
- Because of slow air drainage and frost pockets, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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 northern hardwoods

## Suitability:Well suited

Management concerns: Erodibility and equipment use Management measures and considerations:

- Designing roads on the contour, installing watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees 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: Erodibility, seeps and springs, corrosivity, and large stones
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil 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.
- Stones and boulders may be a problem during excavation.


## Septic tank absorption fields

## Suitability: Suited

Management concerns: Slope, restricted permeability, 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.
- Stones and boulders may be a problem during excavation.


## Local roads and streets

## Suitability: Suited

Management concerns: Erodibility, low strength, frost action, and seeps and springs
Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve 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, soil compaction, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and
using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


## Interpretive Groups

Land capability classification: 4 e

## WtD—Whiteoak fine sandy loam, 15 to 30 percent slopes, very stony

## Setting

Landscape: Intermediate mountains in the central and northeastern parts of the county
Elevation range: 3,000 to 4,200 feet
Landform: Coves, colluvial fans, and benches
Landform position: Footslopes and toeslopes
Shape of areas: Irregular
Size of areas: 2 to 30 acres

## Composition

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

## Typical Profile

## Surface layer:

0 to 9 inches-very dark grayish brown fine sandy loam

## Subsoil:

9 to 12 inches-dark yellowish brown loam
12 to 30 inches-yellowish brown clay loam

30 to 55 inches-yellowish brown loam 55 to 62 inches-yellowish brown loam

## 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: About 3 percent stones and boulders that average about 10 to 24 inches in diameter and 3 to 25 feet apart
Organic matter content (surface layer): High or very high
Potential for frost action: Moderate
Soil reaction: Very strongly acid to moderately acid, except where the surface has been limed
Special climatic conditions: Soil subject to slow air drainage, which allows late spring and early fall frosts
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

## Minor Components

Dissimilar inclusions:

- Spivey soils that have more rock fragments in the subsoil than the Whiteoak soil, in drainageways
- Somewhat poorly drained Cullowhee and poorly drained Nikwasi 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 have a seasonal high water table at a depth of less than 6.0 feet, in depressions and on toeslopes
- Areas that are occasionally or rarely flooded for very brief periods, along stream channels


## Similar inclusions:

- Whiteoak soils that have a sandy loam or loam surface layer
- Random areas of soils that have a surface layer with less organic matter and a thinner dark surface layer, in cropped fields or those with a cropping history


## Land Use

Dominant Uses: Pasture, hayland, and woodland Other Uses: Fraser fir production, ornamental crops, and building site development

## Agricultural Development

## Cropland

Suitability: Poorly suited
Management concerns: Equipment use, erodibility,
tilth, pesticide retention, soil fertility, and climate
Management measures and considerations:

- This map unit is difficult to manage for cultivated crops because the slope and very stony surface limit 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.
- 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.
- Applying lime and fertilizer according to recommendations based on soil tests helps to increase the availability of plant nutrients and maximize crop productivity.
- Because of slow air drainage, late spring frost may damage new growth in some years.


## Pasture and hayland

Suitability for pasture: Suited
Suitability for hayland: Poorly suited
Management concerns: Equipment use, erodibility, pesticide retention, and soil fertility
Management measures and considerations:

- The slope and very stony surface limit the use of equipment and may be hazardous.
- Fencing livestock away from creeks and streams helps to prevent streambank erosion and sedimentation.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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.


## Ornamental crops

Suitability:Suited
Management concerns: Equipment use, erodibility, climate, pesticide retention, root disease, soil fertility, and plant shape
Management measures and considerations:

- This map unit may be difficult to manage for ornamental crops because the slope and very stony surface limit 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.
- Because of slow air drainage, late spring frost may damage new growth in some years.
- Using plant-applied herbicides and other pesticides instead of soil-applied herbicides and other pesticides, which can be tied up by the organic matter in the surface layer, increases 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 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.
- The slope affects the shape of low-growing ornamentals on the uphill side.


## 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 watercontrol 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 when the soil is wet prevents rutting of the soil surface and damage to trees 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: Erodibility, slope, seeps and springs, and corrosivity
Management measures and considerations:

- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Designing structures that conform to the natural slope helps to improve soil performance.
- 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.
- Stones and boulders may be a problem during excavation.


## Septic tank absorption fields

## Suitability: Poorly suited

Management concerns: Slope, restricted permeability, 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.
- 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.
- Stones and boulders may be a problem during excavation.


## Local roads and streets

Suitability: Poorly suited
Management concerns: Slope, erodibility, low strength, frost action, seeps and springs, and large stones Management measures and considerations:

- Designing roads on the contour and installing watercontrol structures, such as 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 helps to improve 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.
- Stones and boulders may be a problem during excavation.


## Lawns and landscaping

Suitability: Poorly suited
Management concerns:Large stones, slope, erodibility, soil compaction, soil fertility, root disease, climate, and pesticide retention
Management measures and considerations:

- This map unit is difficult to manage for lawns and
landscaping because the slope and very stony surface limit equipment use.
- Designing plantings on natural contours helps to increase water infiltration and control runoff.
- Vegetating disturbed areas as soon as possible and using erosion-control structures, such as sediment fences and catch basins, help to maintain soil stability and keep eroding soil on site.
- Avoiding the use of heavy equipment in areas to be landscaped helps to prevent soil compaction.
- Using lime and fertilizer, mulching, and irrigating 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 ornamentals.
- In areas where water concentrates, Fraser fir and other ornamentals are susceptible to phytophthora root disease. These areas should be avoided.
- Because of slow air drainage, 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.


## Interpretive Groups

Land capability classification: 6e

## 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 in 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.

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 soil layers with a high content of rock fragments 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

Christine Vance, Soil Conservation Technician, Natural Resources Conservation Service, helped prepare this section.

General management concerns 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 Avery Soil and Water Conservation District, or the North Carolina Cooperative Extension Service.

Federal and State regulations require than 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 2002, according to the North Carolina Cooperative Extension Service of Avery County, the county had approximately 2,000 acres of cropland.

The major crops grown in Avery County include burley tobacco, vegetables, landscaping ornamentals, and Christmas trees. Row crops such as burley tobacco are grown mainly in the northern part of the county on upland soils (in areas of Edneytown and Edneyville soils), on flood plains (in areas of Rosman soils), on low stream terraces (in areas of Statler soils), and on toeslopes and in coves (in areas of Saunook soils). Ornamental crops are grown throughout the county on intermediate and low mountains and intermountain hills (in areas of Porters, Watauga, Cashiers, and Chandler soils), in coves (in areas of Saunook and Whiteoak soils), and on flood plains and low terraces (in areas of Rosman, Reddies, and Statler soils).

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 Avery 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 Avery County. It is a hazard on soils that have slopes of more than 2 percent. 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.

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. Avery County's trout streams are especially sensitive to damage caused by runoff and sediment.

Erosion-control practices provide a protective surface cover, minimize 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 increase the rate of water infiltration, minimizes runoff, and help 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 bottom land and low terraces are subject to flooding of varying frequencies and duration. Rosman sandy loam, Reddies, Nikwasi, and Cullowhee soils are frequently flooded (the chance of flooding is greater than 50 percent in any year); Rosman loam, Reddies, Dellwood, and Ostin soils are
occasionally flooded (the chance of flooding is 5 to 50 percent in any year); and Statler 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.

Cullowhee soils are on bottom land and may require artificial drainage. Wet areas resulting from seeps and springs occur in Statler, Saunook, and Whiteoak soils. These areas are commonly identified on the soil map by a "wet spot" symbol. Subsurface drainage tile and surface ditching are methods used to control water in these 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 Avery County on slopes of less than 3 percent commonly have better tilth than soils 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, increase 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 Fannin soils become cloddy if they are plowed outside a narrow range in moisture content.

Some flood plain soils in the survey area have poor tilth because of gravel in the surface layer. 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, Cullasaja, Spivey, and Northcove soils. In most cases the rock fragments prevent tillage.

Soil fertility.-The soils in Avery 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 (through applications of calcitic lime) or calcium and magnesium (through applications of 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 longterm 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.

Appropriate rates depend on the crop and the potential productivity of the soil. 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 and Reddies. 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 nontarget 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 13. Table 14 shows the general range of organic matter content of the surface layer.

In some areas, the organic matter content of a soil may be outside the range shown in table 14. 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, Whiteoak, 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 Fannin, may have enough clay in the surface layer to bind pesticides.

The wet conditions of Nikwasi and Cullowhee soils
and areas with seeps and springs may reduce the effectiveness of pesticides and allow the contamination of surface water and ground water. Saturated soils and areas with excess surface water from prolonged rains or irrigation can carry herbicides and other pesticides to surface waters. The contamination of surface water and ground water is also a concern for Rosman, Dellwood, and Reddies soils due to a high leaching rate caused by a low clay content. Table 16 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 should be scouted to determine if pests are present and then monitored to determine when populations require control in order to prevent economic loss. This allows for the most timely, and thus the most cost-effective, use of the pesticide.

Other methods of weed, pest, and disease control include the use of goats, biological agents, mulching, hand weeding, and mowing. These viable alternatives can be used alone or in combination with chemical control. The latest information on these types of control can be obtained at the local office of the North Carolina Cooperative Extension Service, the Avery Soil and Water Conservation District, or the Natural Resources Conservation Service.

Soil biological improvements.-The "soil food web," or biological community, is the living component of soil. Soil is a living system. Optimum soil quality and productivity cannot be achieved unless the soil supports a diverse, strongly active biological community. A single handful of healthy soil contains countless microbes, bacteria, fungi, protozoa, beneficial nematodes, micro-arthropods, and larger animals, such as earthworms. These soil organisms support plant health as they decompose organic matter, cycle nutrients, and control soil organisms considered crop pests. They also decompose or fix pesticides and nutrients that might otherwise enter
water and become pollutants. Many organisms enhance soil aggregation and porosity (soil structure), thus increasing infiltration rates and reducing runoff rates.

Organic matter is the key to the biological health of soil. It serves as the food source for the numerous types of beneficial soil organisms. Biological improvements require additions of organic matter, 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 2002, according to the North Carolina Cooperative Extension Service of Avery County, the county had approximately 10,400 acres of pasture and 1,200 acres of hayland.

A successful livestock enterprise depends on a forage program that provides large quantities of goodquality feed. In most areas of pasture and hayland in Avery County, renovation, brush control, and measures that prevent overgrazing are needed. The soils in the survey area vary widely in their ability to produce grasses and legumes due to differences in properties such as depth to bedrock or strata of 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 Cullowhee, commonly join steeper, well drained cove and upland soils, such as Saunook and Edneytown.

Some pastures on steep side slopes 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 Edneytown, Chandler, Edneyville, and Porters soils. Fannin soils, although eroded, can support good pastures in areas that do not have compacted cow trails. Cove soils, such as Whiteoak and Saunook, 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 Avery County, the soils do not have natural fertility sufficient enough to produce hay and forage crops and require 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 content and clay content of the surface layer and the depth to the water table affect the amount and frequency of soil-applied herbicides and other pesticides. Soils such as Porters, Wayah, Tanasee, Cashiers, Saunook, Whiteoak, Dellwood, Reddies, and Rosman have enough organic matter in the surface layer to inhibit the activity of soil-applied pesticides. Eroded soils such as Fannin may have enough clay in the surface layer to bind pesticides.

The wet conditions of Nikwasi and Cullowhee 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 a low clay content. Table 16 shows depth to water table and flooding frequency for soils in the survey area.

Using integrated pest management programs avoids unnecessary pesticide applications. Crops should be 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 Avery 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 highestproducing 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. Edneytown, Fannin, and Saunook soils are examples. Alfalfa grows poorly on wet soils, such as Cullowhee and Nikwasi. The more poorly drained soils and the soils that are less than 2 feet deep are suited to clovergrass 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 ladino or red
clover. In Avery County, it is a good management practice to seed a legume with fescue. 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.

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 Cullowhee 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 Avery County is located on land that is too steep or wet to row crop. This can lead to a variety of erosion problems. For example, 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 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 are generally not planted in Avery County.

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

Renovation can increase forage yields in areas that support a good stand of grass. This process includes partially destroying the sod, applying lime and fertilizer, and seeding desirable forage species. Plowing is not recommended for forage establishment or rejuvenation. In plowed areas, the soil can crust over after a rain, resulting in a high seedling mortality rate, and the bare soil is susceptible to severe erosion. Sowing seed directly into the existing sod is the preferred method. Adding legumes to the stand of grass provides highquality 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 Avery Soil and Water Conservation District, or the Natural Resources Conservation Service.

## Ornamental Crops

Jeffrey H. Owen, Area Extension Forestry Specialist, North Carolina State University, helped prepare this section.

In 2003, according to the North Carolina Cooperative Extension Service of Avery County, the county had approximately 6,000 acres of Christmas trees and 2,000 acres of ornamental crops.

A variety of soils in Avery County have been managed very successfully for ornamental crops, including some which have been flagged as potential problems soils (fig. 12). Table 4 shows the suitability of soils in the survey area for Fraser fir, ball and burlap harvesting, and line-out beds. 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 ornamental crops. Well suited indicates that no limitations affect production although inclusions of limiting, dissimilar soils or site


Figure 12.-Fraser fir on Porters gravelly loam, 15 to 30 percent slopes, stony (background), and on Porters gravelly loam, 30 to 50 percent slopes, stony (foreground). These soils are some of the most productive soils in the county for Fraser fir.
features may be present. Suited indicates 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 of table 13. Table 14 shows the general range of organic matter content. Tables 16 and 17 show the 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 unit delineations may vary.

The following paragraphs discuss several points related to the management of 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 Avery 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. "Depth to rock" indicates that soft or hard bedrock is at a depth of 40 inches or less. "Climate" indicates that there are frigid climatic conditions and/or damaging high winds at high elevations, generally above 4,500 feet. 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. An onsite investigation is recommended to determine site-specific conditions, especially on flood plains, in
and around drainageways, in map units with slopes greater than 30 percent, and on sites at elevations of less than 3,000 feet or more than 4,000 feet.

Technical assistance may be obtained from the local office of the North Carolina Cooperative Extension Service, the Avery Soil and Water Conservation District, or the Natural Resources Conservation Service.

## Soil-Plant-Landscape-Climate Relationships

Ornamental crops are grown throughout Avery County and include Christmas trees, mountain laurel, rhododendron, hemlock, boxwood, and other species of native trees, shrubs, and herbaceous plants used in landscaping. Hybrid trees and shrubs such as holly, juniper, and yews are also grown. The selection of species to plant 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 of more 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. Edneytown, Chandler, and Buladean soils occur on warm side slopes. Cashiers and Porters soils occur on cool side slopes. Saunook and Whiteoak soils occur in coves and on footslopes. Rosman, Reddies, and Dellwood soils occur on flood plains.

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 amounts generally increase as elevation increases, productivity gains may be offset by the shorter growing season and climatic conditions. Growth on soils that are shallow or moderately deep to bedrock, such as Cleveland, Unicoi, Ashe, Burton, Chestnut, Unaka, Soco, 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 the soil-water relationship.-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.

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 waterholding 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 susceptiblility to phytophthora root disease. Access with machinery is limited when the soil is wet. 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. Periods of desired moisture conditions, however, may not coincide with harvest schedules.

Upland soils, such as Fannin, Cashiers, Chandler, and Porters soils, and colluvial soils, such as Saunook and Whiteoak soils, are suitable for adapted ornamental crops. Flood plain soils, such as Rosman and Reddies soils, 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 prevent excessive erosion, maintains water quality, and protects the beneficial soil surface. 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.

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 erosioncontrol structures, such as silt fences and catch basins, help to maintain soil stability and keep sediments on site. Roads should be graveled or seeded with perennial vegetation. This allows yearround 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 more 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, Whiteoak, 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 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 Avery County are acidic and generally low in natural fertility, ornamental crops benefit from soil amendments of lime, fertilizer, and organic matter. Following lime and fertilizer recommendations based on soil tests and plant tissue analysis helps to increase the availability of nutrients and is a critical aspect of all management plans. Since calcium and phosphorus tend to remain in the surface layer of the soil when topdressed, incorporation of lime and fertilizer into the soil prior to planting is beneficial. 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 Cullowhee 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 the depth to a seasonal high water table. Table 16 shows the depth to water table and the flooding frequency for soils in the survey area.

Liming requirements are a major concern because high acidity in the soil reduces the availability of nutrients to plants and affects the activity of beneficial bacteria and other components of the soil's biological community. Lime neutralizes exchangeable aluminum, which can adversely affect many crops. Liming with calcitic lime adds calcium to the soil, and liming with dolomitic lime adds both calcium and magnesium.

Soil tests also indicate the need for nitrogen, phosphorus, and potassium fertilizer. Phosphorus and potassium levels vary from field to field due to soil type and past management. Unlike nitrogen, 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 countless microbes, micro-arthropods, and other life forms. 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 Avery County. The thickness and texture of the soil layers is shown in the USDA texture column in table 13. Table 14 shows the general range of organic matter content in the surface layer.

In some areas, the organic matter content of a soil may be outside the range shown in table 14. 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, Whiteoak, Dellwood, Reddies, and Rosman have enough organic matter in the surface layer to inhibit the activity of the soilapplied 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 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 Cullowhee 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 16 shows the depth to the water table and the flooding frequency for soils in the survey area.

Erosion-control practices, such as maintaining permanent ground cover and establishing grassed filter strips in drainageways and field borders, help to minimize soil loss and runoff that can carry absorbed or dissolved pesticides to surface waters. Utilizing weather forecasts and scheduling irrigation so that it does not conflict with pesticide use 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 at the local office of the North Carolina Cooperative Extension Service, the Natural Resources Conservation Service, or the Avery Soil and Water Conservation District

Phytophthora root rot.-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 lineout 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 5. 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 Avery 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 water 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 5 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 (5). 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 forestland or 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 the numbers 1 through 8 . The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

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, 2e. 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 (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, droughty, or stony; and $c$, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by $w$, $s$, or $c$ because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, forestland, wildlife habitat, or recreation.

The capability classification of map units in this survey area is given in the section "Detailed Soil Map Units" and in the yields table.

## Prime Farmland

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 shortand 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, 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. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 3,060 acres, or 2 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available.

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 6. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The extent of each listed map unit is shown in table 3. 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."

## Forestland Management and Productivity

Albert Coffey, Forester, Natural Resources Conservation Service, helped prepare this section.

Owners of forestland in Avery 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 a sustainable yield of the most valued crop while maintaining the integrity of the ecosystem.

Forestland covers about 118,865 acres, or 75 percent of the land area of Avery County. Of this, timberland or commercial forest covers about 114,418 acres, or 72 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 Avery County are as described in the following paragraphs:

White pine-hemlock. This forest type covers 5,445 acres. It is predominantly eastern white pine. Commonly included trees are hemlock, red maple, and sweet birch.

Oak-pine. This forest type covers 6,939 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 17,503 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 84,531 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 include Ditney, Unicoi, Soco, and Stecoah 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 Avery 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 include Fannin, Chandler, Micaville, Buladean, Soco, Chestnut, and Edneytown.

Upland hardwoods (SAF White Oak-Black OakNorthern Red Oak). This forest type occurs on upland side slopes and ridges on various aspects at elevations as high as 4,000 feet. The dominant species vary from northern red oak, white oak, and yellowpoplar 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, westto south-facing slopes. Major soils on warm aspects include Fannin, Edneytown, Buladean, Chandler, Ashe, Soco, and Unicoi. Major soils on cool aspects include Porters, Plott, Cashiers, Unaka, Jeffrey, Crossnore, and Pineola.

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, Whiteoak, Cullasaja, Spivey, and Northcove.

Northern hardwoods (SAF Sugar Maple-BeechYellow 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 eastfacing 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, Plott, and Cashiers on side slopes and Saunook, Thunder, and Cullasaja in coves. In areas underlain by metasedimentary rock, major soils are Jeffrey, Crossnore, and Spivey. Above about 4,800 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 4,800 feet in elevation (fig. 13). 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 Avery 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.


Figure 13.-An area of Clingman-Craggey-Rock outcrop complex, windswept, 15 to 95 percent slopes, extremely bouldery, on Grandfather Mountain. The higher elevations, about 4,400 feet and higher, are the natural habitat for red spruce and Fraser fir forests, as shown in photograph.

These factors can affect forest health, vitality, species composition, and, ultimately, the quantity, quality, and value of the timber produced. The potential volume of wood produced by a stand of timber is not always the best indicator of the value of a site. Species composition and quality are as important as volume.

Naturally occurring site factors are also important to consider. The steepness and length of slopes and landform position affect water movement and availability. Elevation and aspect affect the amount of sunlight a site receives and the rate of evaporation. Sites on south-facing slopes are warmer and drier than those on north-facing slopes. The amount of rainfall and the length of growing season influence site productivity. While rainfall generally increases as elevation increases, productivity gains may be offset by a shorter growing season. The most productive sites are generally below 4,000 feet in elevation, on north- to east-facing slopes or on those shaded by the higher mountains, in sheltered coves, or in concave
areas on footslopes and toeslopes (fig. 14). 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. Cashiers and Porters soils are examples of soils on cool side slopes. Saunook and Whiteoak soils are examples of soils on footslopes and in coves.

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. Soils on cool slopes include minor components such as areas on exposed spur ridges. These areas can produce yields lower than those indicative of the soil map unit as a whole. In either case, different tree species may occur in these areas of minor components.

A knowledge of soils helps to provide a basic understanding of the distribution and growth of tree species on the landscape. For example, yellow-poplar


Figure 14.-Cool slopes include north- to east-facing slopes, those shaded by the higher mountains, and commonly coves. These areas are more productive woodland sites but are susceptible to late spring and early fall frosts.
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, Unaka, Soco, 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 water flow.

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, 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 Avery Country have good rooting depth, receive adequate amounts of rainfall, and are relatively productive. Exceptions are soils with a high mica content, such as Chandler and Micaville, and soils that formed over quartzite and metasandstone, such as Soco, Ditney, and Stecoah. 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 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 7 summarizes this forestry information and rates the soils for a number of factors to be considered in management. Slight, moderate, and severe are used to indicate the degree of the major soil limitations to be considered in 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.

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 predominant common trees are listed in table 7. 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 of wood fiber is the yield likely to be produced by the most important trees, expressed in cubic feet per acre per year. Cubic feet per acre can be
converted to cubic meters per hectare by dividing by 14.3. It can be converted to board feet by multiplying by a factor of about 5 . For example, a productivity class of 8 means that a soil can be expected to produce about 114 cubic feet per acre per year at the point where mean annual increment culminates, or about 570 board feet per acre per year.

Trees to manage are those that are used for planting 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 several factors among many that can influence the choice of trees for use in reforestation.

## Recreation

The Avery County Chamber of Commerce helped prepare this section.

The diverse climate of Avery County provides a wide variety of recreational activities (fig. 15). Because of the relatively cool summers, the survey area has become a highly desirable place to vacation for many people in the southeastern United States. Winter also provides many activities. The South's highest ski slopes are at Beech Mountain, Sugar Mountain, and Seven Devils. Tourism is the leading industry in Avery County. According to the Avery Chamber of Commerce, it generates 51 million dollars in sales each year.

The Avery County Parks and Recreation Department organizes a variety of recreational activities and sports leagues for a wide range of ages at the county's numerous sports fields, parks, and community schools. The county hosts several events each year which draw local as well as national and international visitors. These events include Banner Elk's Woolly Worm Festival and the Highland Games at Grandfather Mountain. There are numerous 18 -hole golf courses and numerous privately owned campgrounds, which offer camping, picnicking, hiking, fishing, swimming, and playground facilities. The county also has a strong tradition in crafts, ranging from pottery, quilts, and other woven works to art, toys, jewelry, and furniture. Avery County craftsmen show their work in open studios, at shops, and at local crafts festivals.

Nature enthusiasts enjoy visiting the privately owned Grandfather Mountain, known for its ruggedness and pristine beauty. The mountain has habitat for abundant wildlife, both natural and managed, and has one of the most diverse plant communities in the world. Avery County and Grandfather Mountain also host the


Figure 15.-Many streams, creeks, and rivers, such as the Toe River, offer a variety of recreational activities to those who visit or reside in Avery County.

Highland Games, which offer arts and crafts, exhibits, music, and other entertainment.

The U.S. Forest Service manages approximately 28,500 acres of Avery County (Pisgah National Forest). This area offers picnicking, nature study, trails for hiking, bicycling, horseback riding, and roadway touring for motor vehicles. The best known trail is the Appalachian Trail, which follows the Tennessee State line. These public lands are also used for hunting, fishing, and camping. Areas have been designated 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 fishing destinations. The U.S. Forest Service allows back-county camping throughout the national forest.

The Blue Ridge Parkway winds along the Blue Ridge escarpment on the southern and eastern border of Avery County. It rises to nearly 4,500 feet in elevation. The Parkway offers opportunities for hiking, picnicking, and sightseeing and access to commercial areas. The

Blue Ridge Parkway is managed by the National Park Service of the U.S. Department of the Interior.

A knowledge of soils and soil properties is needed in the planning and developing new resources and in maintaining existing resources for public and private recreational developments (fig. 16).

The soils of the survey area are rated ir table 8 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


Figure 16.-Avery County offers many outdoor recreational activities. Soil survey information can identify less sloping and more suitable areas when planning the development of such areas as golf courses.
planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 8, the degree of soil limitation is expressed as slight, moderate, or severe. Slight means that soil properties are generally favorable and that limitations are minor and easily overcome. Moderate means that limitations can be overcome or alleviated by planning, design, or special maintenance. Severe means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or a combination of these.

The information in table 8 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

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 Avery 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, Chestnut, Edneytown, 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 Plott 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 Cullasaja, Whiteoak, Saunook, Balsam, and Tanasee, have a cool, moist environment and frequently have seeps, spring, 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 Ostin, Cullowhee, 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. Largemouth bass, bluegill, crappie, and other sunfish are dominant in warm-water ponds.

The protection of wetlands and rare mountain bogs is critical, especially for waterfowl, furbearers, reptiles, and amphibians. This unique habitat has a high resource value, especially in the mountain region where acreage is declining. Wetland areas should be protected from drainage, development, and grazing.

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 often forced to move to less desirable soils which support less desirable habitat. The result is a decrease in wildlife populations. For example Rosman, Saunook, and Edneytown soils are rated good as potential habitat for woodland wildlife. However, these soils are intensively used for farming and housing, forcing woodland wildlife elsewhere. Other soils, such as Buladean, Chandler, and Edneytown, 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 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 helps to prevent the sedimentation of lakes and streams. Cover needs to be maintained where fields join woodlands. This "transition zone" serves as a travel corridor and provides critical protection for animals entering fields to eat. It is also utilized as a nesting area by many species. This cover can be established by allowing native vegetation to develop for several years without maintenance. Grain and legume crops can be established in open land to improve seasonal food sources for wildlife. These habitat improvements can usually be carried out in any area, regardless of
soil type. However, plant species, fertilization, and maintenance needs may vary. Mainly grouse, turkey, rabbits, deer, and many nongame species benefit from these activities.

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. The 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. Also, 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, corrositivity, shrink-swell potential, available waterholding 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 soils in Avery County occur on a variety of landscapes, from flood plains and gently sloping terraces to mountaintops more than 6,000 feet above sea level. The soils in the county are used for a wide range of purposes, from burley tobacco production to construction of multi-unit housing. Soils in many areas may be easily developed using conventional engineering design techniques. Others require specialized engineering and construction techniques to overcome inherent limitations. In planning engineering activities, the limitations of the soils must be considered if construction problems are to be avoided. The tables in this survey can help in evaluating the soil limitations at potential construction sites.

In order to effectively evaluate soils for engineering or construction purposes, the factors which limit a soil's use must be considered. In Avery 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 Avery 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 construction design. Downstream damages and subsequent liability should a failure occur are the consequences of a poor design.

Erodibility.-Erosion control on steep slopes presents a unique challenge. During construction, surface cover is removed, exposing soil to erosion. Piles of soil around a construction site have no resistance to erosional forces. Whenever runoff is allowed to accumulate and move uncontrolled across construction sites, severe erosion occurs. Excavations on sloping mountain soils result in severe erosion and offsite sediment damage unless adequate erosioncontrol measures are taken.

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 strength or shear strength, or both, more quickly on micaceous soils or on soils derived from metasedimentary rock than on other soils. Any excavation cut across the slope of these soils removes the lateral support holding the soil back. In time the weight of the soil above the cut may cause downslope movement, which damages roads and structures.

Soils, like machines, move more freely when lubricated. Such lubrication of soils occurs where there are high concentrations of mica. Mica can be detected by a slick greasy feel and by a shiny sparkle in soil when struck by the sun or other bright light. Water also is a soil lubricant. When soil becomes saturated with water, it tends to move away from the loading forces applied to it. Whether lubricated by natural soil particle characteristics or by water, soil that moves provides very little shear strength. Micaceous soils or soils subject to seeps and springs are poor choices for construction sites due to poor strength manifested by downslope movement. Fannin, Cashiers, Micaville, and Chandler soils are unstable due to a high mica content. Soils in coves and on toeslopes, such as Saunook, Whiteoak, Cullasaja, Northcove, and Spivey, contain seeps and springs.

Landscapes in central Avery County can be relatively unstable because of their metasedimentary geologic origin. These areas include Soco, Stecoah, Crossnore, Jeffrey, Ditney, and Unicoi 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 soils occur on flood plains dominantly along the North Toe, Linville, and Elk 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.

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 Cullasaja, Spivey, and Northcove are skeletal. Other cove soils, such as Whiteoak 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. Ostin and Dellwood soils are skeletal beginning at a depth of 4 to 20 inches. Reddies and Cullowhee soils have 20 to 40 inches of non-skeletal material above the skeletal layer. The skeletal layer in Rosman soils is at a depth of more than 40 inches.

The stone content of residual soils in Avery County, such as Buladean, Pigeonroost, Micaville, and Soco, 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 at a depth of 10 to 40 inches in Ashe, Cleveland, Unaka, Ditney, Burton, and Craggey soils. Hard bedrock is indicated in the pedon descriptions of these soils by the horizon designation "R". Chestnut, Soco, and Pigeonroost soils have weathered bedrock at a depth of 20 to 40 inches.

Buladean and Micaville 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 Avery County located on south- and west-facing slopes are exposed to continual freezing and thawing from November to March. Soils such as Fannin, Edneytown, and Pigeonroost 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. Ostin, Dellwood, Reddies, Cullowhee, Nikwasi, and Rosman soils occur on flood plains. Nikwasi, Rosman sandy loam, and Cullowhee soils flood frequently, and the
others flood occasionally. Statler 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.

Saunook, Thunder, Cullasaja, Spivey, Northcove, and Greenlee soils in coves and Statler 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.

Nikwasi, Cullowhee, 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, Crossnore, Jeffrey, Crossnore, Saunook, Whiteoak, Rosman, Dellwood, and Reddies soils have a high organic matter content in the surface layer that causes low bearing strength. Access roads and construction sites in areas of these soils are of low quality unless the topsoil is removed or surfaced. It is best to remove the organic-rich topsoil and stockpile it for use during the final grading before allowing machinery in 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 9 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.

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 road bank stabilization that use brush and native grasses or weed species. Through a series of logging demonstrations, the design of a minimum standard, intermittent-use road was developed and tested. Features of this design apply to both seldom used and development access roads and are as follows:

1. Soils and geology are identified on maps, and site selection or construction practices, or both, are modified where unstable conditions are located.
2. All exposed soil is revegetated as construction proceeds.
3. The siltation of permanent and intermittent streams is reduced by maintaining a filter strip of undisturbed soil between the road and the stream channel and by building at right angles across channels, always using bridges, open pipe, or streamcrossing 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 helps to protect the soil until new grass is established.
6. Surface water is removed from the roadbed by out-sloping, broad-based dips, and inside ditches. (Insloped roads with ditches and culvert ditches 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 remains 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 Avery Soil and Water Conservation District.

## Sanitary Facilities

Table 10 shows the degree and 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.

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

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

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

The table 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, a high water table, depth to bedrock or to a cemented pan, 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, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill-trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of groundwater pollution. Ease of excavation and revegetation should be considered.

The ratings in the table are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, 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 wind erosion.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as 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 11 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, 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 water table is more than 3 feet. Soils rated fair are
more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10 . They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated poor have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet and have a 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 11, 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 and siltstone, are not considered to be sand and gravel.

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

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

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

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

Soils rated poor are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal 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 12 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 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 13 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 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 about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

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

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH ; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

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 $\mathrm{A}-7$ groups are further classified as $\mathrm{A}-1-\mathrm{a}, \mathrm{A}-1-\mathrm{b}, \mathrm{A}-2-4$, 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 Properties

Table 14 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

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 sand, silt, and clay, ranging from the larger to the smaller.

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.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In table 14, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

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 $1 / 3$ - or $1 / 10$-bar ( 33 kPa or 10 kPa ) moisture tension. Weight is determined after the soil is dried at 105 degrees C . In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2
millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward 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 is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $1 / 3$ - or $1 / 10$-bar tension ( 33 kPa or 10 kPa 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 shrinkswell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3 , shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be
maintained by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 14 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) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of K range from 0.02 to 0.69 . Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor 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 fineearth fraction, or the material less than 2 millimeters in size.

Erosion factor $T$ is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams.
4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of rock fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

## Chemical Properties

Table 15 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality ( pH 7.0 ) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cationexchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable bases plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

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

## Water Features

Table 16 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 longduration 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 16 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 briefif 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 17 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 $(6,8)$. 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 from laboratory measurements. Table 18 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 soilforming processes and the degree of soil formation. Each order is identified by a word ending in sol. An example is Ultisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Udult (Ud, meaning humid, plus ult, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (Hapl, meaning minimal horizonation, plus udult, the suborder of the Ultisols that has a udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup 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 taxonomic class. 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, mineral content, soil temperature regime, soil depth, and reaction. 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 within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile.

## 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 detailed description of each soil horizon follows standards in the "Soil Survey Manual" (7). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (6) and in "Keys to Soil Taxonomy" (8). Unless otherwise indicated, 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 to mafic, highgrade metamorphic or igneous rock

Landscape:Low and intermediate mountains throughout the county
Landform: Mountain ridges and slopes
Landform position: Summits and side slopes
Slope range: 15 to 95 percent
Taxonomic classification: Coarse-loamy, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Ashe gravelly sandy loam in an area of Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, extremely bouldery (fig. 17); 9.4 miles east of Linville on Secondary Road 1511, just across Rockhouse Creek bridge, 50 feet east of the road, on a side slope in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 01 minute 12 seconds $N$. and long. 81 degrees 46 minutes 53 seconds W.
Oe-1 inch to 0; partially decomposed leaf litter.
A- 0 to 5 inches; brown (10YR 4/3) gravelly sandy loam; weak very fine granular structure; very friable; many very fine and fine and few medium roots; few fine flakes of mica; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
BA-5 to 9 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; friable; many very fine and fine and few medium roots; few fine flakes of mica; 18 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Bw-9 to 22 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; common very fine and fine flakes of mica; 18 percent, by volume, gravel; very strongly acid; gradual irregular boundary.
C-22 to 31 inches; yellowish brown (10YR 5/6) gravelly sandy loam; massive; friable; common fine and medium roots; common fine flakes of mica; 20 percent, by volume, gravel; very strongly acid; clear wavy boundary.
R-31 to 36 inches; hard unweathered, slightly fractured biotite granitic gneiss bedrock.

## Range in Characteristics

Thickness of solum: 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: 15 to 35 percent, by volume, in the A horizon, 5 to 35 percent in the $B$ horizon, and 5 to 50 percent in the C horizon; mostly gravel but including cobbles and stones

Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 10 YR or 2.5 Y , value of 3 or 4 , and chroma of 2 to 6 ; where the horizon has value of 3 , it is less than 7 inches thick
Texture (fine-earth fraction)-sandy loam
BA horizon:
Color-hue of 10 YR , 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 7.5 YR to 2.5 Y , 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
Chorizon:
Color-hue of 10 YR or 2.5 Y , 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
Cr layer (if it occurs):
Type of bedrock-weathered, slightly fractured to highly fractured, felsic to mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools
R layer:
Type of bedrock-unweathered, slightly fractured to highly fractured, felsic to 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 to mafic, high-grade metamorphic or igneous rock or lowgrade metasedimentary rock
Landscape: High mountains throughout the county
Landform: Coves, drainageways, and colluvial fans
Landform position:Head slopes, side slopes, and footslopes
Slope range: 15 to 95 percent
Taxonomic classification: Loamy-skeletal, mixed, frigid Typic Haplumbrepts

## Typical Pedon

Balsam very cobbly loam, windswept, 30 to 50 percent slopes, extremely bouldery; 5.7 miles north of Newland on N.C. Highway 194, about 3.3 miles south on U.S. Highway 19E, about 0.2 mile on Secondary Road 1199, about 0.4 mile on Secondary Road 1167, about 2.5 miles northwest on a jeep trail, 1,500 feet north on the Appalachian Trail, 15 feet south of the Appalachian Trail, on a side slope; White Rocks Mountain USGS topographic quadrangle; lat. 36 degrees 08 minutes 24 seconds $N$. and long. 82 degrees 00 minutes 12 seconds W.

Oi-2 inches to 1 inch; slightly decomposed leaf litter. Oe-1 inch to 0; partially decomposed leaf litter.
A1-0 to 8 inches; black (10YR 2/1) very cobbly loam; weak fine granular structure; very friable; many fine and medium roots; few fine flakes of mica; 50 percent, by volume, cobbles, gravel, and stones; very strongly acid; gradual wavy boundary.
A2-8 to 15 inches; very dark brown (10YR 2/2) very cobbly loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; 50 percent, by volume, cobbles, gravel, and stones; strongly acid; gradual wavy boundary.
Bw-15 to 62 inches; dark yellowish brown (10YR 4/4) extremely cobbly loam; weak medium subangular blocky structure; very firm; common fine and medium pores; few fine flakes of mica; 70 percent, by volume, cobbles, gravel, and stones; moderately acid.

## Range in Characteristics

## Thickness of solum: 40 to 72 inches

Depth to bedrock: More than 60 inches
Content of mica flakes: Few or common throughout the profile
Content and size of rock fragments: 35 to 60 percent, by volume, in the A horizon and 35 to 90 percent in the $B$ and $C$ horizons; ranging from gravel to boulders; rock content typically increases as depth increases
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed
A horizon:
Color-hue of 7.5 YR to 2.5 Y , value of 2 or 3 , and chroma of 0 to 3
Texture (fine-earth fraction)-loam
$B A$ horizon (if it occurs):
Color-hue of 7.5 YR to 2.5 Y , value of 3 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-loamy sand, coarse
sandy loam, sandy loam, fine sandy loam, or loam

## Bw horizon:

Color-hue of 7.5 YR to 2.5 Y , 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; thin subhorizons of sandy clay loam occur in some pedons
$B C$ horizon (if it occurs):
Color-hue of 7.5 YR to 2.5 Y , 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-hue of 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-loamy sand, loamy fine sand, coarse sandy loam, sandy loam, or fine sandy loam

## 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, high-grade metamorphic or igneous rock
Landscape:Low and intermediate mountains predominantly in the eastern part of the county Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 15 to 80 percent
Taxonomic classification: Coarse-loamy, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Buladean gravelly sandy loam in an area of ChestnutBuladean complex, 30 to 50 percent slopes, stony; 8.2 miles east of Linville on Secondary Road 1511, about 700 feet east-northeast of the road, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 01 minute 44 seconds $N$. and long. 81 degrees 47 minutes 10 seconds W .
Oe-1 inch to 0 ; partially decomposed leaf litter.
A-0 to 8 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; 20 percent, by volume, gravel; moderately acid; gradual wavy boundary.

Bw-8 to 26 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 8 percent, by volume, gravel; moderately acid; gradual wavy boundary.
BC-26 to 32 inches; dark yellowish brown (10YR 4/6) sandy loam; weak fine subangular blocky structure; friable; few fine roots; few fine flakes of mica; 10 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C1-32 to 38 inches; yellowish brown (10YR 5/6 and $5 / 8$ ) and brownish yellow (10YR 6/6) loamy sand saprolite; massive; very friable; few fine roots; few fine flakes of mica; 12 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C2-38 to 42 inches; yellowish brown (10YR 5/4 and $5 / 8$ ) loamy sand saprolite; massive; very friable; few fine roots; few fine flakes of mica; 12 percent, by volume, gravel; strongly acid; gradual wavy boundary.
Cr-42 to 62 inches; soft weathered biotite granitic gneiss bedrock that can be dug with difficulty with hand tools.

## Range in Characteristics

## Thickness of solum: 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: 15 to 35 percent, by volume, in the A horizon and less than 35 percent in the B and C horizons; mostly gravel
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 3 to 6 , and chroma of 2 to 4 ; where the horizon has value of 3 , it is less than 7 inches thick
Texture (fine-earth fraction)-sandy loam
Bwhorizon:
Color-hue of 7.5 YR or 10YR and value and chroma of 4 to 6
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam
BC horizon:
Color-horizon has hue of 7.5 YR to 2.5 Y , value of 4 to 8 , and chroma of 1 to 6 , or it is mixed in shades of these colors
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam; some pedons have pockets of loamy sand or sandy loam saprolite

## Chorizon:

Color-horizon is multicolored, has hue of 5 YR to 2.5 Y , value of 3 to 8 , and chroma of 1 to 8 , or is mixed or mottled in shades of these colors
Texture (fine-earth fraction)-loamy sand or sandy loam saprolite
Crlayer:
Type of bedrock-weathered, slightly fractured to highly fractured, felsic to mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

## Burton Series

Depth class: Moderately deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet
Permeability:Moderately rapid
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock or low-grade metasedimentary rock
Landscape:High mountains throughout the county Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 8 to 95 percent
Taxonomic classification: Fine-loamy, mixed, frigid Typic Haplumbrepts

## Typical Pedon

Burton gravelly loam in an area of Burton-Wayah complex, windswept, 30 to 50 percent slopes, stony; 5.7 miles north of Newland on N.C. Highway 194, about 3.3 miles south on U.S. Highway 19E, about 0.2 mile on Secondary Road 1199, about 0.4 mile on Secondary Road 1167, about 2.5 miles northwest on a jeep trail, 1,000 feet west on the Appalachian Trail, 500 feet south of the Appalachian Trail, on a side slope; White Rocks Mountain USGS topographic quadrangle; lat. 36 degrees 08 minutes 11 seconds N . and long. 82 degrees 00 minutes 21 seconds W .

Oe-1 inch to 0 ; partially decomposed litter.
A-0 to 18 inches; black (10YR 2/1) gravelly loam; weak fine granular structure; very friable; many fine roots; few very fine flakes of mica; 20 percent, by volume, gravel; strongly acid; gradual wavy boundary.
Bw-18 to 24 inches; dark yellowish brown (10YR 3/4) gravelly loam; weak fine subangular blocky structure; friable; common fine and medium roots;

20 percent, by volume, gravel; moderately acid; gradual wavy boundary.
R-24 to 29 inches; hard unweathered gabbro bedrock.

## Range in Characteristics

Thickness of solum: 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: 15 to 35 percent, by volume, in the A horizon, less than 35 percent in the B horizon, and less than 50 percent in the C horizon; gravel, cobbles, and stones
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

## A horizon:

Color-hue of 5 YR to 2.5 Y , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam

## Bw horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 3 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam; thin subhorizons of sandy clay loam occur in some pedons
C horizon (if it occurs):
Color-horizon is multicolored or has hue of 7.5YR to 2.5 Y , 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
Cr layer (if it occurs):
Type of bedrock-soft weathered, slightly fractured to highly fractured, felsic to mafic, low-grade to high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

R layer:
Type of bedrock-hard unweathered, slightly fractured to highly fractured, felsic to mafic, lowgrade to 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 high-grade
metamorphic rock that has a high mica content

Landscape: Intermediate mountains predominantly in the south-central part of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 8 to 95 percent
Taxonomic classification: Fine-loamy, micaceous, mesic Umbric Dystrochrepts

## Typical Pedon

Cashiers sandy loam, 8 to 15 percent slopes, stony; 1.8 miles east of Linville on Secondary Road 1511, about 12.9 miles south on the Blue Ridge Parkway, 250 feet northwest of the Blue Ridge Parkway, in woods adjacent to the Chestoa View overlook parking lot; Linville Falls USGS topographic quadrangle; lat. 35 degrees 55 minutes 39 seconds $N$. and long. 81 degrees 57 minutes 22 seconds W .
Oi-1 inch to 0 ; slightly decomposed leaf litter.
A1-0 to 4 inches; very dark brown (10YR 2/2) sandy loam; weak fine granular structure; very friable; many fine roots; many fine flakes of mica; 12 percent, by volume, gravel; very strongly acid; clear wavy boundary.
A2-4 to 7 inches; dark brown (10YR 3/3) sandy loam; weak fine granular structure; very friable; many fine roots; many fine flakes of mica; 12 percent, by volume, gravel; very strongly acid; clear wavy boundary.
Bw-7 to 31 inches; dark yellowish brown (10YR 4/6) loam; weak fine subangular blocky structure; friable; common fine and medium roots; many fine and medium flakes of mica; 5 percent, by volume, gravel; very strongly acid; gradual irregular boundary.
C1-31 to 45 inches; yellowish brown (10YR 5/8) sandy loam saprolite; massive; friable; common fine and common medium roots; many fine and medium flakes of mica; 8 percent, by volume, gravel; strongly acid; gradual irregular boundary.
C2-45 to 62 inches; yellowish brown (10YR 5/8) sandy loam saprolite; massive; friable; few fine and few medium roots; many fine and medium flakes of mica; 12 percent, by volume, gravel; moderately acid.

## Range in Characteristics

Thickness of solum: 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 15 percent, by volume, in the A horizon and less than 35 percent in the B and C horizons; mostly gravel

Soil reaction: Very strongly acid to moderately acid, except where surface layers have been limed

## A horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 2 or 3 , and chroma of 1 to 4
Texture (fine-earth fraction)-sandy loam

## Bwhorizon:

Color-hue of 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam; thin subhorizons of sandy clay loam occur in some pedons
$B C$ horizon (if it occurs):
Color-hue of 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam
Chorizon:
Color-horizon is multicolored or has hue of 7.5YR to 2.5 Y , 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 rock that has a high mica content
Landscape:Low and intermediate mountains predominantly in the southwestern part of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 15 to 95 percent
Taxonomic classification: Coarse-loamy, micaceous, mesic Typic Dystrochrepts

## Typical Pedon

Chandler sandy loam in an area of Chandler-Micaville complex, 30 to 50 percent slopes, stony; 7.6 miles west of Crossnore on N.C. Highway 194, about 1.7 miles south on U.S. Highway 19E, 1.4 miles east on Secondary Road 1101, about 500 feet south on a private road, in a south-facing road cut; Linville Falls USGS topographic quadrangle; lat. 35 degrees 57
minutes 12 seconds N . and long. 81 degrees 58 minutes 51 seconds W.

Oi-1 inch to 0 ; slightly decomposed leaf litter.
A-0 to 5 inches; dark yellowish brown (10YR 4/4) sandy loam; weak fine granular structure; very friable; many fine and medium roots; many fine and medium flakes of mica; 5 percent, by volume, gravel; strongly acid; clear wavy boundary.
Bw-5 to 21 inches; yellowish brown (10YR 5/6) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; many fine and medium flakes of mica; 5 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
C1-21 to 28 inches; yellowish brown (10YR 5/6), dark yellowish brown (10YR 4/4), and brownish yellow (10YR 6/6) sandy loam saprolite; massive; friable; few fine and medium roots; many medium flakes of mica; 10 percent, by volume, gravel; very strongly acid; gradual irregular boundary.
C2-28 to 62 inches; light yellowish brown (10YR 6/4), very pale brown (10YR 8/3), and brownish yellow (10YR 6/6) sandy loam saprolite; massive; few fine and medium roots; many medium and coarse flakes of mica; 10 percent, by volume, gravel; very strongly acid.

## Range in Characteristics

Thickness of solum: 20 to 40 inches
Depth to bedrock: More than 72 inches
Content of mica flakes: Few to many in the A horizon and many in the $B$ and $C$ horizons
Content of rock fragments: Less than 15 percent, by volume, in the $A$ horizon and less than 25 percent in the $B$ and $C$ horizons
Soil reaction: Very strongly acid to moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 7.5 YR or 10 YR , value of 2 to 5 , and chroma of 1 to 4 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction)-sandy loam

## Bw horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt loam

Chorizon:
Color-horizon is multicolored or has hue of 7.5YR to 2.5 Y , 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, loam, or silt loam

## 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, high-grade metamorphic or igneous rock
Landscape:Low and intermediate mountains throughout the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 15 to 95 percent
Taxonomic classification: Coarse-loamy, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Chestnut gravelly sandy loam in an area of EdneyvilleChestnut complex, 30 to 50 percent slopes, stony; 7.1 miles north of Newland on N.C. Highway 194, about 8.2 miles north on Secondary Road 1316, about 0.25 mile east on Secondary Road 1312, about 1.8 miles southeast on Beech Mountain Road, 200 feet west of the road on a side road, 50 feet north of the road, in a road cut; Elk Park USGS topographic quadrangle; lat. 36 degrees 13 minutes 40 seconds $N$. and long. 81 degrees 55 minutes 01 second W.

Oi-1 inch to 0 ; slightly decomposed leaf litter.
A-0 to 3 inches; dark brown (10YR 3/3) gravelly sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; 20 percent, by volume, gravel; strongly acid; clear smooth boundary.
Bw-3 to 16 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 10 percent, by volume, gravel; strongly acid; gradual irregular boundary.
$B C-16$ to 22 inches; yellowish brown (10YR 5/8) sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; few fine flakes of mica; 10 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
C-22 to 28 inches; brownish yellow (10YR 6/8) gravelly fine sandy loam; massive; friable; few fine roots; few fine flakes of mica; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Cr-28 to 62 inches; soft weathered, slightly fractured granite that can be dug with difficulty with hand tools.

## Range in Characteristics

Thickness of solum: 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: 15 to 35 percent, by volume, in the A horizon and 5 to 35 percent in the $B$ and $C$ horizons; mostly gravel or cobbles
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 2 to 6 , and chroma of 1 to 6 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction)-sandy loam

## Bwhorizon:

Color-hue of 5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam; some pedons have thin subhorizons of sandy clay loam

## BC horizon:

Color-hue of 5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam

## Chorizon:

Color-horizon is multicolored or has hue of 5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-loamy sand, sandy loam, fine sandy loam, or loam saprolite

## Cr layer:

Type of bedrock-soft weathered, slightly fractured to highly fractured, felsic to mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

## Cleveland Series

Depth class: Shallow
Drainage class: Somewhat excessively drained
Depth to seasonal high water table: More than 6.0 feet
Permeability: Moderately rapid
Parent material: Residuum affected by soil creep, weathered from felsic to mafic, high-grade
metamorphic or igneous rock
Landscape:Low and intermediate mountains throughout the county
Landform: Mountain ridges and slopes

Landform position: Summits and side slopes
Slope range: 30 to 95 percent
Taxonomic classification: Loamy, mixed, mesic Lithic Dystrochrepts

## Typical Pedon

Cleveland gravelly fine sandy loam in an area of Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, extremely bouldery (fig. 18); 9.9 miles east of Linville on Secondary Road 1511, about 100 feet east of the road, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 00 minutes 49 seconds $N$. and long. 81 degrees 46 minutes 50 seconds W.

Oe-1 inch to 0; partially decomposed leaf litter. A-0 to 4 inches; dark brown (10YR 3/3) gravelly fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Bw-4 to 17 inches; yellowish brown (10YR 5/6)
gravelly fine sandy loam; weak medium subangular
blocky structure; friable; few fine and medium roots; common very fine flakes of mica; 20 percent, by volume, gravel; strongly acid; abrupt smooth boundary.
R-17 to 22 inches; hard unweathered, moderately fractured biotite granitic gneiss bedrock.

## Range in Characteristics

Thickness of solum: 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: 15 to 35 percent, by volume, in the A horizon and less than 35 percent in the B and C horizons; gravel, cobbles, or stones
Soil reaction: Very strongly acid to moderately acid, except where surface layers have been limed

## A horizon:

Color-hue of 7.5 YR or 10 YR , value of 2 to 4 , and chroma of 1 to 3 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction)-fine sandy loam

## Bwhorizon:

Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam

C horizon (if it occurs):
Color-horizon is multicolored or has hue of 7.5YR or 10YR, value of 4 to 6 , and chroma of 3 or 4
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam
R layer:
Type of bedrock-hard unweathered, slightly fractured to highly fractured, felsic to mafic, high-grade metamorphic or igneous rock

## Clingman Series

Depth class:Very shallow and shallow
Drainage class: Somewhat excessively drained
Depth to seasonal high water table:More than 6.0 feet
Permeability:Moderately rapid
Parent material: Organic deposits underlain in most places by a thin mineral layer
Landscape:High mountains predominantly in the Grandfather Mountain area
Landform: Mountain ridges and slopes
Landform position: Summits and side slopes
Slope range: 15 to 95 percent
Taxonomic classification: Dysic Lithic Borofolists

## Typical Pedon

Clingman peat in an area of Clingman-Craggey-Rock outcrop complex, windswept, 15 to 95 percent slopes, extremely bouldery; 2.2 miles east of Linville on U.S. Highway 221, about 1 mile north on the entrance road to Grandfather Mountain to the top of the mountain, 500 feet north-northeast of the parking lot on the ridgetop, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 05 minutes 48 seconds N . and long. 81 degrees 49 minutes 53 seconds W.

Oi1-0 to 4 inches; very dark brown (10YR 2/2) broken face peat; 90 percent fiber, 67 percent rubbed; massive; loose; many very fine to medium roots; extremely acid; clear smooth boundary.
Oi2-4 to 10 inches; black (10YR 2/1) peat; 80 percent fiber, 62 percent rubbed; massive; friable; many very fine to medium roots; extremely acid; clear smooth boundary.
A-10 to 14 inches; dark brown (10YR 3/3) sandy loam; weak fine granular structure; friable; few fine and medium roots; 10 percent, by volume, gravel; extremely acid; abrupt smooth boundary.
R-14 to 21 inches; hard unweathered, slightly fractured, low-grade feldspathic metasandstone.

## Range in Characteristics

Thickness of solum: 3 to 20 inches

Depth to bedrock: 3 to 20 inches to hard bedrock
Content of mica flakes: None to many throughout the profile
Content and size of rock fragments: Less than 15 percent, by volume; mostly gravel or cobbles
Soil reaction: Extremely acid or very strongly acid in the organic material and extremely acid to strongly acid in the mineral layers

## Oi horizon:

Color-horizon has hue of 2.5 YR or 10YR, value of 2 or 3 , and chroma of 1 to 3 , or it is neutral in hue and has value of 2 or 3
Texture-slightly decomposed leaves, twigs, and moss (fibric material)

Oe horizon (if it occurs):
Color-horizon has hue of 2.5 YR or 10YR, value of 2 or 3 , and chroma of 1 to 3 , or it is neutral in hue and has value of 2 or 3
Texture-partially decomposed organic matter (hemic material)
Oa horizon (if it occurs):
Color-horizon has hue of 2.5YR or 10YR, value of 2 to 4 , and chroma of 1 to 3 , or it is neutral in hue and has value of 2 to 4
Texture-highly decomposed organic matter (sapric material)
Mineral horizon (A, E, Bw, Bs, Bhs, or C horizon):
Color-horizon has hue of 5 YR to 5 B , value of 2 to 7 , and chroma of 1 to 6 , or it is neutral in hue and has value of 2 to 8
Texture (fine-earth fraction)-loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam
Cr layer (if it occurs):
Type of bedrock-soft weathered, slightly fractured to highly fractured, metamorphic, igneous or low-grade metasedimentary rock that can be dug with difficulty with hand tools
R layer:
Type of bedrock-hard unweathered, slightly fractured to highly fractured, metamorphic, igneous or low-grade metasedimentary rock

## 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, weathered from felsic to mafic, high-grade
metamorphic or igneous rock or low-grade metasedimentary rock
Landscape:High mountains throughout the county
Landform: Mountain ridges and slopes
Landform position: Summits and side slopes
Slope range: 8 to 95 percent
Taxonomic classification: Loamy, mixed, frigid Lithic Haplumbrepts

## Typical Pedon

Craggey gravelly loam in an area of Burton-CraggeyRock outcrop complex, windswept, 15 to 30 percent slopes; 5.7 miles north of Newland on N.C. Highway 194, about 3.3 miles south on U.S. Highway 19E, about 0.2 mile on Secondary Road 1199, about 0.4 mile on Secondary Road 1167 , approximately 2.5 miles northwest on a jeep trail, 1,000 feet west on the Appalachian Trail, 15 feet south of the Appalachian Trail, on a side slope; White Rocks Mountain USGS topographic quadrangle; lat. 36 degrees 08 minutes 14 seconds $N$. and long. 82 degrees 00 minutes 16 seconds W.

Oe- 1 inch to 0 ; partially decomposed litter.
A-0 to 13 inches; very dark brown (10YR 2/2) gravelly loam; weak fine granular structure; very friable; many fine roots; few very fine flakes of mica; 20 percent, by volume, gravel; strongly acid; clear smooth boundary.
R-13 to 18 inches; hard unweathered gabbro bedrock.

## Range in Characteristics

Thickness of solum: 10 to 20 inches
Depth to bedrock: 10 to 20 inches to hard bedrock
Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 5 to 35 percent in the Bw horizon; gravel, cobbles, or stones
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

## A horizon:

Color-hue of 5 YR to 10 YR , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam
Bw horizon (if it occurs):
Color-hue of 7.5 YR or 10YR and value and chroma of 3 to 6
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam

Cr layer (if it occurs):
Type of bedrock-soft weathered, slightly fractured to highly fractured, felsic to mafic, high-grade
metamorphic or igneous rock or low-grade metasedimentary rock that can be dug with difficulty with hand tools

## R layer:

Type of bedrock-hard unweathered, slightly fractured to highly fractured, felsic to mafic, high-grade metamorphic or igneous rock or lowgrade metasedimentary rock

## Crossnore 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: Intermediate mountains in the central and northeast-central parts of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 30 to 80 percent
Taxonomic classification: Fine-loamy, mixed, mesic Umbric Dystrochrepts

## Typical Pedon

Crossnore gravelly sandy loam in an area of Crossnore-Jeffrey complex, 30 to 50 percent slopes, very stony; 1.9 miles east of Linville on U.S. Highway 221, about 0.5 mile south on Secondary Road 1510, about 50 feet northwest of the road, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 04 minutes 45 seconds $N$. and long. 81 degrees 51 minutes 09 seconds W .

Oi-2 inches to 0 ; undecomposed oak leaf litter.
A-0 to 7 inches; dark brown (10YR 3/3) gravelly sandy loam; weak fine granular structure; very friable; many fine and few medium roots; 20 percent, by volume, gravel; very strongly acid; clear wavy boundary.
Bw-7 to 16 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak medium subangular blocky structure; friable; common fine and few medium roots; 18 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
BC-16 to 22 inches; brownish yellow (10YR 6/6) gravelly sandy loam; weak medium subangular blocky structure; friable; few fine and few medium roots; 18 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
C-22 to 30 inches; gravelly loamy sand saprolite that is multicolored in shades of brown, yellow, and
white; massive; friable; few very fine and fine roots; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Cr-30 to 61 inches; soft weathered, multicolored, partially consolidated low-grade metasandstone that can be dug with difficulty with hand tools.

## Range in Characteristics

Thickness of solum: 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: None to common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon, less than 35 percent in the $B$ horizon, and less than 50 percent in the $C$ horizon; gravel, cobbles, channers, or stones but dominantly gravel and cobbles
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed
A or Ap horizon:
Color-hue of 10YR, value of 2 or 3 , and chroma of 1 to 4
Texture (fine-earth fraction)—sandy loam

## Bw horizon:

Color-hue of 10 YR or 2.5 Y , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or silt loam; thin subhorizons of sandy clay loam occur in some pedons
BC horizon:
Color-horizon has hue of 10 YR to 2.5 Y , value of 4 to 7 , and chroma of 4 to 8 , or it is multicolored
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or silt loam

## Chorizon:

Color-horizon has hue of 7.5 YR to 2.5 Y , value of 4 to 8 , and chroma of 1 to 8 , or it is multicolored
Texture (fine-earth fraction)-loamy sand, sandy loam, fine sandy loam, loam, or silt loam saprolite
Cr layer:
Type of bedrock—soft weathered, multicolored lowgrade metasedimentary bedrock that is partially consolidated but can be dug with difficulty with hand tools

## Cullasaja Series

Depth class:Very deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet

Permeability:Moderately rapid
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic and igneous rock
Landscape: Intermountain hills and intermediate mountains throughout 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 classification: Loamy-skeletal, mixed, mesic Typic Haplumbrepts

## Typical Pedon

Cullasaja cobbly loam, 15 to 30 percent slopes, extremely bouldery; 4.2 miles south of Minneapolis on U.S. Highway 19E South, 4.1 miles northwest on Secondary Road 1132, east of the road in a road cut; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 06 minutes 31 seconds $N$. and long. 82 degrees 02 minutes 47 seconds W .
A1-0 to 13 inches; very dark brown (10YR 2/2) cobbly loam; weak fine granular structure; very friable; many very fine, fine, and medium roots; few very fine flakes of mica; 10 percent, by volume, gravel and 10 percent cobbles; strongly acid; gradual wavy boundary.
A2-13 to 18 inches; dark brown (10YR 3/3) very cobbly loam; weak fine granular structure; very friable; common fine and medium roots; few very fine flakes of mica; 15 percent, by volume, gravel, 25 percent cobbles, and 5 percent stones; moderately acid; gradual wavy boundary.
Bw-18 to 48 inches; dark yellowish brown (10YR 4/4) very cobbly loam; weak fine subangular blocky structure; friable; common fine and medium roots; few very fine flakes of mica; 20 percent, by volume, gravel, 25 percent cobbles, and 5 percent stones; moderately acid; gradual smooth boundary.
C-48 to 62 inches; dark yellowish brown (10YR 4/4) extremely cobbly sandy loam; massive; few fine and medium roots; few very fine flakes of mica; 25 percent, by volume, gravel, 35 percent cobbles, and 10 percent stones; moderately acid.

## Range in Characteristics

Thickness of solum: 30 to more than 60 inches
Depth to bedrock: More than 72 inches
Content of mica flakes: Few or common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon, 35 to 65 percent in the upper part of the $B$ horizon, and 35 to 80
percent in the lower part of the $B$ horizon and in the C horizon; ranging from gravel to boulders
Soil reaction: Very strongly acid to slightly acid in the A horizon, except in limed areas, and very strongly acid to moderately acid in the B and C horizons

## A or Ap horizon:

Color-hue of 5 YR to 10 YR , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam or fine sandy loam

## Bw horizon:

Color-hue of 5 YR to 10 YR , value of 3 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or sandy clay loam; thin subhorizons of sandy clay loam occur in some pedons
$B C$ horizon (if it occurs):
Color-hue of 5 YR to 10 YR , value of 3 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-coarse sandy loam, sandy loam, loam, or loamy sand

## Chorizon:

Color-hue of 7.5 YR or 10 YR , value of 4 or 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-coarse sandy loam, sandy loam, fine sandy loam, loam, or loamy sand

## Cullowhee Series

Depth class:Very deep
Drainage class: Somewhat poorly drained
Depth to seasonal high water table: 1.5 to 2.0 feet from November through May
Permeability: Moderately rapid in the upper part of the profile and rapid in the lower part
Parent material: Recent alluvium that is loamy in the upper part and sandy or sandy-skeletal in the lower part
Landscape:Mountain valleys
Landform: Flood plains throughout the county
Landform position: Planar to slightly concave slopes Slope range: 0 to 3 percent
Taxonomic classification: Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Aquic Haplumbrepts

## Typical Pedon

Cullowhee loam, 0 to 3 percent slopes, frequently flooded; 1.0 mile east of Newland on N.C. Highway 181, about 2.3 miles north on Secondary Road 1346,
about 0.7 mile north on Secondary Road 1347, about 200 feet west of the road and across the North Toe River, on a flood plain; Newland USGS topographic quadrangle; lat. 36 degrees 00 minutes 44 seconds N . and long. 81 degrees 54 minutes 33 seconds W .
A—0 to 10 inches; dark brown (10YR 3/3) loam; weak fine granular structure; friable; many fine and medium roots; few very fine flakes of mica; 3 percent, by volume, gravel; slightly acid; gradual wavy boundary.
Bw-10 to 21 inches; brown (10YR 4/3) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; many medium distinct dark grayish brown (10YR 4/2) irregularly shaped iron depletions; common fine distinct dark yellowish brown (10YR 4/6) iron accumulations; few very fine flakes of mica; 5 percent, by volume, gravel; moderately acid; gradual wavy boundary.
Cg -21 to 30 inches; dark gray (10YR 4/1) sandy loam; friable; few very fine and fine roots; few fine distinct dark yellowish brown (10YR $3 / 6$ and 4/4) irregularly shaped masses of iron accumulation; massive; few very fine flakes of mica; 8 percent, by volume, gravel; slightly acid; clear wavy boundary.
C-30 to 62 inches; yellowish brown (10YR 5/4) very cobbly loamy sand; massive; very friable; common fine distinct dark gray (10YR 4/1) irregularly shaped iron depletions; few very fine flakes of mica; 20 percent, by volume, gravel and 30 percent cobbles; moderately acid.

## Range in Characteristics

Thickness of solum: 12 to 35 inches
Depth to contrasting material: 20 to 40 inches to deposits of cobbles and gravel that are stratified with sandy 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 15 percent, by volume, in the A horizon, less than 35 percent in the B and C horizons, and more than 35 percent in the lower part of the C horizon (within a depth of 20 to 40 inches); mostly gravel or cobbles but including stones
Soil reaction: Very strongly acid to slightly acid, except where surface layers have been limed

A or Ap horizon:
Color-hue of 10 YR or 7.5 YR , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam

Bw horizon:
Color-hue of 10 YR or 2.5 Y , value of 4 to 6 , and chroma of 3 to 6
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam
Redoximorphic features-chroma of 2 or less, within a depth of 20 inches; iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

Cg horizon (below a depth of 20 inches if it occurs):
Color-hue of 10 YR or 2.5 Y , value of 4 to 6 , and chroma of 1 or 2
Texture (fine-earth fraction)—sand, loamy sand, sandy loam, fine sandy loam, or loam
Redoximorphic features-iron or clay depletions in shades of brown, yellow, olive, or gray; ;ron accumulations in shades of red, brown, yellow, or olive
Chorizon:
Color-hue of 10 YR or 2.5 Y , value of 4 to 6 , and chroma of 3 to 6
Mottles or streaks (if they occur)-shades of black, red, brown, yellow, white, gray, or olive
Texture (fine-earth fraction)-sand, loamy sand, sandy loam, fine sandy loam, or loam
Redoximorphic features-chroma of 2 or less, within a depth of 20 inches; iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

## Dellwood Series

Depth class:Very deep
Drainage class: Moderately well drained
Depth to seasonal high water table: 2.0 to 4.0 feet from January through April
Permeability: Moderately rapid in the A horizon and rapid in the C horizon
Parent material: Recent alluvium that is loamy or sandy in the upper part and sandy-skeletal in the lower part
Landscape: Mountain valleys
Landform: Flood plains predominantly at the upper end of mountain valleys or adjacent to streams and rivers on the larger flood plains
Landform position: Planar to slightly convex slopes
Slope range: 1 to 5 percent
Taxonomic classification: Sandy-skeletal, mixed, mesic Fluventic Haplumbrepts

## Typical Pedon

Dellwood cobbly sandy loam, 1 to 5 percent slopes, occasionally flooded; from Minneapolis, 0.6 mile south on U.S. Highway 19E, about 100 feet west of the highway, in a field; Newland USGS topographic quadrangle; lat. 36 degrees 05 minutes 34 seconds $N$. and long. 81 degrees 59 minutes 34 seconds W .
A1-0 to 11 inches; very dark grayish brown (10YR $3 / 2$ ) cobbly sandy loam; weak fine granular structure; very friable; common fine and medium roots; few very fine flakes of mica; 15 percent, by volume, cobbles and 10 percent gravel; moderately acid; clear wavy boundary.
A2-11 to 16 inches; very dark grayish brown (10YR
$3 / 2$ ) very cobbly loamy sand; weak fine granular structure; very friable; common fine and medium roots; few very fine flakes of mica; 35 percent, by volume, cobbles and 10 percent gravel; strongly acid; gradual wavy boundary.
C—16 to 62 inches; dark yellowish brown (10YR 4/4)
extremely cobbly loamy sand; massive; very friable; few fine roots; few very fine flakes of mica; 50 percent, by volume, cobbles and 15 percent gravel; strongly acid.

## Range in Characteristics

Thickness of solum: 8 to 20 inches
Depth to contrasting material: 8 to 20 inches to deposits of cobbles and pebbles that are stratified with sandy material
Depth to bedrock: More than 60 inches
Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the upper part of the A horizon, 15 to 60 percent in the lower part of the A horizon, dominantly less than 35 percent in the $B$ horizon, and more than 35 percent in the C horizon; mostly gravel or cobbles but including stones
Soil reaction:Very strongly acid to neutral
A or Ap horizon:
Color-hue of 10 YR , value of 2 or 3 , and chroma of 1 to 3
Texture-sandy loam
AC horizon (if it occurs):
Color-hue of 7.5 YR or 10 YR , 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 7.5 YR or 10 YR and value and chroma of 4 to 6

Texture (fine-earth fraction)—sandy loam or fine sandy loam

## Chorizon:

Color-horizon is multicolored or has hue of 10YR, value of 3 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-coarse sand, sand, loamy coarse sand, or loamy sand

## 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 eastern and southeastern parts of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 15 to 95 percent
Taxonomic classification: Coarse-loamy, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Ditney gravelly sandy loam in an area of Soco-Ditney complex, 30 to 50 percent slopes, very stony; 3.5 miles east of Linville on Secondary Road 1511, about 100 feet northeast of the road, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 02 minutes 28 seconds N . and long. 81 degrees 50 minutes 26 seconds W .
Oe-1 inch to 0; partially decomposed leaf litter.
A-0 to 2 inches; brown (10YR 4/3) gravelly sandy loam; weak fine granular structure; very friable; many fine and medium and few coarse roots; 20 percent, by volume, gravel; extremely acid; clear smooth boundary.
$\mathrm{E}-2$ to 8 inches; light yellowish brown (10YR 6/4) gravelly sandy loam; weak fine granular structure; very friable; common fine, medium, and coarse roots; 18 percent, by volume, gravel; strongly acid; gradual wavy boundary.
Bw- 8 to 20 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak fine subangular blocky structure; very friable; common fine and medium roots; 18 percent, by volume, gravel; very strongly acid; gradual irregular boundary.
C-20 to 30 inches; yellowish brown (10YR 5/6) and light yellowish brown (10YR 6/4) gravelly loamy sand; massive; very friable; few fine and medium
roots; 20 percent, by volume, gravel; strongly acid; gradual wavy boundary.
R-30 to 35 inches; hard unweathered, moderately fractured, low-grade feldspathic metasandstone.

## Range in Characteristics

Thickness of solum: 20 to 40 inches
Depth to bedrock: 20 to 40 inches to hard bedrock
Content of mica flakes: None or few throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A and E horizons, 5 to 35 percent in the Bw horizon, and 10 to 40 percent in the BC and C horizons; mostly gravel or channers but including cobbles, flagstones, and stones
Soil reaction: Extremely acid to strongly acid, except where surface layers have been limed

## A horizon:

Color-hue of 10 YR , value of 3 to 5 , and chroma of 1 to 4 ; where the horizon has value of 3 , it is less than 7 inches thick
Texture (fine-earth fraction)-sandy loam

## E horizon:

Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam

## Bwhorizon:

Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam
$B C$ horizon (if it occurs):
Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam

## Chorizon:

Color-hue of 7.5 YR or 10 YR , value of 4 to 8 , and chroma of 3 to 8
Texture (fine-earth fraction)—loamy sand, sandy loam, fine sandy loam, or loam
$R$ layer:
Type of bedrock-hard 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 to mafic, highgrade metamorphic and igneous rock
Landscape: Intermountain hills and low and intermediate mountains throughout the county
Landform: Slopes and ridges on hills and mountains
Landform position: Side slopes and summits
Slope range: 8 to 50 percent
Taxonomic classification: Fine-loamy, mixed, mesic Typic Hapludults

## Typical Pedon

Edneytown fine sandy loam in an area of EdneytownPigeonroost complex, 8 to 15 percent slopes, stony; 7.8 miles east of Linville on Secondary Road 1511, about 500 feet north on National Forest Service Road 451 , about 350 feet east-southeast on a trail, 50 feet north of the road, in a clearing in the woods;
Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 08 minutes 00 seconds $N$. and long. 81 degrees 47 minutes 32 seconds W .

Oi-1 inch to 0 ; slightly decomposed leaf litter.
A-0 to 3 inches; dark yellowish brown (10YR 3/4) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; 10 percent, by volume, gravel; very strongly acid; clear smooth boundary.
Bt1-3 to 12 inches; strong brown (7.5YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 8 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Bt2-12 to 32 inches; strong brown (7.5YR 4/6) clay loam; moderate medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; 8 percent, by volume, gravel; very strongly acid; gradual irregular boundary.
BC-32 to 43 inches; strong brown (7.5YR 5/6) loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; 10 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
C-43 to 62 inches; strong brown (7.5YR 4/6) sandy loam; massive; friable; few fine roots; few fine flakes of mica; 10 percent, by volume, gravel; very strongly acid.

## Range in Characteristics

Thickness of solum: 20 to 40 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 15 percent, by volume, in the A horizon, 0 to 35 percent in the E horizon, and less than 15 percent in the Bt and C horizons; ranging from gravel to stones
Soil reaction: Very strongly acid to moderately acid in the $A$ and $E$ horizons, except where surface layers have been limed, 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 the horizon has value of 3 , it is less than 6 inches thick
Texture (fine-earth fraction)-fine sandy loam
E horizon (if it occurs):
Color-hue of 10 YR , 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 7.5 YR or 10YR, value of 5 to 7 , and chroma of 4 to 8
Texture (fine-earth fraction)-fine sandy loam, sandy clay loam, or clay loam
$B C$ horizon:
Color-hue of 7.5 YR or 10 YR , value of 5 to 7 , and chroma of 6 to 8
Texture (fine-earth fraction)-sandy loam, loam, or sandy clay loam
Chorizon:
Color-hue of 7.5 YR or 10 YR , value of 5 to 8 , and chroma of 3 to 8
Mottles-shades of red, brown, or white
Texture (fine-earth fraction)-loamy sand, sandy loam, fine sandy loam, or loam

## Edneyville 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 to mafic, highgrade metamorphic or igneous rock
Landscape:Low and intermediate mountains
throughout most of the county, except in the eastern part
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 30 to 80 percent

Taxonomic classification: Coarse-loamy, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Edneyville fine sandy loam in an area of EdneyvilleChestnut complex, 30 to 50 percent slopes, stony (fig. 19) 7.1 miles north of Newland on N.C. Highway 194, about 8.2 miles north on Secondary Road 1316, about 0.25 mile east on Secondary Road 1312, about 1.5 miles southeast on Beech Mountain Road, 0.4 mile northwest of the road on a side road, 0.15 mile north on the side road, east of the road in a road cut; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 14 minutes 00 seconds N . and long. 81 degrees 55 minutes 02 seconds W .

Oe-1 inch to 0 ; partially decomposed leaf litter.
A-0 to 3 inches; very dark gray (10YR 3/1) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; 10 percent, by volume, gravel; strongly acid; clear wavy boundary.
Bw1-3 to 10 inches; yellowish brown (10YR 5/8) loam; weak fine subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 8 percent, by volume, gravel; strongly acid; gradual wavy boundary.
Bw2-10 to 17 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; 8 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Bw3-17 to 25 inches; yellowish brown (10YR 5/8) sandy loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; 13 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
C1-25 to 40 inches; yellowish brown (10YR 5/6 and $5 / 8$ ) and brownish yellow (10YR 6/6) gravelly sandy loam saprolite; massive; friable; few fine roots; few fine flakes of mica; 25 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
C2-40 to 62 inches; gravelly sandy loam saprolite that is multicolored in shades of brown and yellow; massive; friable; few very fine roots; few fine flakes of mica; 25 percent, by volume, gravel; strongly acid.

## Range in Characteristics

Thickness of solum: 20 to 55 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 15
percent, by volume, in the A horizon and less than 35 percent in the B and C horizons; mostly gravel Soil reaction: Very strongly acid to moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 2 to 5 , and chroma of 1 to 4 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction)-fine sandy loam

## Bwhorizon:

Color-hue of 7.5 YR or 2.5 Y , value of 4 to 7 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam
$B C$ horizon (if it occurs):
Color-horizon has hue of 7.5 YR to 2.5 Y , value of 4 to 7 , and chroma of 3 to 8 , or it is mixed in shades of these colors
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

## Chorizon:

Color-horizon is multicolored or has hue of 7.5YR to 2.5 Y , value of 4 to 7 , and chroma of 3 to 8
Texture (fine-earth fraction)-loamy sand, sandy loam, fine sandy loam, or loam saprolite

## Fannin Series

Depth class: Very deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet
Permeability: Moderate
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic and igneous rock that has a high mica content
Landscape: Intermountain hills and low and intermediate mountains in the southwestern part of the county
Landform: Ridges and slopes on hills and mountains
Landform position: Summits and side slopes
Slope range: 8 to 50 percent
Taxonomic classification: Fine-loamy, micaceous, mesic Typic Hapludults

## Typical Pedon

Fannin fine sandy loam, 15 to 30 percent slopes; 7.6 miles west of Crossnore on N.C. Highway 194, about 3.1 miles south on U.S. Highway 19E, about 0.5 mile north at Mayland Community College entrance, 450 feet northwest of north campus building, in woods; Spruce Pine USGS topographic quadrangle; lat. 35
degrees 56 minutes 15 seconds $N$. and long. 82 degrees 01 minute 09 seconds W .

Oi-1 inch to 0 ; slightly decomposed leaf litter.
A-0 to 5 inches; strong brown (7.5YR 4/6) fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; many fine flakes of mica; 8 percent, by volume, gravel; strongly acid; gradual wavy boundary.
Bt-5 to 23 inches; yellowish red (5YR 5/8) clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; many fine and medium flakes of mica; 5 percent, by volume, gravel; moderately acid; gradual irregular boundary.
BC-23 to 30 inches; yellowish red (5YR 5/8) loam; weak medium subangular blocky structure; friable; common fine and medium roots; many fine and medium flakes of mica; 8 percent, by volume, gravel; moderately acid; gradual wavy boundary.
C1-30 to 38 inches; strong brown (7.5YR 5/6) loam saprolite; common fine faint reddish yellow (7.5YR 6/6) and common fine faint strong brown (7.5YR 4/6) mottles; massive; friable; few fine and medium roots; many fine, medium, and coarse flakes of mica; 10 percent, by volume, gravel; moderately acid; clear smooth boundary.
C2-38 to 62 inches; sandy loam saprolite that is multicolored in shades of red, yellow, and brown; massive; friable; few fine and medium roots; many medium and coarse flakes of mica; 10 percent, by volume, gravel; moderately acid.

## Range in Characteristics

Thickness of solum: 20 to 45 inches
Depth to bedrock: More than 72 inches
Content of mica flakes: Common or many in the A horizon and the upper part of the $B$ horizon and many in the lower part of the $B$ horizon and in the Chorizon
Content and size of rock fragments: Less than 15 percent, by volume, in the A horizon and 0 to 25 percent in the B and C horizons; mostly gravel or cobbles
Soil reaction: Very strongly acid to slightly acid, except where surface layers have been limed
A or Ap horizon:
Color-hue of 7.5 YR or 10 YR , value of 3 to 5 , and chroma of 2 to 4 ; where the horizon has value of 3 , it is less than 6 inches thick
Texture (fine-earth fraction)-fine sandy loam or sandy clay loam
$B A$ or $B E$ horizon (if it occurs):
Color-hue of 5YR, value of 4 or 5, and chroma of 4 to 6

Texture (fine-earth fraction)-fine sandy loam or loam

## Bt horizon:

Color-hue of 2.5 YR or 5 YR , value of 4 or 5 , and chroma of 4 to 8
Mottles-shades of red, brown, or yellow
Texture (fine-earth fraction)-loam, sandy clay loam, or clay loam

## $B C$ horizon:

Color-hue of 2.5 YR or 5 YR , value of 4 or 5 , and chroma of 4 to 8
Mottles (if they occur)—shades of red, brown, or yellow
Texture (fine-earth fraction)-loam, fine sandy loam, sandy loam, or sandy clay loam

## Chorizon:

Color-horizon is multicolored or has hue of 2.5YR or 5 YR , value of 4 or 5 , and chroma of 4 to 8
Mottles (if they occur)—shades of red, brown, or yellow
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

## Greenlee 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 to mafic, high-grade metamorphic and igneous rock
Landscape:Low and intermediate mountains in the eastern and southeastern parts of the county
Landform: Coves, colluvial fans, drainageways, and benches
Landform position:Head slopes, side slopes, footslopes, and toeslopes
Slope range: 30 to 50 percent
Taxonomic classification: Loamy-skeletal, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Greenlee very cobbly sandy loam, 30 to 50 percent slopes, extremely bouldery; 2.9 miles east of Pineola on Secondary Road 1518, about 2.3 miles north on National Forest Service Road 464, about 300 yards northeast on a trail, 150 feet north of the trail, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 01 minute 00 seconds N . and long. 81 degrees 50 minutes 55 seconds W .

Oe-1 inch to 0; partially decomposed leaf litter. A-0 to 4 inches; dark brown (10YR 3/3) very cobbly
sandy loam; weak fine granular structure; very friable; many fine and medium roots; few fine flakes of mica; 30 percent, by volume, cobbles and 10 percent gravel; moderately acid; clear wavy boundary.
Bw1-4 to 12 inches; yellowish brown (10YR $5 / 4$ ) very cobbly sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 30 percent, by volume, cobbles and 15 percent gravel; moderately acid; gradual wavy boundary.
Bw2-12 to 32 inches; light yellowish brown (10YR 6/4) very cobbly sandy loam; weak medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; 30 percent, by volume, cobbles and 15 percent gravel; moderately acid; gradual wavy boundary.
C-32 to 62 inches; light yellowish brown (10YR 6/4) and very pale brown (10YR 7/4) very cobbly sandy loam; massive; few fine roots; few fine flakes of mica; 30 percent, by volume, cobbles, 15 percent gravel, and 10 percent stones; strongly acid.

## Range in Characteristics

Thickness of solum: 20 to more than 60 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: 35 to 60 percent, by volume, in the $A$ and $B$ horizons and 35 to 80 percent in the C horizon; ranging from gravel to boulders
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed
A or Ap horizon:
Color-hue of 10 YR or 7.5 YR , value of 2 to 5 , and chroma of 1 to 4 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction)-sandy loam

## Bwhorizon:

Color-hue of 10 YR or 7.5 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or sandy clay loam
$B C$ horizon (if it occurs):
Color-hue of 10 YR or 7.5 YR , value of 4 to 6 , and chroma of 3 to 6
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or loamy sand

Chorizon:
Color-hue of 10 YR or 7.5 YR , value of 4 to 6 , and chroma of 3 to 8

Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or loamy sand

## Jeffrey 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: Intermediate mountains in the central and northeast-central parts of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 30 to 80 percent
Taxonomic classification: Fine-loamy, mixed, mesic Umbric Dystrochrepts

## Typical Pedon

Jeffrey gravelly sandy loam in an area of CrossnoreJeffrey complex, 30 to 50 percent slopes, very stony; 1.2 miles east of Newland on N.C. Highway 181, about 100 feet north of the road, in a road cut; Newland USGS topographic quadrangle; lat. 36 degrees 04 minutes 27 seconds $N$. and long. 81 degrees 54 minutes 44 seconds W.

A1-0 to 5 inches; black (10YR 2/1) gravelly sandy loam; weak fine granular structure; very friable; many fine and medium roots; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
A2—5 to 9 inches; dark brown (10YR 3/3) gravelly sandy loam; weak fine granular structure; very friable; many fine and medium roots; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Bw-9 to 20 inches; yellowish brown (10YR 5/6)
gravelly loam; weak fine subangular blocky structure; friable; common fine and medium roots; 18 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
C—20 to 31 inches; yellowish brown (10YR 5/6)
gravelly sandy loam; massive; friable; few fine and medium roots; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
R-31 to 36 inches; hard unweathered, slightly fractured, low-grade feldspathic metasandstone.

## Range in Characteristics

Thickness of solum: 18 to 35 inches
Depth to bedrock: 20 to 40 inches to hard bedrock

Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon, less than 30 percent in the $B$ horizon, and 15 to 50 percent in the $C$ horizon; including gravel, cobbles, channers, and stones but dominantly gravel or cobbles
Soil reaction: Very strongly acid or strongly acid, except where surface layers have been limed

A or Ap horizon:
Color-hue of 10YR and value and chroma of 2 or 3
Texture (fine-earth fraction)—sandy loam

## Bw horizon:

Color-hue of 10 YR , value of 4 or 5 , and chroma of 3 to 6
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam; thin subhorizons of sandy clay loam occur in some pedons
$B C$ horizon (if it occurs):
Color-hue of 10 YR , value of 4 or 5 , and chroma of 3 to 6
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

Chorizon:
Color-horizon has hue of 10 YR , value of 4 or 5 , and chroma of 4 to 6 , or it is multicolored
Texture (fine-earth fraction)-loamy sand, sandy loam, fine sandy loam, or loam
Cr layer (if it occurs):
Type of bedrock—soft, weathered, low-grade metasedimentary bedrock that is partially consolidated but can be dug with difficulty with hand tools
$R$ layer:
Type of bedrock—hard unweathered, low-grade metasedimentary bedrock

## Maymead 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 to mafic, low-grade metasedimentary rock
Landscape: Low and intermediate mountains in the eastern and southeastern parts of the county
Landform: Coves, colluvial fans, drainageways, and benches

Landform position:Head slopes, side slopes,
footslopes, and toeslopes
Slope range: 8 to 30 percent
Taxonomic classification: Coarse-loamy, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Maymead loam in an area of Northcove-Maymead complex, 8 to 15 percent slopes, extremely stony; 3.7 miles east of Linville on U.S. Highway 221 North, 4.4 miles east on Secondary Road 1514, about 0.9 mile west on National Forest Service Road 192, about 450 feet south of a campsite, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 04 minutes 23 seconds $N$. and long. 81 degrees 47 minutes 34 seconds W .
Oi-2 inches to 1 inch; slightly decomposed leaf litter.
Oe-1 inch to 0 ; partially decomposed leaf litter.
A-0 to 4 inches; very dark grayish brown (10YR 3/2) loam; weak fine granular structure; very friable; many fine, medium, and coarse roots; 12 percent, by volume, gravel and cobbles; very strongly acid; clear wavy boundary.
Bw1-4 to 10 inches; yellowish brown (10YR 5/4) loam; weak medium subangular blocky structure; friable; common fine and medium roots; 12 percent, by volume, gravel and cobbles; strongly acid; gradual wavy boundary.
Bw2-10 to 18 inches; yellowish brown (10YR 5/6) gravelly loam; weak medium subangular blocky structure; friable; common fine and medium roots; 15 percent, by volume, gravel and 5 percent cobbles; very strongly acid; gradual wavy boundary.
Bw3-18 to 40 inches; yellowish brown (10YR 5/6) cobbly loam; weak fine subangular blocky structure; friable; common fine and medium roots; 20 percent, by volume, cobbles and 10 percent gravel; very strongly acid; gradual wavy boundary.
C-40 to 62 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; massive; friable; common fine roots; 30 percent, by volume, cobbles, 10 percent gravel, and 10 percent stones; very strongly acid.

## Range in Characteristics

Thickness of solum: 40 to more than 70 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: 10 to 15 percent, by volume, in the A horizon and 10 to 50 percent in the $B$ and $C$ horizons; an average of 15 to 35 percent in the horizons between depths of 10 and

40 inches (control section); ranging from gravel to boulders
Soil reaction: Very strongly acid or strongly acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 10 YR , value of 3 to 5 , and chroma of 2 or 3 ; where the horizon has value of 3 , it is less than 7 inches thick
Texture (fine-earth fraction)-loam
E horizon (if it occurs):
Color-hue of 10 YR , value of 4 or 5 , and chroma of 4 or 6
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam

## Bw horizon:

Color-hue of 10 YR or 7.5 YR , value of 4 or 5 , and chroma of 4 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam; some pedons have a thin layer of sandy clay loam
C horizon:
Color-hue of 10YR or 7.5 YR , value of 4 or 5 , and chroma of 4 to 8
Texture (fine-earth fraction)-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 rock that has a high mica content
Landscape:Low and intermediate mountains predominantly in the southwestern part of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits Slope range: 15 to 95 percent
Taxonomic classification: Coarse-loamy, micaceous, mesic Typic Dystrochrepts

## Typical Pedon

Micaville loam in an area of Chandler-Micaville complex, 30 to 50 percent slopes, stony; 7.6 miles west of Crossnore on N.C. Highway 194, about 3.1 miles south on U.S. Highway 19E, about 0.5 mile north at Mayland Community College entrance, 1,000 feet northwest of north campus building, in woods; Spruce Pine USGS topographic quadrangle; lat. 35 degrees 56
minutes 20 seconds N . and long. 82 degrees 01 minute 11 seconds W.

Oi-1 inch to 0 ; slightly decomposed leaf litter.
A-0 to 4 inches; dark yellowish brown (10YR 4/4) loam; weak fine granular structure; very friable; common fine and medium roots; many very fine and fine flakes of mica; 5 percent, by volume, gravel; strongly acid; clear smooth boundary.
Bw-4 to 34 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; many fine and medium flakes of mica; 5 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
BC-34 to 44 inches; strong brown ( 7.5 YR 5/8) sandy loam; weak medium subangular blocky structure; friable; few fine and medium roots; many fine and medium flakes of mica; 10 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C-44 to 48 inches; strong brown (7.5YR 5/6) and yellowish red (5YR 5/8) sandy loam; massive; friable; few fine roots; many fine and medium flakes of mica; 12 percent, by volume, gravel; strongly acid; gradual wavy boundary.
Cr-48 to 62 inches; soft weathered, slightly fractured mica schist that can be dug with difficulty with hand tools.

## Range in Characteristics

Thickness of solum: 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 15 percent, by volume, in the A horizon and less than 35 percent in the $B$ and $C$ horizons; mostly gravel but including cobbles and stones
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

A or Ap horizon:
Color-hue of 7.5 YR or 10 YR , value of 2 to 5 , and chroma of 1 to 4 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction)-loam
Bwhorizon:
Color-hue of 7.5 YR or 10 YR , 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-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8

Texture (fine-earth fraction)-loamy sand, loamy fine sand, sandy loam, fine sandy loam, or loam

## Chorizon:

Color-horizon is multicolored or has hue of 5 YR to 10 YR , value of 3 to 8 , and chroma of 2 to 8
Texture (fine-earth fraction)-loamy sand, coarse sandy loam, sandy loam, fine sandy loam, or loam saprolite
Crlayer:
Type of bedrock-soft weathered, slightly fractured to highly fractured, felsic, high-grade metamorphic rock that has a high mica content but can be dug with difficulty with hand tools

## Nikwasi Series

Depth class:Very deep
Drainage class: Poorly drained
Depth to seasonal high water table: 0 to 1.0 foot from November through May
Permeability: Moderately rapid in the upper part of the profile and rapid in the underlying material
Parent material: Recent alluvium that is loamy in the upper part and sandy-skeletal in the lower part
Landscape:Valleys of intermountain hills and low and intermediate mountains throughout the county
Landform: Flood plains
Landform position: Planar to slightly concave slopes
Slope range: 0 to 3 percent
Taxonomic classification: Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Cumulic Humaquepts

## Typical Pedon

Nikwasi loam, 0 to 3 percent slopes, frequently flooded; 5.4 miles south of Minneapolis on U.S. Highway 19E, about 250 feet south of the road, in pasture; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 03 minutes 08 seconds N. and long. 82 degrees 00 minutes 54 seconds W .
A1-0 to 10 inches; black (10YR 2/1) loam; weak fine granular structure; very friable; many fine roots; few very fine flakes of mica; 3 percent, by volume, gravel; strongly acid; gradual wavy boundary.
A2-10 to 24 inches; black ( $\mathrm{N} 2.5 / 0$ ) loam; weak fine granular structure; very friable; many fine roots; common fine flakes of mica; 3 percent, by volume, gravel; strongly acid; gradual wavy boundary.
Cg1-24 to 30 inches; dark gray (10YR 4/1) gravelly sandy loam; massive; friable; common fine and medium roots; many fine and medium flakes of


Figure 17.-A profile of Ashe gravelly sandy loam. Ashe soils have thin, light colored surface layers and are 20 to 40 inches to hard bedrock. The scale is in feet.


Figure 18.-A profile of Cleveland gravelly fine sandy loam. Cleveland soils have thin, light colored surface layers and are less than 20 inches to hard bedrock. The scale is in feet.


Figure 19.-A profile of Edneyville fine sandy loam. Edneyville soils have thin, light colored surface layers and are more than 60 inches to hard bedrock. The scale is in inches/feet.


Figure 20.-A profile of Ostin cobbly fine sandy loam. Ostin soils are on flood plains and formed in coarse textured alluvium containing large amouints of sand, gravel, and cobbles. The scale is in feet.
mica; 18 percent, by volume, gravel; moderately acid; clear wavy boundary.
Cg2-30 to 62 inches; dark gray (10YR 4/1) very gravelly sand; massive; friable; few fine roots; many fine and medium flakes of mica; 35 percent, by volume, gravel and 15 percent cobbles; strongly acid.

## Range in Characteristics

Depth to contrasting material: 24 to 40 inches
Depth to bedrock: More than 72 inches
Content of mica flakes: None to many throughout the profile
Content and size of rock fragments: Less than 15 percent, by volume, in the A horizon, less than 35 percent in 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, except where surface layers have been limed
A or Ap horizon:
Color-horizon has hue of 10 YR or 2.5 Y , value of 2 or 3 , and chroma of 1 to 3 , or it is neutral in hue and has value of 2 or 3
Texture (fine-earth fraction)-loam
Redoximorphic features-iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

AC horizon (if it occurs):
Color-horizon has hue of 10 YR or 2.5 Y , value of 2 or 3 , and chroma of 1 to 3 , or it is neutral in hue and has value of 2 or 3
Texture-sand, loamy coarse sand, loamy fine sand, or loamy sand
Redoximorphic features-iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

Cg horizon, upper part (fine-earth fraction):
Color-this part has hue of 10 YR or 2.5Y, value of 4 to 7 , and chroma of 1 to 2 , or it is neutral in hue and has value of 4 to 7
Texture (fine-earth fraction)-loamy sand
Redoximorphic features-iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

Cg horizon, lower part (fine-earth fraction):
Color-this part has hue of 10YR or 2.5Y, value of 4 to 7 , and chroma of 1 to 2 , or it is neutral in hue and has value of 4 to 7

Texture (fine-earth fraction)-sand, coarse sand, loamy coarse sand, or loamy sand
Redoximorphic features-iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

## Northcove 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 to mafic, low-grade metasedimentary rock
Landscape: Low and intermediate mountains in the eastern and southeastern 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 classification: Loamy-skeletal, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Northcove very cobbly loam in an area of NorthcoveMaymead complex, 8 to 15 percent slopes, extremely stony; 3.7 miles east of Linville on U.S. Highway 221 North, 4.4 miles east on Secondary Road 1514, about 0.9 mile west on National Forest Service Road 192, about 250 feet south of a campsite, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 04 minutes 27 seconds $N$. and long. 81 degrees 47 minutes 32 seconds W .

Oi-3 to 2 inches; slightly decomposed leaf litter. Oe-2 inches to 0 ; partially decomposed leaf litter. A-0 to 4 inches; very dark grayish brown (10YR 3/2) very cobbly loam; weak fine granular structure; very friable; many fine and medium roots; 25 percent, by volume, cobbles and 15 percent gravel; extremely acid; gradual wavy boundary.
BA-4 to 8 inches; yellowish brown (10YR 5/4) very cobbly sandy loam; weak medium subangular blocky structure; friable; many fine and medium roots; 25 percent, by volume, cobbles, 15 percent gravel, and 5 percent stones; very strongly acid; gradual wavy boundary.
$\mathrm{Bw}-8$ to 36 inches; yellowish brown (10YR 5/8) very cobbly sandy loam; weak fine subangular blocky structure; friable; common fine, medium, and coarse roots; 30 percent, by volume, cobbles, 10
percent gravel, and 10 percent stones; strongly acid; gradual wavy boundary.
C—36 to 62 inches; yellowish brown (10YR 5/6) extremely cobbly sandy loam; massive; friable; few fine and medium roots; 30 percent, by volume, cobbles, 20 percent stones, and 15 percent gravel; moderately acid.

## Range in Characteristics

Thickness of solum: 35 to more than 60 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: 35 to 60 percent, by volume, in the $A$ and $B$ horizons and 35 to 80 percent in the C horizon; ranging from gravel to boulders
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed
A horizon:
Color-hue of 10 YR or 7.5 YR , value of 2 to 5 , and chroma of 2 to 4 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction) -loam

## BA horizon:

Color-hue of 10 YR or 7.5 YR , value of 4 or 5 , and chroma of 3 to 6
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

## Bw horizon:

Color-hue of 10 YR or 7.5 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

## Chorizon:

Color-hue of 10 YR or 7.5 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loamy sand

## Ostin Series

Depth class: Very deep
Drainage class:Well drained
Depth to seasonal high water table: 2.0 to 3.5 feet from January through April
Permeability: Moderately rapid in the A horizon and rapid or very rapid in the C horizon
Parent material: Recent alluvium that is loamy or 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 or adjacent to streams and rivers on the larger flood plains
Landform position: Planar to slightly convex slopes
Slope range: 0 to 5 percent
Taxonomic classification: Sandy-skeletal, mixed, mesic Typic Udifluvents

## Typical Pedon

Ostin cobbly fine sandy loam, 0 to 5 percent slopes, occasionally flooded (fig. 20) 6.6 miles east of Linville on Secondary Road 1511, about 300 feet northwest of the road, across Gragg Prong Creek, in a small field; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 02 minutes 00 seconds $N$. and long. 81 degrees 48 minutes 15 seconds W.

Ap-0 to 4 inches; dark brown (10YR 3/3) cobbly fine sandy loam; weak fine granular structure; very friable; many fine roots; few fine flakes of mica; 15 percent, by volume, cobbles and 10 percent gravel; strongly acid; clear wavy boundary.
C1—4 to 17 inches; brown (10YR 4/3) very cobbly loamy sand; massive; very friable; few fine roots; few fine flakes of mica; 35 percent, by volume, cobbles and 10 percent gravel; moderately acid; clear wavy boundary.
C2—17 to 62 inches; dark yellowish brown (10YR 4/4) extremely cobbly loamy sand; massive; very friable; few fine roots; few fine flakes of mica; 50 percent, by volume, cobbles and 15 percent gravel; slightly acid.

## Range in Characteristics

Depth to bedrock: More than 60 inches
Depth to contrasting material: Less than 20 inches to deposits of cobbles and gravel that are stratified with sandy material
Content of mica flakes: Few to many throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 5 to 80 percent in the $C$ horizon; an average of more than 35 percent in the control section; mostly gravel or cobbles but including stones
Soil reaction:Very strongly acid to neutral
A or Ap horizon:
Color-hue of 10 YR , value of 3 to 5 , and chroma of 1 to 6 ; where the horizon has value of 3 , it is less than 7 inches thick
Texture-fine sandy loam

## Chorizon:

Color-horizon is multicolored or has hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8

Texture (fine-earth fraction)—sand, loamy sand, or coarse sand

## 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 to mafic, highgrade metamorphic or igneous rock
Landscape: Intermountain hills and low and intermediate mountains predominantly in the eastern part of the county
Landform: Slopes and ridges on hills and mountains
Landform position: Side slopes and summits
Slope range: 8 to 50 percent
Taxonomic classification: Fine-loamy, mixed, mesic Typic Hapludults

## Typical Pedon

Pigeonroost gravelly loam in an area of EdneytownPigeonroost complex, 8 to 15 percent slopes, stony; 7.8 miles east of Linville on Secondary Road 1511, about 1.25 miles north on National Forest Service Road 451, about 700 feet northwest of the road, in woods on a ridgetop; Grandfather USGS topographic quadrangle; lat. 36 degrees 02 minutes 43 seconds $N$. and long. 81 degrees 47 minutes 42 seconds $W$.

Oi-1 inch to 0; slightly decomposed leaf litter.
A—0 to 2 inches; dark yellowish brown (10YR 4/4) gravelly loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; 20 percent, by volume, gravel; strongly acid; clear smooth boundary.
E-2 to 6 inches; yellowish brown (10YR 5/6) gravelly loam; weak fine granular structure; very friable; common fine and medium roots; few fine flakes of mica; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Bt-6 to 20 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 10 percent, by volume, gravel; very strongly acid; gradual irregular boundary.
BC-20 to 32 inches; strong brown (7.5YR 4/6) and dark yellowish brown (10YR 4/6) loam; weak fine subangular blocky structure; friable; few fine roots; few fine flakes of mica; 10 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Cr-32 to 62 inches; soft weathered, moderately
fractured gneiss that can be dug with difficulty with hand tools.

## Range in Characteristics

Thickness of solum: 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: Few or common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and less than 35 percent in the $B$ and $C$ horizons; ranging from gravel to stones
Soil reaction: Extremely acid to moderately acid in the A horizon, except where surface layers have been limed, and very strongly acid or strongly acid in the $B$ and $C$ horizons

## A or Ap horizon:

Color-hue of 7.5 YR or 10 YR , value of 3 to 5 , and chroma of 2 to 6 ; where the horizon has value of 3 , it is less than 6 inches thick
Texture (fine-earth fraction)—loam
E or BE horizon (if it occurs):
Color-hue of 7.5YR or 10YR and value and chroma of 4 or 6
Texture (fine-earth fraction)-loam, fine sandy loam, sandy loam, or sandy clay loam

## Bt horizon:

Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)—loam, sandy clay loam, clay loam, or silty clay loam

BC horizon:
Color-horizon has hue of 7.5 YR or 10YR, value of 4 to 8 , and chroma 3 to 8 , or it is mixed in shades of red, brown, or yellow
Texture (fine-earth fraction) -coarse sandy loam, sandy loam, fine sandy loam, loam, sandy clay loam, or clay loam

C horizon (if it occurs):
Color-horizon is multicolored or has hue of 5 YR to 10 YR and value and chroma of 3 to 8
Texture-coarse sandy loam, sandy loam, fine sandy loam, or loam

Cr layer:
Type of bedrock—soft weathered, slightly fractured to highly fractured, felsic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools

## Pineola 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: Intermediate mountains in the central and northeastern parts of the county
Landform: Mountain ridges and slopes
Landform position: Summits and side slopes
Slope range: 2 to 30 percent
Taxonomic classification: Fine-loamy, mixed, mesic Humic Hapludults

## Typical Pedon

Pineola gravelly loam, 8 to 15 percent slopes, stony; about 1.9 miles east of Linville on U.S. Highway 221, about 1.2 miles south on Secondary Road 1510, about 200 feet southeast on a logging road, 30 feet east of the road, in woods; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 04 minutes 25 seconds $N$. and long. 81 degrees 51 minutes 34 seconds W.

Oi-2 inches to 0 ; undecomposed oak leaf litter. A-0 to 7 inches; dark brown (10YR 3/3) gravelly loam; weak fine granular structure; very friable; many fine and few medium roots; 20 percent, by volume, gravel; strongly acid; clear wavy boundary.
Bt-7 to 20 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine and few medium roots; 8 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
BC-20 to 26 inches; brownish yellow (10YR 6/6) loam; weak medium subangular blocky structure; friable; few fine and few medium roots; 10 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C-26 to 32 inches; brownish yellow (10YR 6/6) gravelly loam saprolite; many medium distinct very pale brown (10YR 7/4) mottles; massive; friable; few very fine and fine roots; 20 percent, by volume, gravel; strongly acid; clear wavy boundary.
Cr-32 to 61 inches; weathered multicolored, partially consolidated, low-grade metasiltstone that can be dug with difficulty with hand tools.

## Range in Characteristics

Thickness of solum: 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: None to common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon, less than 35 percent in the B horizon, and less than 50 percent in the C horizon; including gravel, cobbles, channers, and stones but dominantly gravel or channers
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 7.5 YR or 10 YR , value of 2 or 3 , and chroma of 1 to 4
Texture (fine-earth fraction)—loam
$A B$ or $B A$ horizon (if it occurs):
Color-hue of 7.5 YR to 10 YR , value of 3 or 4 , and chroma of 2 to 6
Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt loam
Bt horizon:
Color-hue of 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)—clay loam, sandy clay loam, loam, or silty clay loam
BC horizon:
Color-horizon has hue of 7.5 YR to 2.5 Y , value of 4 to 7 , and chroma of 4 to 8 , or it is multicolored in shades of red, brown, yellow, black, and white
Texture (fine-earth fraction)-coarse sandy loam, sandy loam, fine sandy loam, loam, or silt loam

## Chorizon:

Color-horizon has hue of 5 YR to 2.5 Y , value of 3 to 8 , and chroma of 1 to 8 , or it is multicolored in shades of red, brown, yellow, black, and white
Texture (fine-earth fraction)-loamy coarse sand, loamy sand, loamy fine sand, coarse sandy loam, sandy loam, fine sandy loam, loam, or silt loam

Crlayer:
Type of bedrock-weathered, multicolored, lowgrade metasedimentary bedrock that is partially consolidated but can be dug with difficulty with hand tools

## Plott Series

Depth class:Very deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet Permeability: Moderately rapid
Parent material: Residuum affected by soil creep in the
upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Landscape: Intermediate mountains predominantly in the southwestern and western parts of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 15 to 95 percent
Taxonomic classification: Fine-loamy, mixed, mesic Typic Haplumbrepts

## Typical Pedon

Plott loam, 30 to 50 percent slopes, stony; in Mitchell County, North Carolina; 9.9 miles north from
Bakersville on North Carolina Highway 261, about 0.1 mile southwest on Secondary Road 1346 to a private road, 0.7 mile northwest on the private road, in a road cut; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 05 minutes 24 seconds $N$. and long. 82 degrees 06 minutes 22 seconds W .
A-0 to 13 inches; very dark grayish brown (10YR 3/2) loam, brown (10YR 4/3) dry; moderate medium granular structure; friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; strongly acid; clear wavy boundary.
$A B-13$ to 16 inches; very dark grayish brown (10YR 3/2) loam, dark yellowish brown (10YR 4/4) dry; common medium distinct strong brown (7.5YR 4/6) mottles; weak fine subangular blocky structure; very friable; common very fine and fine roots; common very fine and fine tubular pores; few fine flakes of mica; 1 percent, by volume, gravel; strongly acid; clear wavy boundary.
Bw-16 to 37 inches; strong brown (7.5YR 4/6) loam; weak medium subangular blocky structure; friable; common very fine to coarse roots; common very fine and fine tubular pores; few fine flakes of mica; 5 percent, by volume, gravel; strongly acid; gradual wavy boundary.
BC-37 to 43 inches; dark brown (7.5YR 4/4) sandy loam; weak fine subangular blocky structure; very friable; few very fine and fine roots; few very fine and fine tubular pores; common distinct streaks of multicolored saprolite; few fine flakes of mica; 5 percent, by volume, gravel; strongly acid; clear wavy boundary.
C-43 to 62 inches; multicolored loamy sand saprolite; massive; very friable; few very fine roots; few very fine tubular pores; common fine flakes of mica; strongly acid.

## Range in Characteristics

Thickness of solum: 30 to more than 60 inches
Depth to bedrock: More than 60 inches

Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: Less than 15 percent, by volume, in the A horizon, less than 35 percent 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 moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 5 YR to 10 YR , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam
Thickness-10 to 20 inches

## AB horizon:

Color-hue of 7.5 YR or 10 YR , value of 3 or 4 , and chroma of 2 to 4
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam

## Bwhorizon:

Color-horizon has hue of 7.5YR to 10YR, value of 3 to 5 , and chroma of 4 to 8 , and it may be mottled in shades of these colors
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam; thin subhorizons of sandy clay loam occur in some pedons

## BC horizon:

Color-horizon has hue of 7.5 YR or 10YR, value of 4 to 6 , and chroma of 3 to 8 , and it may be mottled in shades of these colors
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam

## C horizon:

Color-horizon is multicolored or has hue of 5 YR to 2.5 Y and value and chroma of 3 to 8
Texture (fine-earth fraction)-sand, loamy sand, loamy fine sand, sandy loam, or fine sandy loam saprolite

## Porters Series

Depth class: Deep
Depth to seasonal high water table: More than 6.0 feet
Drainage class:Well drained
Permeability: Moderately rapid
Parent material: Residuum affected by soil creep in the upper part, weathered from felsic to mafic, highgrade metamorphic or igneous rock
Landscape: Intermediate mountains throughout the county, except in the easternmost part
Landform: Mountain slopes and ridges

Landform position: Side slopes and summits
Slope range: 8 to 80 percent
Taxonomic classification: Fine-loamy, mixed, mesic
Umbric Dystrochrepts

## Typical Pedon

Porters gravelly loam, 30 to 50 percent slopes, stony; 4.2 miles south of Minneapolis on U.S. Highway 19E, about 4.7 miles northwest on Secondary Road 1132 to the end of the road at U.S. Forest Service gate, 0.2 mile north of the gate on the service road, 10 feet east of the road, in a road cut; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 07 minutes 11 seconds N . and long. 82 degrees 03 minutes 00 seconds W.

Oe-1 inch to 0; partially decomposed leaf litter.
A1-0 to 2 inches; dark brown (10YR 3/3) gravelly loam; weak fine granular structure; very friable; many fine and medium roots; few very fine flakes of mica; 18 percent, by volume, gravel; very strongly acid; clear wavy boundary.
A2-2 to 9 inches; dark yellowish brown (10YR 3/4) gravelly loam; weak fine granular structure; very friable; many fine and medium roots; few very fine flakes of mica; 18 percent, by volume, gravel; very strongly acid; clear wavy boundary.
Bw-9 to 30 inches; dark yellowish brown (10YR 4/6) loam; weak fine subangular blocky structure; friable; common fine and medium roots; few very fine flakes of mica; 10 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C1-30 to 40 inches; dark yellowish brown (10YR 4/6)
fine sandy loam; massive; friable; few very fine flakes of mica; 12 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C2-40 to 54 inches; gravelly sandy loam saprolite that is multicolored in shades of brown; massive; friable; few very fine flakes of mica; 20 percent, by volume, gravel; slightly acid; gradual wavy boundary.
R-54 to 62 inches; hard unweathered, slightly fractured amphibolite bedrock.

## Range in Characteristics

Thickness of solum: 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 35 percent, by volume, in all horizons; ranging from gravel to stones

Soil reaction: Very strongly acid to slightly acid, except where surface layers have been limed

## A horizon:

Color-hue of 7.5 YR or 10 YR , value of 2 or 3 , and chroma of 1 to 4
Texture (fine-earth fraction)-loam

## Bwhorizon:

Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam; thin subhorizons of sandy clay loam occur in some pedons
$B C$ horizon (if it occurs):
Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam
Chorizon:
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 saprolite

Cr layer (if it occurs):
Type of bedrock-soft weathered, slightly fractured to highly fractured, felsic to mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools
R layer:
Type of bedrock-hard unweathered, slightly fractured to highly fractured, felsic to 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 April
Permeability: Moderately rapid in the surface layer and subsoil and rapid in the underlying material
Parent material: Recent alluvium that is loamy in the upper part and sandy or sandy-skeletal in the lower part
Landscape: Mountain valleys
Landform: Flood plains
Landform position: Planar to slightly convex slopes
Slope range: 0 to 3 percent
Taxonomic classification: Coarse-loamy over sandy or
sandy-skeletal, mixed, mesic Fluventic
Haplumbrepts

## Typical Pedon

Reddies fine sandy loam, 0 to 3 percent slopes, frequently flooded; 5.3 miles south of Minneapolis on U.S. Highway 19E, about 500 feet south-southeast of the road, in pasture; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 03 minutes 07 seconds $N$. and long. 82 degrees 01 minute 03 seconds W .

A-0 to 11 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; very friable; many fine roots; few fine flakes of mica; 3 percent, by volume, gravel; slightly acid; clear wavy boundary.
Bw-11 to 24 inches; dark yellowish brown (10YR 4/6) sandy loam; weak fine subangular blocky structure; very friable; common fine roots; common fine and medium flakes of mica; 8 percent, by volume, gravel; moderately acid; clear wavy boundary.
C—24 to 62 inches; dark yellowish brown (10YR 4/6) very cobbly sand; massive; very friable; few fine roots in top part of the horizon; many fine and medium flakes of mica; 25 percent, by volume, cobbles and 20 percent gravel; moderately acid.

## Range in Characteristics

Thickness of solum: 20 to 39 inches
Depth to contrasting material: 20 to 40 inches to deposits of cobbles and gravel that are stratified with sandy 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 15 percent, by volume, in the A horizon, less than 35 percent in the B horizon, and more than 35 percent in the C horizon; mostly gravel or cobbles but including stones
Soil reaction:Very strongly acid to neutral
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; in some pedons there is a recently deposited thin layer of sandy overwash

## Bw horizon:

Color-hue of 7.5 YR or 10YR, value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam
Redoximorphic features-chroma of 2 or less, below a depth of 20 inches

## Chorizon:

Color-horizon is multicolored or has hue of 7.5YR to 2.5 Y , value of 2 to 6 , and chroma of 2 to 8
Texture (fine-earth fraction)-sand, coarse sand, loamy sand, or loamy fine sand
Redoximorphic features-iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

## Rosman Series

## Depth class:Very deep

Depth to seasonal high water table: 2.5 to 5.0 feet from January through April
Drainage class:Well drained
Permeability:Moderately rapid
Parent material: Recent alluvium
Landscape: Mountain valleys
Landform: Larger flood plains
Landform position: Planar to slightly convex slopes
Slope range: 0 to 5 percent
Taxonomic classification: Coarse-loamy, mixed, mesic Fluventic Haplumbrepts

## Typical Pedon

Rosman loam, 0 to 3 percent slopes, occasionally flooded; 1.8 miles south of Linville, 0.1 mile west on Camp Linn-Haven Drive, 650 feet south in a field; Newland USGS topographic quadrangle; lat. 36 degrees 03 minutes 01 second $N$. and long. 81 degrees 53 minutes 17 seconds W .

A-0 to 14 inches; dark brown (10YR 3/3) loam; moderate fine granular structure; very friable; many fine roots; few very fine flakes of mica; moderately acid; gradual wavy boundary.
Bw-14 to 35 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine roots; few very fine flakes of mica; slightly acid; gradual irregular boundary.
C1-35 to 40 inches; yellowish brown (10YR 5/8) sandy loam; massive; very friable; common very fine roots; few very fine flakes of mica; strongly acid; gradual irregular boundary.
C2-40 to 55 inches; yellowish brown (10YR 5/8) loamy sand; massive; few very fine roots; few very fine flakes of mica; strongly acid; gradual wavy boundary.
C3-55 to 62 inches; yellowish brown (10YR 5/8) loamy sand; few very fine roots; few fine prominent yellowish red (5YR 4/6) iron accumulations; few fine distinct pale brown (10YR 6/3) iron depletions; few very fine flakes of mica; strongly acid.

## Range in Characteristics

Thickness of solum: 35 to 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
Depth to bedrock: More than 60 inches
Content of mica flakes: Few to many throughout the profile
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 or cobbles
Soil reaction: Strongly acid to neutral in the A and Bw horizons and the upper part of the C horizon and strongly acid to slightly acid in the lower part of the C horizon

## A horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam or sandy loam
$A p$ or $A b$ horizon (if it occurs):
Color-hue of 7.5 YR to 2.5 Y , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam or sandy loam

## Bwhorizon:

Color-hue of 5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or silt loam
Redoximorphic features (in some pedons)chroma of 2 or less, below a depth of 20 inches

## Chorizon:

Color-hue of 7.5 YR to 2.5 Y , value of 3 to 6 , and chroma of 2 to 8
Texture (fine-earth fraction)-coarse sand, sand, fine sand, coarse sandy loam, sandy loam, fine sandy loam, or loam
Redoximorphic features (if they occur)-iron or clay depletions in shades of brown, yellow, olive, or gray; iron accumulations in shades of red, brown, yellow, or olive

## Saunook Series

Depth class:Very deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet Permeability:Moderate
Parent material: Colluvium derived from felsic to mafic, high-grade metamorphic and igneous rock

Landscape: Intermountain hills and low and intermediate mountains throughout the county
Landform: Coves, colluvial fans, drainageways, saddles, and benches
Landform position: Head slopes, footslopes, and toeslopes
Slope range: 2 to 50 percent
Taxonomic classification: Fine-loamy, mixed, mesic Humic Hapludults

## Typical Pedon

Saunook loam, 8 to 15 percent slopes; 4.2 miles south of Minneapolis on U.S. Highway 19E, about 4.4 miles northwest on Secondary Road 1132, about 50 feet east of the road, in an old abandoned field; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 06 minutes 45 seconds $N$. and long. 82 degrees 02 minutes 50 seconds $W$.

A1-0 to 5 inches; dark brown (10YR 3/3) loam; weak fine granular structure; very friable; many fine and medium roots; few fine flakes of mica; 12 percent, by volume, gravel; strongly acid; clear wavy boundary.
A2-5 to 8 inches; dark yellowish brown (10YR 3/4) loam; weak fine granular structure; very friable; many fine and medium roots; few fine flakes of mica; 12 percent, by volume, gravel; strongly acid; gradual wavy boundary.
$\mathrm{Bt}-8$ to 26 inches; dark yellowish brown (10YR 4/6) clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 10 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
$B C-26$ to 41 inches; dark yellowish brown (10YR 4/6) gravelly loam; weak medium subangular blocky structure; friable; common fine roots; few fine flakes of mica; 20 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C-41 to 62 inches; dark yellowish brown (10YR 4/6), yellowish brown (10YR 5/8), and brown (10YR 5/3) cobbly fine sandy loam; massive; friable; few fine roots; few fine flakes of mica; 15 percent, by volume, cobbles and 10 percent gravel; strongly acid.

## Range in Characteristics

Thickness of solum: 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: 2 to 15 percent, by volume, in the A horizon, less than 35 percent in
the Bt horizon, and less than 60 percent in the BC 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 to slightly acid in the B and C horizons

## A or Ap horizon:

Color-hue of 10 YR , value of 2 or 3 , and chroma of 2 to 4
Texture (fine-earth fraction)—loam or silt loam

## Bt horizon:

Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-loam, silt loam, clay loam, or sandy clay loam
$B C$ horizon:
Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, silt loam, or sandy clay loam

## Chorizon:

Color-horizon is multicolored or has hue of 7.5YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, silt loam, or loamy sand

## Soco Series

Depth class:Moderately deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet
Permeability:Moderately rapid
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Landscape: Low and intermediate mountains in the eastern and southeastern parts of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 15 to 95 percent
Taxonomic classification: Coarse-loamy, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Soco channery loam in an area of Stecoah-Soco complex, 30 to 50 percent slopes, stony; 3.7 miles east of Linville on U.S. Highway 221 North, 5.4 miles east on Secondary Road 1514, about 1,700 feet northeast, eventually turning northwest on an old jeep trail, in a road cut; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 04 minutes 39 seconds $N$. and long. 81 degrees 46 minutes 21 seconds W.

Oe-1 inch to 0; partially decomposed leaf litter.
A-0 to 3 inches; brown (10YR 4/3) channery loam; weak fine granular structure; very friable; many fine and medium roots; 20 percent, by volume, channers; strongly acid; clear smooth boundary.
$\mathrm{E}-3$ to 7 inches; yellowish brown (10YR 5/4) channery loam; weak fine granular structure; very friable; common fine and medium roots; 20 percent, by volume, channers; strongly acid; gradual wavy boundary.
Bw1-7 to 15 inches; yellowish brown (10YR 5/6) loam; weak fine subangular blocky structure; friable; common fine and medium roots; few very fine flakes of mica; 10 percent, by volume, channers; strongly acid; clear wavy boundary.
Bw2-15 to 28 inches; yellowish brown (10YR 5/6) channery loam; weak fine subangular blocky structure; friable; common fine and medium roots; few very fine flakes of mica; 20 percent, by volume, channers; very strongly acid; gradual wavy boundary.
C-28 to 35 inches; yellowish brown (10YR 5/6) channery fine sandy loam; massive; friable; few fine and medium roots; few very fine flakes of mica; 20 percent, by volume, channers; very strongly acid; clear wavy boundary.
Cr-35 to 62 inches; soft weathered, moderately fractured, low-grade feldspathic metasandstone that can be dug with difficulty with hand tools.

## Range in Characteristics

Thickness of solum: 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: 15 to 35 percent, by volume, in the A and E horizons and less than 35 percent in the B and C horizons; mostly channers or gravel but including cobbles, flagstones, and stones
Soil reaction: Extremely acid to strongly acid, except where surface layers have been limed
A horizon:
Color-hue of 7.5 YR to 2.5 Y , value of 2 to 5 , and chroma of 1 to 6 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction)-loam

## Ehorizon:

Color-hue of 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-loam, fine sandy loam, or silt loam

## Bw horizon:

Color-hue of 5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or silt loam
$B C$ horizon (if it occurs):
Color-hue of 5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or silt loam

## Chorizon:

Color-horizon is multicolored or has colors similar to those of the Bw and BC horizons
Texture (fine-earth fraction)-loamy sand, sandy loam, fine sandy loam, loam, or silt loam

## Crlayer:

Type of bedrock-soft weathered, slightly fractured to highly fractured, low-grade metasedimentary rock that can be dug with difficulty with hand tools

## Spivey Series

## Depth class:Very deep

Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet
Permeability:Moderate and moderately rapid
Parent material: Colluvium derived from low-grade metasedimentary rock
Landscape: Intermediate mountains in the central and northeast-central 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 classification: Loamy-skeletal, mixed, mesic Typic Haplumbrepts

## Typical Pedon

Spivey cobbly loam, 30 to 50 percent slopes, extremely bouldery; 5.5 miles north of Linville on U.S. Highway 221, about 200 yards south of the highway in a wooded drainageway; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 05 minutes 43 seconds $N$. and long. 81 degrees 48 minutes 15 seconds W.

Oi-1 inch to 0; slightly decomposed leaf litter.
A-0 to 11 inches; very dark grayish brown (10YR 3/2) cobbly loam; moderate fine granular structure; very friable; many fine and medium roots; 10 percent,
by volume, cobbles and 10 percent gravel; very strongly acid; clear wavy boundary.
Bw1-11 to 17 inches; brown (10YR 4/3) very cobbly loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 25 percent, by volume, cobbles, 20 percent gravel, and 5 percent stones; strongly acid; gradual wavy boundary.
Bw2-17 to 34 inches; yellowish brown (10YR 5/4) very cobbly loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 20 percent, by volume, cobbles, 20 percent gravel, and 10 percent stones; strongly acid; gradual wavy boundary.
C-34 to 62 inches; yellowish brown (10YR 5/6) very cobbly sandy loam; massive; few fine roots; 20 percent, by volume, cobbles, 20 percent stones, and 15 percent gravel; strongly acid.

## Range in Characteristics

Thickness of solum: 30 to more than 60 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 35 to 80 percent in the $B$ and $C$ horizons; ranging from gravel to boulders
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 7.5 YR or 10 YR , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam

## Bwhorizon:

Color-hue of 7.5 YR or 10YR, value of 4 or 5 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam; thin subhorizons of sandy clay loam occur in some pedons

## Chorizon:

Color-hue of 7.5 YR or 10 YR , value of 4 or 5 , and chroma of 3 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, or loam

## Statler Series

Depth class:Very deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet

Permeability: Moderate in the upper part of the profile and moderately rapid in the underlying material
Parent material: Old alluvium
Landscape:Valleys of intermountain hills and low and intermediate mountains throughout the county
Landform: Low stream terraces on the larger flood plains
Landform position: Planar to slightly convex slopes Slope range: 0 to 6 percent
Taxonomic classification: Fine-loamy, mixed, mesic Humic Hapludults

## Typical Pedon

Statler loam, 0 to 6 percent slopes, rarely flooded; 2.6 miles south of Crossnore on U.S. Highway 221, about 0.3 mile south on Secondary Road 1525, about 0.2 mile west on Secondary Road 1531, about 200 feet south of a church, in a field; Carvers Gap USGS topographic quadrangle; lat. 35 degrees 58 minutes 37 seconds $N$. and long. 81 degrees 58 minutes 45 seconds W.

Ap-0 to 9 inches; dark brown (10YR 3/3) loam; weak fine granular structure; very friable; many fine and common medium roots; few fine flakes of mica; 5 percent, by volume, gravel; strongly acid; clear smooth boundary.
Bt1-9 to 30 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 5 percent, by volume, gravel; strongly acid; gradual smooth boundary.
Bt2-30 to 38 inches; dark yellowish brown (10YR 4/6) sandy clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 5 percent, by volume, gravel; strongly acid; gradual smooth boundary.
C-38 to 62 inches; dark yellowish brown (10YR 4/4) fine sandy loam; massive; friable; few fine roots; few fine flakes of mica; 8 percent, by volume, gravel; strongly acid.

## Range in Characteristics

Thickness of solum: 30 to 80 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: None to common throughout the profile
Content and size of rock fragments: Less than 15 percent, by volume, in the A and Bt horizons and less than 30 percent in the C horizon; ranging from mostly gravel to cobbles
Soil reaction: Strongly acid or moderately acid, except where surface layers have been limed

A or Ap horizon:
Color-hue of 7.5 YR or 10 YR , value of 2 or 3 , and chroma of 2 to 4
Texture (fine-earth fraction)-loam
Bt horizon:
Color-hue of 5 YR to 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)—clay loam, sandy clay loam, loam, or silt loam; subhorizons of fine sandy loam occur in some pedons

## Chorizon:

Color-hue of 5 YR to 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-fine sandy loam, loam, or silt loam

## Stecoah Series

Depth class: Deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet Permeability:Moderately rapid
Parent material: Residuum affected by soil creep in the upper part, weathered from low-grade metasedimentary rock
Landscape:Low and intermediate mountains in the eastern and southeastern parts of the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 15 to 80 percent
Taxonomic classification: Coarse-loamy, mixed, mesic Typic Dystrochrepts

## Typical Pedon

Stecoah channery loam in an area of Stecoah-Soco complex, 30 to 50 percent slopes, stony; 3.7 miles east of Linville on U.S. Highway 221 North, 4.4 miles east on Secondary Road 1514, about 0.6 mile west on National Forest Service Road 192, about 1,250 feet southeast on a closed service road, in a road cut; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 04 minutes 18 seconds $N$. and long. 81 degrees 47 minutes 08 seconds W .
Oe-1 inch to 0 ; partially decomposed leaf litter.
A-0 to 4 inches; dark grayish brown (10YR 4/2) channery loam; weak fine granular structure; very friable; many fine and medium roots; few very fine flakes of mica; 20 percent, by volume, channers; extremely acid; clear wavy boundary.
BE-4 to 9 inches; yellowish brown (10YR 5/4) channery fine sandy loam; weak fine subangular blocky structure; very friable; common fine and
medium roots; few very fine flakes of mica; 20 percent, by volume, channers; strongly acid; gradual wavy boundary.
Bw-9 to 22 inches; brownish yellow (10YR 6/8) sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; few very fine flakes of mica; 10 percent, by volume, channers; very strongly acid; gradual wavy boundary.
$B C-22$ to 28 inches; brownish yellow (10YR 6/8) and very pale brown (10YR 7/3) sandy loam; weak fine subangular blocky structure; friable; common fine and medium roots; few very fine flakes of mica; 10 percent, by volume, channers; very strongly acid; gradual wavy boundary.
C1-28 to 40 inches; brownish yellow (10YR 6/6) and very pale brown (10YR 8/3) channery loamy sand; massive; friable; few fine and medium roots; few very fine flakes of mica; 15 percent, by volume, channers; strongly acid; gradual irregular boundary.
C2-40 to 50 inches; very pale brown (10YR 8/2) channery loamy sand; common medium distinct brownish yellow (10YR 6/6) mottles; massive; friable; few fine and medium roots; few very fine flakes of mica; 18 percent, by volume, channers; strongly acid; gradual irregular boundary.
$\mathrm{Cr}-50$ to 62 inches; soft weathered, moderately fractured, low-grade feldspathic metasandstone that can be dug with difficulty with hand tools.

## Range in Characteristics

Thickness of solum: 24 to 50 inches
Depth to bedrock: 40 to 60 inches to soft bedrock Content of mica flakes: Few or common throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and less than 35 percent in the $\mathrm{BE}, \mathrm{Bw}, \mathrm{BC}$, and C horizons; mostly channers or gravel but including cobbles, flagstones, and stones
Soil reaction: Extremely acid to strongly acid, except where surface layers have been limed

## A horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 2 to 5 , and chroma of 2 to 6 ; where the horizon has value of 3 or less, it is less than 7 inches thick
Texture (fine-earth fraction)-loam

## BE horizon:

Color-hue of 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-loam, fine sandy loam, or silt loam

Bw horizon:
Color-hue of 5 YR to 2.5 Y , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or silt loam
BC horizon:
Color-hue of 5 YR to 2.5 Y , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or silt loam

## Chorizon:

Color-horizon is multicolored or has colors similar to those of the Bw and BC horizons
Texture (fine-earth fraction)-loamy sand, sandy loam, fine sandy loam, loam, or silt loam
Crlayer:
Type of bedrock—soft weathered, slightly fractured to highly fractured, low-grade metasedimentary rock that can be dug with difficulty with hand tools

## Thunder 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 to mafic, high-grade metamorphic and igneous rock
Landscape: Intermountain hills and low and intermediate mountains throughout most of the county, except in the east-central and eastern parts of the county
Landform: Coves, colluvial fans, drainageways, and benches
Landform position:Head slopes, footslopes, and toeslopes
Slope range: 8 to 50 percent
Taxonomic classification: Loamy-skeletal, mixed, mesic Humic Hapludults

## Typical Pedon

Thunder cobbly loam in an area of Saunook-Thunder complex, 8 to 15 percent slopes, very stony; 4.2 miles south of Minneapolis on U.S. Highway 19E, about 4.6 miles northwest on Secondary Road 1132, about 75 feet east of the road in an old abandoned field; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 06 minutes 55 seconds $N$. and long. 82 degrees 02 minutes 50 seconds W.

A—0 to 12 inches; dark brown (10YR 3/3) cobbly loam;
weak medium granular structure; very friable; many fine and medium roots; few fine flakes of mica; 15 percent, by volume, cobbles and 10 percent gravel; strongly acid; clear wavy boundary.
Bt-12 to 25 inches; dark yellowish brown (10YR 4/6) very cobbly loam; weak medium subangular blocky structure; friable; common fine and medium roots; few fine flakes of mica; 20 percent, by volume, cobbles, 20 percent gravel, and 5 percent stones; strongly acid; gradual wavy boundary.
BC-25 to 51 inches; dark yellowish brown (10YR 4/6) extremely cobbly loam; weak medium subangular blocky structure; friable; few fine roots; few fine flakes of mica; 35 percent, by volume, cobbles, 25 percent gravel, and 5 percent stones; strongly acid; gradual wavy boundary.
C—51 to 62 inches; yellowish brown (10YR 5/6) extremely cobbly sandy loam; massive; few fine roots; few fine flakes of mica; 35 percent, by volume, cobbles, 30 percent gravel, and 10 percent stones; moderately acid.

## Range in Characteristics

Thickness of solum: 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 35 percent, by volume, in the A horizon and more than 35 percent in the B and C horizons; ranging from gravel to boulders
Soil reaction: Strongly acid to slightly acid, except where surface layers have been limed
A or Ap horizon:
Color-hue of 10YR, value of 2 to 4 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam

## Bt horizon:

Color-hue of 5 YR to 10 YR , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-loam, sandy clay loam, or clay loam

## $B C$ horizon:

Color-hue of 7.5 YR 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

## Chorizon:

Color-hue of 7.5 YR or 10 YR , value of 4 or 6 , and chroma of 4 to 8

Texture (fine-earth fraction)-loamy sand, coarse sandy loam, or sandy loam

## Udorthents

Depth class: Deep and very deep
Drainage class: Well drained and moderately well drained
Depth to seasonal high water table: Variable; commonly more than 6.0 feet from January through December
Permeability: Moderately rapid to slow
Parent material: Fill areas-mixtures of natural soils; stony excavated areas-variable, depending on the type of underlying bedrock
Landscape: Intermountain hills and low and intermediate mountains dominantly in the central and southern parts of the county
Landform: Hillslopes, mountain slopes, ridges, coves, stream terraces, and flood plains
Landform position: Summits, side slopes, footslopes, toeslopes, and bottom land
Slope range:Variable
Taxonomic classification: Udorthents

## Typical Pedon

Udorthents consist 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. Areas of Udorthents include landfills, borrow pits, and recreational areas, such as ball fields. A typical pedon is not given due to the variable nature of the soil material.

## Range in Characteristics

Thickness of underlying material: 30 to more than 60 inches
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, except where surface layers have been limed

Fill areas:
Color-hue of 2.5 YR to 2.5 Y , value of 2 to 8 , and chroma of 1 to 8
Texture (fine-earth fraction)-variable, commonly loamy

## Excavated areas:

Color-hue of 2.5 YR to 2.5 Y , value of 2 to 8 , and chroma of 1 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 to mafic, highgrade metamorphic or igneous rock
Landscape: Intermediate mountains throughout the county
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 15 to 95 percent
Taxonomic classification: Fine-loamy, mixed, mesic Umbric Dystrochrepts

## Typical Pedon

Unaka gravelly fine sandy loam in an area of UnakaPorters complex, 50 to 95 percent slopes, very rocky; 6.5 miles south of Minneapolis on U.S. Highway 19E, about 200 feet east of the road, in woods; Carvers Gap USGS topographic quadrangle; lat. 36 degrees 02 minutes 22 seconds $N$. and long. 82 degrees 00 minutes 35 seconds W .
Oi-1 inch to 0 ; slightly decomposed leaf litter.
A- 0 to 7 inches; dark brown (10YR 3/3) gravelly fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; common fine flakes of mica; 20 percent, by volume, gravel; strongly acid; gradual wavy boundary.
$\mathrm{Bw}-7$ to 14 inches; dark yellowish brown (10YR 4/4) gravelly sandy loam; weak fine subangular blocky structure; very friable; few fine roots; common fine flakes of mica; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
C-14 to 21 inches; gravelly sandy loam saprolite that is multicolored in shades of brown and yellow; massive; very friable; few fine roots; common fine flakes of mica; 25 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Cr -21 to 25 inches; soft weathered, moderately fractured gneiss that can be dug with difficulty with hand tools.
R-25 to 30 inches; hard unweathered, slightly fractured gneiss.

## Range in Characteristics

## Thickness of solum: 13 to 39 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: 15 to 35 percent, by volume, in the A horizon, 5 to 35 percent in the $B$ horizon, and 5 to 35 percent in the C horizon; ranging from gravel to stones
Soil reaction: Very strongly acid or strongly acid, except where surface layers have been limed

## A horizon:

Color-hue of 10YR and value and chroma of 2 or 3
Texture (fine-earth fraction)—fine sandy loam

## Bwhorizon:

Color-hue of 7.5 YR or 10 YR , value of 4 or 5 , and chroma of 4 to 6
Texture (fine-earth fraction)—sandy loam or loam; thin subhorizons of sandy clay loam or clay loam occur in some pedons

## Chorizon:

Color-multicolored in shades of brown, yellow, and gray
Texture (fine-earth fraction)—sandy loam or loam saprolite
Crlayer:
Type of bedrock-soft weathered, slightly fractured to highly fractured, felsic to mafic, high-grade metamorphic or igneous rock that can be dug with difficulty with hand tools
$R$ layer:
Type of bedrock-hard unweathered, slightly fractured to highly fractured, felsic to 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 east-central part of the county
Landform: Mountain ridges and slopes
Landform position: Summits and side slopes
Slope range: 30 to 95 percent

Taxonomic classification: Loamy-skeletal, mixed, mesic Lithic Dystrochrepts

## Typical Pedon

Unicoi gravelly fine sandy loam in an area of UnicoiRock outcrop complex, 30 to 95 percent slopes, extremely bouldery; 1.6 miles east of Linville on Secondary Road 1511, about 25 feet east of the road, in a road cut; Grandfather Mountain USGS topographic quadrangle; lat. 36 degrees 02 minutes 36 seconds $N$. and long. 81 degrees 50 minutes 32 seconds W .

Oi-1 inch to 0 ; slightly decomposed leaf litter.
A1-0 to 2 inches; very dark gray (10YR 3/1) gravelly fine sandy loam; weak fine granular structure; very friable; many fine and medium and common coarse roots; 25 percent, by volume, gravel and 5 percent cobbles; very strongly acid; clear smooth boundary.
A2-2 to 5 inches; dark brown (10YR 3/3) gravelly fine sandy loam; weak fine granular structure; very friable; many fine and medium and common coarse roots; 25 percent, by volume, gravel and 5 percent cobbles; very strongly acid; gradual wavy boundary.
Bw-5 to 19 inches; brownish yellow (10YR 6/6) very cobbly sandy loam; weak fine subangular blocky structure; friable; common fine, medium, and coarse roots; 15 percent, by volume, gravel and 30 percent cobbles; very strongly acid; clear wavy boundary.
R-19 to 24 inches; hard unweathered, moderately fractured, low-grade feldspathic metasandstone.

## Range in Characteristics

## Thickness of solum: 7 to 20 inches

Depth to bedrock: 7 to 20 inches to hard bedrock
Content of mica flakes: None or few throughout the profile
Content and size of rock fragments: 15 to 35 percent, by volume, in the A horizon and 35 to 65 percent in the Bw and C horizons; mostly gravel, channers, cobbles, or stones
Soil reaction: Extremely acid to strongly acid, except where surface layers have been limed
A horizon:
Color-hue of 10YR, value of 3 to 6 , and chroma of 1 to 4 ; where the horizon has value of 3 , it is less than 7 inches thick
Texture (fine-earth fraction)—-fine sandy loam
E 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 it is multicolored in shades of yellow and brown
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam
C horizon (if it occurs):
Color-horizon has hue of 7.5YR or 10YR, value of 4 to 6 , and chroma of 3 to 8 , or it is multicolored in shades of yellow and brown
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

## Watauga 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 to mafic, highgrade metamorphic and igneous rock that has a high mica content
Landscape: Intermountain hills and low and intermediate mountains predominantly in the southwestern part of the county
Landform: Ridges and slopes on hills and mountains
Landform position: Summits and side slopes
Slope range: 8 to 30 percent
Taxonomic classification: Fine-loamy, micaceous, mesic Typic Hapludults

## Typical Pedon

Watauga sandy loam, 15 to 30 percent slopes, stony; 7.6 miles west of Crossnore on N.C. Highway 194, about 1.7 miles south on U.S. Highway 19E, about 1.4 miles east on Secondary Road 1101, about 200 feet south on a private road, 100 feet east in woods; Linville Falls USGS topographic quadrangle; lat. 35 degrees 57 minutes 14 seconds $N$. and long. 81 degrees 58 minutes 50 seconds W .

Oi-1 inch to 0 ; slightly decomposed leaf litter.
A-0 to 5 inches; dark yellowish brown (10YR 4/6) sandy loam; weak fine granular structure; very friable; common fine and medium roots; many fine
flakes of mica; 8 percent, by volume, gravel; very strongly acid; clear wavy boundary.
$\mathrm{Bt}-5$ to 20 inches; strong brown (7.5YR 5/6) clay loam; weak medium subangular blocky structure; friable; common fine and medium roots; many fine and medium flakes of mica; 5 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
BC-20 to 26 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable; common fine and medium roots; many fine and medium flakes of mica; 8 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C1-26 to 45 inches; brownish yellow (10YR 6/6) sandy loam saprolite; massive; friable; few fine and medium roots; many medium and coarse flakes of mica; 10 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C2-45 to 62 inches; yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/6) sandy loam saprolite; massive; friable; few fine and medium roots; many medium and coarse flakes of mica; 10 percent, by volume, gravel; strongly acid.

## Range in Characteristics

## Thickness of solum: 20 to 60 inches

Depth to bedrock: More than 72 inches
Content of mica flakes: Common or many in the A horizon and the upper part of the $B$ horizon and many in the lower part of the $B$ horizon and in the C horizon
Content and size of rock fragments: Less than 15 percent, by volume, in the $A$ and $B$ horizons and less than 35 percent in the C horizon; mostly gravel or cobbles
Soil reaction: Very strongly acid to moderately acid, except where surface layers have been limed

## A or Ap horizon:

Color-hue of 7.5 YR or 10 YR , value of 3 to 5 , and chroma of 2 to 4 ; where the horizon has value of 3 , it is less than 6 inches thick.
Texture (fine-earth fraction)-sandy loam
$B A$ or $B E$ horizon (if it occurs):
Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)-sandy loam, loam, sandy clay loam, or clay loam

## Bt horizon:

Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8
Mottles-shades of red, brown, or yellow
Texture (fine-earth fraction)-loam, sandy clay loam, or clay loam

BC horizon:
Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8
Mottles (if they occur)—shades of red, brown, or yellow
Texture (fine-earth fraction)—loam or fine sandy loam

Chorizon:
Color-horizon is multicolored or has hue of 5 YR to 2.5 Y , value of 4 to 8 , and chroma of 1 to 8
Mottles (if they occur)-shades of red, brown, or yellow
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, coarse sandy loam, or loamy coarse sand

## 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 predominantly from felsic to mafic, high-grade metamorphic and igneous rock
Landscape: High mountains
Landform: Mountain slopes and ridges
Landform position: Side slopes and summits
Slope range: 8 to 95 percent
Taxonomic classification: Fine-loamy, mixed, frigid Typic Haplumbrepts

## Typical Pedon

Wayah gravelly loam in an area of Burton-Wayah complex, windswept, 8 to 15 percent slopes, stony; 5.7 miles north of Newland on N.C. Highway 194, about 3.3 miles south on U.S. Highway 19E, about 0.2 mile on Secondary Road 1199, about 0.4 mile on Secondary Road 1167, about 2.0 miles northwest on a jeep trail, 500 feet east of the trail, in a grassy bald on a ridgetop; White Rocks Mountain USGS topographic quadrangle; lat. 36 degrees 08 minutes 01 second $N$. and long. 81 degrees 59 minutes 44 seconds W .
Oe-1 inch to 0 ; partially decomposed grass and roots.
A- 0 to 18 inches; dark brown (10YR 3/3) gravelly loam; weak very fine granular structure; very friable; many very fine and common fine and medium roots; few very fine flakes of mica; 20 percent, by volume, gravel; very strongly acid; gradual wavy boundary.
Bw-18 to 32 inches; dark yellowish brown (10YR 4/4) fine sandy loam; weak fine subangular blocky
structure; friable; common fine roots; few very fine flakes of mica; 8 percent, by volume, gravel; moderately acid; gradual wavy boundary.
BC-32 to 38 inches; dark yellowish brown (10YR 4/6) sandy loam; weak fine subangular blocky structure; friable; common fine roots; few very fine flakes of mica; 10 percent, by volume, gravel; strongly acid; gradual wavy boundary.
C-38 to 62 inches; multicolored gravelly loamy sand saprolite; massive; friable; few very fine flakes of mica; 20 percent, by volume, gravel; moderately acid.

## Range in Characteristics

Thickness of solum: 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: 15 to 35 percent, by volume, in the A horizon and less than 35 percent in the B and C horizons; ranging from gravel to stones
Soil reaction: Extremely acid to moderately acid, except where surface layers have been limed

A horizon:
Color-hue of 7.5 YR or 10 YR , value of 2 or 3 , and chroma of 1 to 3
Texture (fine-earth fraction)-loam
$B A$ horizon (if it occurs):
Color-hue of 7.5 YR to 2.5 Y , 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 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-sandy loam, fine sandy loam, or loam; thin subhorizons of sandy clay loam occur in some pedons

## $B C$ horizon:

Color-hue of 7.5 YR to 2.5 Y , 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
Chorizon:
Color-horizon has hue of 7.5 YR to 2.5 Y , value of 4 to 6 , and chroma of 3 to 8 , or it is multicolored Texture (fine-earth fraction)-loamy sand, sandy loam, fine sandy loam, or loam

## Whiteoak Series

Depth class:Very deep
Drainage class:Well drained
Depth to seasonal high water table: More than 6.0 feet Permeability:Moderate
Parent material: Colluvium derived from low-grade metasedimentary rock
Landscape: Intermediate mountains in the central and northeast-central parts of the county
Landform: Coves, colluvial fans, and benches
Landform position: Footslopes and toeslopes
Slope range: 2 to 30 percent
Taxonomic classification: Fine-loamy, mixed, mesic Umbric Dystrochrepts

## Typical Pedon

Whiteoak fine sandy loam, 15 to 30 percent slopes, very stony; 0.5 mile east of Newland on N.C. Highway 181, about 150 feet north of a school parking lot, in a grassed area; Newland USGS topographic quadrangle; lat. 36 degrees 04 minutes 59 seconds $N$. and long. 81 degrees 55 minutes 19 seconds W.

A-0 to 9 inches; very dark grayish brown (10YR 3/2) fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; 8 percent, by volume, gravel; slightly acid; clear smooth boundary.
BA-9 to 12 inches; dark yellowish brown (10YR 4/4) loam; weak fine subangular blocky structure; friable; common fine and medium roots; 8 percent, by volume, gravel; moderately acid; clear smooth boundary.
Bt1-12 to 30 inches; yellowish brown (10YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine and medium roots; 5 percent, by volume, gravel; moderately acid; gradual irregular boundary.
Bt2-30 to 55 inches; yellowish brown (10YR 5/6) loam; weak medium subangular blocky structure; friable; common fine roots; 8 percent, by volume, gravel; very strongly acid; gradual irregular boundary.
BC-55 to 62 inches; yellowish brown (10YR 5/8) loam; weak medium subangular blocky structure; friable; few fine roots; 10 percent, by volume, gravel; very strongly acid.

## Range in Characteristics

Thickness of solum: 40 to more than 60 inches
Depth to bedrock: More than 60 inches
Content of mica flakes: None to common throughout the profile

Content and size of rock fragments: Less than 15 percent, by volume, in the A horizon and less than 35 percent in the Bt horizon; content may range to 60 percent in the $B C$ and $C$ horizons; size ranges from gravel to stones
Soil reaction: Very strongly acid to moderately acid, except where surface layers have been limed
A or Ap horizon:
Color-hue of 10 YR , value of 2 or 3 , and chroma of 1 to 4
Texture (fine-earth fraction)-fine sandy loam
BA horizon:
Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 3 to 8
Texture (fine-earth fraction)-loam, silt loam, or fine sandy loam
Bt horizon:
Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8

Texture (fine-earth fraction)—loam, silt loam, silty clay loam, clay loam, or sandy clay loam
BC horizon:
Color-hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 4 to 8
Texture (fine-earth fraction)—sandy loam, fine sandy loam, loam, or silt loam
C horizon (if it occurs):
Color-horizon has hue of 7.5YR or 10YR, value of 4 to 6 , and chroma of 4 to 8 , or it is multicolored
Texture (fine-earth fraction)-sandy loam, fine sandy loam, loam, or silt loam

The Whiteoak soils in Avery County are considered taxadjuncts to the series because there is a sufficient increase in clay content from the surface horizon to the subsurface horizon to meet the criteria for an argillic horizon. This difference, however, does not affect the use and management of the soils. These soils are fineloamy, mixed, mesic Humic Hapludults.

## Formation of the Soils

This section describes the factors of soil formation and relates them to the soils in the survey area. It also discusses the processes of horizon differentiation.

## 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 soilforming 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 Avery County: residuum, colluvium, and alluvium (fig. 21).

## Residuum

Residuum occurs throughout the county on ridgetops and side slopes of intermountain hills and low, intermediate, and high mountains. Residual parent material is the result of bedrock weathering in place. In Avery County, it is derived from three general rock
types-metasedimentary, felsic crystalline, and mafic crystalline.

Metasedimentary rocks, such as quartzite, metasiltstone, and metasandstone, weather into the parent material of Ditney, Unicoi, Pineola, Crossnore, Jeffrey, Soco, and Stecoah soils. These soils are yellow or brown, have root-limiting layers, and are low in natural fertility.

Felsic crystalline and mafic crystalline rocks, such as granite, gneiss, mica-schist, and amphibolite, weather into the parent material of Ashe, Cleveland, Wayah, Burton, Porters, Chestnut, Buladean, Chandler, Micaville, Cashiers, Edneytown, and Pigeonroost 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.

## Colluvium

Colluvium occurs throughout Avery County in coves, on benches, on footslopes, on toeslopes, and in sloping drainageways (fig. 22). 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, Thunder, Cullasaja, Spivey, Whiteoak, Northcove, Maymead, Greenlee, Balsam, and Tanasee.

## Alluvium

Alluvium is material deposited on flood plains along streams and 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 commonly stratified with sand and 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


Figure 21.-Relationship of landform position and parent material.
a high content of rock fragments. Ostin, 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. Nikwasi, Cullowhee, and Rosman soils are examples. Statler soils formed in old alluvium on low stream terraces of the larger flood plains.

## Climate

Climate, particularly precipitation and temperature, affects the chemical, biological, and physical relationships in the soil. Annual rainfall ranges from 50 inches in the area along the Tennessee-North Carolina State line in the western part of the county to more than 60 inches on Grandfather Mountain. 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, which indicate that unique environmental factors are at work.

## Plant and Animal Life

Plants and animals influence the formation of soil and differentiation of soil horizons. The kind and number of organisms 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 Avery 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.


Figure 22.-Colluvial material that is approximately 20 feet thick and underlain by residual bedrock. In some areas in the survey area, colluvial material is as much as 100 feet thick over residuum.

## Relief

The relief, or topography, in Avery 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 may 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 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 that 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 Avery County vary considerably in age. The oldest soils occur on warm, stable uplands. Edneytown and Fannin 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 that these soils have not had time to develop further is steepness of slope. Geologic erosion and the percolation of water downslope instead of through the soil hinder soil formation. Soils at high elevations, such as Wayah, Burton, and Craggey, are young partially due to climatic factors. Limited periods of favorable temperatures hinder soil development.

In coves, Cullasaja, Spivey, 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 and takes away soil material. Examples of soils that formed in alluvium are Ostin, Dellwood, Reddies, and Cullowhee.

## Processes of Horizon Differentiation

One or more soil-forming processes are involved in the formation of soil horizons. These processes are the accumulation of organic matter; the leaching of bases and other soluble material; the chemical weathering, mainly by hydrolysis, of primary minerals into silicate clay minerals; the translocation of silicate clay and some silt-sized particles from one horizon to another; and the reduction and transfer of iron. These processes are also referred to as additions, removals, transfers, and transformations.

Some organic matter has accumulated in all of the soils in the survey area. Most of the soils contain moderate amounts of organic matter in the surface layer. The content of organic matter ranges from low, as in eroded Fannin soils, to high, as in Porters soils.

Most of the soils in the survey area are acid in the
upper layers, unless the surface layer has been limed. The leaching of bases occurs as water percolates down through the soil profile. Because of the relatively high amounts of rainfall in the survey area over geologic time, acid conditions have been created in Avery County.

The translocation of clay minerals is an important process in the development of many soils in the survey area. As clay minerals are removed from the A horizon, they accumulate as clay films on the faces of peds, in pores, and in root channels in the $B$ horizon. The amount of translocated clay is low in Buladean and Chandler soils and high in Edneytown and Fannin soils.

As silicate clay forms from primary minerals, some iron is commonly released as hydrated oxides. These oxides are generally red. Even if they occur in small amounts, they give the soil material a brownish color. They are largely responsible for the strong brown, yellowish brown, reddish brown, or red colors that are dominant in the subsoil of soils in the survey area.

The reduction and transfer of iron has occurred in all of the soils that are not characterized by good natural drainage. This process, known as gleying, is evidenced by a gray matrix color and by iron or clay depletions. Some of the iron may be reoxidized and segregated and thus form yellow, brown, red, or other brightly colored masses of iron accumulation in an essentially gray matrix in the subsoil. Nodules or concretions of iron or manganese also commonly form as a result of this process. Soil features associated with chemically reduced iron are referred to as redoximorphic features. Somewhat poorly drained Cullowhee soils display many of these features.

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## Glossary

ABC soil. A soil having an $A, a B$, and a $C$ horizon.
$A C$ soil. A soil having only an $A$ and a $C$ horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.
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.
Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.
Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.
Alpha,alpha-dipyridyl. A dye that when dissolved in 1 N 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.
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.
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.
Aspect. The direction in which a slope faces.
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

Backslope (side slope). The geomorphic component that forms the steepest inclined surface and principal element of many hillsides. Backslopes in profile are commonly steep, are linear, and may or may not include cliff segments.
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 $\mathrm{Ca}, \mathrm{Mg}, \mathrm{Na}$, and K ), expressed as a percentage of the total cationexchange capacity.
Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.
Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.
Bottom land. The normal flood plain of a stream, subject to flooding.
Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.
Breast height. An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.
Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Cable logging. A method of moving felled trees to a landing for loading and transport to a processing facility. Most cable logging systems consist of a truck-mounted drum, a pole, and wire cables in an arrangement similar to that of a rod and reel used for fishing. To reduce friction and soil disturbance, felled trees generally are yarded and reeled in while one end is lifted or the entire log is completely suspended. Because this system minimizes road construction, it is used in logging steep side slopes and for reducing operational costs.
Cable yarding. A method of moving felled trees to a nearby central area for transport to a processing facility. Most cable yarding systems involve use of a 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 reeled in while one end is lifted or the entire log is suspended.
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 is, by volume, 15 to 35 percent thin, flat fragments of sandstone or schist as much as 6 inches ( 15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.
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.
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.
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 textured soil. Sand or loamy sand.
Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches ( 7.6 to 25 centimeters) in diameter.
Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches ( 7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.
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 watercontrol 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.
Compressible (in tables). Excessive decrease in volume of soft soil under load.
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.
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.
Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.
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 soils, 20 to 40 inches; shallow soils, 10 to 20 inches; and very shallow soils, less than 10 inches.
Depth to rock (in tables). Bedrock is too near the surface for the specified use.
Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.
Dissimilar inclusions (soil). Soils that affect use or management differently than the named
components of a map unit. They comprise less than 25 percent of each map unit and vary from delineation to delineation. Nonlimiting dissimilar inclusions have soil properties that 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 recognizedexcessively drained, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained. These classes are defined in the "Soil Survey Manual."
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.
Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.
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.
Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.
Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.
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.
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.
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.
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 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 is, 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 or (rarely) schist 6 to 15 inches ( 15 to 38 centimeters) long.

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 inclined surface at the base of a hill.
Forb. Any herbaceous plant not a grass or a sedge.
Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.
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.
Fragile (in tables). A soil that is easily damaged by use or disturbance.
Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.
Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.
Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.
Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.
Gravel. Rounded or angular fragments of rock as much as 3 inches ( 2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.
Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches ( 7.6 centimeters) in diameter.
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.
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-value crop. Crops, such as tobacco, vegetables, and Christmas trees, that require a high level of management, are labor intensive, and have a potential for high profit per acre.
Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.
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 soilforming 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.
Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, 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 ....................................................... Iow |  |
| 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
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.
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.
Knoll. A small, low, rounded hill rising above adjacent landforms.
Landform. Part of a landscape such as a ridge, mountainslope, 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.
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.
Low strength. The soil has a low resistance to deforming, sliding, or failure. It is not strong enough to support loads.
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.
Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.
Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.
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.
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 contrastfaint, 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).
Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.
Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)
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 10 YR , value of 6 , and chroma of 4 .

Neutral soil. A soil having a pH value of 6.6 to 7.3 . (See Reaction, soil.)
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:


Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, hardpan, fragipan, claypan, plowpan, and traffic pan.
Parent material. The unconsolidated organic and mineral material in which soil forms.
Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)
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.
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 downward movement of water through the soil.
Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.
Permeability. The quality of the soil that enables water 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 $\qquad$ 0.01 to 0.06 inch <br> Slow. $\qquad$ 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 |  |
| ery 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.
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.
Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.
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 .................................................... 8.9 to 8.4
Strongly alkaline .......................... 8.0
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,alphadipyridyl, 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.
Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.
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.
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.
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.

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 groundwater runoff or seepage flow from ground water.
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.
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.
Second bottom. The first terrace above the normal flood plain (or first bottom) of a river.
Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.
Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)
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.
Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.
Shrink-swell (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.
Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered
soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.
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).
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.
Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.
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, classes for simple and complex slopes 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 percent and higher

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 intake (in tables). The slow movement of water into 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 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 |  |
|  | ess than 0.002 |

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and $B$ horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.
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.
Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.
Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are-platy
(laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).
Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.
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 color and lower in content of organic matter than the overlying surface layer.
Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the 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 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 outermost inclined surface at the base of a hill or mountain; part of a footslope.
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 top-dress road banks, 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.
Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.
Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.
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.
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.
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.
Windthrow. The uprooting and tipping over of trees by the wind.

## Tables

Table 1A.-Temperature and Precipitation
(Recorded in the period 1971-2000 at Banner Elk, North Carolina)

| Month | Temperature |  |  | Precipitation |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\left\|\begin{array}{c} \text { Average } \\ \text { daily } \\ \text { maximum } \end{array}\right\|$ | Average daily minimum | Average | Average | 30\% chance <br> will have-- |  | Averagenumber ofdays with0.10 inchor more | Average total snowfall |
|  |  |  |  |  | Less than-- | More than-- |  |  |
|  | ${ }^{\circ} \mathrm{F}$ | ${ }^{\circ} \mathrm{F}$ | ${ }^{\circ} \mathrm{F}$ | In | In | In |  | In |
| January----- | 41.9 | 21.1 | 31.5 | 4.27 | 2.99 | 5.16 | 8 | 10.1 |
| February---- | 44.5 | 23.1 | 33.8 | 4.04 | 3.06 | 4.89 | 8 | 12.3 |
| March------ | 52.3 | 29.9 | 41.1 | 5.03 | 3.52 | 5.92 | 9 | 7.7 |
| April------- | 60.8 | 36.9 | 48.8 | 3.91 | 3.02 | 5.30 | 8 | 2.6 |
| May-------- | 67.9 | 45.4 | 56.7 | 4.84 | 3.90 | 5.62 | 10 | 0.2 |
| June-------- | 74.1 | 52.6 | 63.3 | 4.71 | 3.13 | 5.75 | 9 | 0.0 |
| July-------- | 77.5 | 56.5 | 67.0 | 4.54 | 3.26 | 5.38 | 9 | 0.0 |
| August------ | 76.3 | 55.6 | 66.0 | 4.32 | 2.85 | 5.48 | 7 | 0.0 |
| September--- | 71.4 | 50.2 | 60.8 | 4.16 | 2.85 | 5.34 | 7 | 0.0 |
| October----- | 62.9 | 39.4 | 51.2 | 3.57 | 2.18 | 5.03 | 6 | 0.4 |
| November---- | 53.9 | 31.6 | 42.8 | 3.85 | 2.60 | 4.27 | 7 | 2.3 |
| December---- | 46.1 | 25.0 | 35.6 | 3.14 | 2.14 | 3.96 | 7 | 5.9 |
| Yearly: |  |  |  |  |  |  |  |  |
| Average---- | 60.8 | 38.9 | 49.9 | --- | --- | --- | - | --- |
| Extreme---- | --- | --- | - | --- | -- | -- | --- | --- |
| Total------ | --- | --- | --- | 50.38 | 45.39 | 56.08 | 95 | 41.4 |

Table 1B．－Temperature and Precipitation
（Recorded in the period 1971－2000 at Grandfather Mountain，North Carolina）

| Month | Temperature |  |  | Precipitation |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Average daily maximum | $\left\lvert\, \begin{gathered} \text { Average } \\ \text { daily } \\ \text { minimum } \end{gathered}\right.$ | Average | Average | 30\％chance <br> will have－－ |  | Average number of days with 0.10 inch or more | Average <br> total <br> snow－ <br> fall |
|  |  |  |  |  | Less than－－ | More than－－ |  |  |
|  | ${ }^{\circ} \mathrm{F}$ | ${ }^{\circ} \mathrm{F}$ | ${ }^{\circ} \mathrm{F}$ | In | In | In |  | In |
| January－－－－－ | 35.8 | 19.9 | 27.8 | 4.74 | 3.42 | 5.35 | 10 | 16.0 |
| February | 38.3 | 22．3 | 30.3 | 4.79 | 3.41 | 5.57 | 9 | 14.4 |
| March－－－－－－－ | 45.2 | 28.7 | 36.9 | 5.78 | 4.11 | 7.04 | 10 | 9.7 |
| April－－－－－－－ | 53.5 | 36.5 | 45.0 | 5.06 | 3.33 | 6.48 | 8 | 4.4 |
| May－－－－－－－－－ | 60.6 | 45.6 | 53.1 | 6.13 | 4.87 | 7.04 | 10 | 0.5 |
| June－－－－－－－－ | 66.3 | 52.8 | 59.5 | 6.57 | 4.68 | 8.52 | 9 | 0.0 |
| July | 69.8 | 56.8 | 63.3 | 5.40 | 4.03 | 6.30 | 10 | 0.0 |
| August－－－－－－ | 68.2 | 56.1 | 62．1 | 5.44 | 3.43 | 6.64 | 9 | 0.0 |
| September－－－ | 63.1 | 50.7 | 56.9 | 5.68 | 3.42 | 6.72 | 7 | 0.0 |
| October－－－－－ | 55.0 | 40.7 | 47.8 | 4.55 | 2.39 | 5.54 | 6 | 0.5 |
| November－－－－ | 46.4 | 31.8 | 39.1 | 4.65 | 2.92 | 5.14 | 7 | 3.0 |
| December－－－－ | 39.5 | 24．1 | 31.8 | 4.04 | 2.76 | 4.82 | 8 | 9.7 |
| Yearly： |  |  |  |  |  |  |  |  |
| Average－－－－ | 53.5 | 38.8 | 46.1 | － | －－ | －－ー | －－－ | －－－ |
| Extreme－－－－ | －－－ | － | －ーー | － | －－－ | －－－ | －－－ | －－－ |
| Total－－－－－－ | －ーー | －－－ | －－－ | 62.82 | 55.87 | 67.30 | 103 | 58．1 |

Table 2A.-Growing Season
(Recorded in the period 1971-2000 at Banner Elk, North Carolina)

| Probability | Beginning and ending dates and growing season length |  |  |
| :---: | :---: | :---: | :---: |
|  | Temperature higher than $24{ }^{\circ} \mathrm{F}$ | Temperature higher than $28{ }^{\circ} \mathrm{F}$ | Temperature higher than $32{ }^{\circ} \mathrm{F}$ |
| 50 percent* | $04 / 13$ to $10 / 26$ 196 days | $\begin{gathered} 05 / 01 \text { to } 10 / 11 \\ 163 \text { days } \end{gathered}$ | $\begin{gathered} 05 / 12 \text { to } 10 / 01 \\ 142 \text { days } \end{gathered}$ |
| 70 percent* | $04 / 08$ to $10 / 30$ 205 days | $04 / 26$ to $10 / 16$ 173 days | $\begin{gathered} 05 / 07 \text { to } 10 / 06 \\ 152 \text { days } \end{gathered}$ |

* Percent chance of the growing season occurring between the beginning and ending dates.

Table 2B.-Growing Season
(Recorded in the period 1971-2000 at Grandfather Mountain, North Carolina)

| Probability | Beginning and ending dates and <br> growing season length |  |  |
| :---: | :---: | :---: | :---: |
|  | Temperature higher than $24{ }^{\circ} \mathrm{F}$ | Temperature higher than $28^{\circ} \mathrm{F}$ | Temperature higher than $32{ }^{\circ} \mathrm{F}$ |
| 50 percent* | 04/19 to 10/22 186 days | 04/29 to 10/13 167 days | 05/08 to 10/03 147 days |
| 70 percent* | $04 / 15$ to $10 / 26$ 194 days | $04 / 25$ to $10 / 17$ 176 days | $05 / 04$ to $10 / 07$ 155 days |

* Percent chance of the growing season occurring between the beginning and ending dates.

Table 3.-Acreage and Proportionate Extent of the Soils

| $\begin{aligned} & \text { Map } \\ & \text { symbol } \end{aligned}$ | Soil name | Acres | $\begin{aligned} & \text { Per- } \\ & \text { cent } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| AcF | Ashe-Cleveland-Rock outcrop complex, 30 to 95 percent slopes, extremely $\qquad$ | 2,092 | 1.3 |
| BaD | Balsam very cobbly loam, windswept, 15 to 30 percent slopes, extremely bouldery | 823 | 0.5 |
| BaE | Balsam very cobbly loam, windswept, 30 to 50 percent slopes, extremely bouldery | 2,358 | 1.5 |
| BCE | Balsam-Rubble land complex, windswept, 30 to 50 percent slopes | 1,444 | 0.9 |
| BCF | Balsam-Rubble land complex, windswept, 50 to 95 percent slope | 272 | 0.2 |
| BuC | Burton-Craggey-Rock outcrop complex, windswept, 8 to 15 percent slopes--- | 184 | 0.1 |
| BuD | Burton-Craggey-Rock outcrop complex, windswept, 15 to 30 percent slopes-- | 1,213 | 0.8 |
| BuF | Burton-Craggey-Rock outcrop complex, windswept, 30 to 95 percent slopes-- | 5,088 | 3.2 |
| BwC | Burton-Wayah complex, windswept, 8 to 15 percent slopes, stony | 157 | * |
| BwD | Burton-Wayah complex, windswept, 15 to 30 percent slopes, stony | 980 | 0.6 |
| BwE | Burton-Wayah complex, windswept, 30 to 50 percent slopes, stony---------- | 2,708 | 1.7 |
| BwF | Burton-Wayah complex, windswept, 50 to 80 percent slopes, stony---------- | 628 | 0.4 |
| CaC | Cashiers sandy loam, 8 to 15 percent slopes, sto | 55 | * |
| CaD | Cashiers sandy loam, 15 to 30 percent slopes, stony | 328 | 0.2 |
| CaE | Cashiers sandy loam, 30 to 50 percent slopes, stony | 379 | 0.2 |
| CaF | Cashiers sandy loam, 50 to 95 percent slopes, ston | 29 | * |
| Ced | Chandler-Micaville complex, 15 to 30 percent slopes, sto | 13 | * |
| CeE | Chandler-Micaville complex, 30 to 50 percent slopes, stony | 5,573 | 3.5 |
| CeF | Chandler-Micaville complex, 50 to 95 percent slopes, stony | 142 | * |
| ChD | Chestnut-Ashe complex, 15 to 30 percent slopes, very stony | 966 | 0.6 |
| ChE | Chestnut-Ashe complex, 30 to 50 percent slopes, very stony | 2,854 | 1.8 |
| ChF | Chestnut-Ashe complex, 50 to 95 percent slopes, very sto | 4,236 | 2.7 |
| CnD | Chestnut-Buladean complex, 15 to 30 percent slopes, stony | 549 | 0.3 |
| CnE | Chestnut-Buladean complex, 30 to 50 percent slopes, stony | 4,611 | 2.9 |
| CnF | Chestnut-Buladean complex, 50 to 80 percent slopes, stony | 1,880 | 1.2 |
| CoF | Clingman-Craggey-Rock outcrop complex, windswept, 15 to 95 percent slopes, extremely bouldery | 610 | 0.4 |
| Cre |  | 8,703 | 5.5 |
| CrF | Crossnore-Jeffrey complex, 50 to 80 percent slopes, very stony | 876 | 0.6 |
| CsD | Cullasaja cobbly fine sandy loam, 8 to 30 percent slopes, very bouldery-- | 11 | * |
| CtC | Cullasaja cobbly loam, 8 to 15 percent slopes, extremely boulder | 356 | 0.2 |
| CtD | Cullasaja cobbly loam, 15 to 30 percent slopes, extremely bouldery | 2,857 | 1.8 |
| CtE | Cullasaja cobbly loam, 30 to 50 percent slopes, extremely boulde | 3,368 | 2.1 |
| CuA | Cullowhee loam, 0 to 3 percent slopes, frequently flooded | 639 | 0.4 |
| DAM |  | 13 | * |
| DeB | Dellwood cobbly sandy loam, 1 to 5 percent slopes, occasionally flooded-- | 880 | 0.6 |
| EpC | Edneytown-Pigeonroost complex, 8 to 15 percent slopes, stony | 208 | 0.1 |
| EpD | Edneytown-Pigeonroost complex, 15 to 30 percent slopes, stony | 5,536 | 3.5 |
| EpE |  | 2,038 | 1.3 |
| EtE |  | 12,438 | 7.9 |
| EtF | Edneyville-Chestnut complex, 50 to 80 percent slopes, stony--------------1 | 1,149 | 0.7 |
| FaC |  | 148 | * |
| Fad |  | 1,112 | 0.7 |
| FeC2 |  | 20 | * |
| FeD2 | Fannin sandy clay loam, 15 to 30 percent slopes, erode | 76 | * |
| FeE2 |  | 61 | * |
| Gre | Greenlee very cobbly sandy loam, 30 to 50 percent slopes, extremely bouldery | 340 | 0.2 |
| M-W | Miscellaneous wat | 42 | * |
| NkA | Nikwasi loam, 0 to 3 percent slopes, frequently flooded--------------------10-1 | , 470 | 0.9 |
| NnE | Northcove very cobbly loam, 30 to 50 percent slopes, extremely bouldery-- | 609 | 0.4 |
| NoC | Northcove-Maymead complex, 8 to 15 percent slopes, extremely stony------- | 88 | * |
| NoD | Northcove-Maymead complex, 15 to 30 percent slopes, extremely stony------ | 474 | 0.3 |
| OsB | Ostin cobbly fine sandy loam, 0 to 5 percent slopes, occasionally flooded | 412 | 0.3 |
| PaB |  | 95 | * |
| PnC |  | 1,495 | 0.9 |
| Pnd |  | 5,515 | 3.5 |

Table 3.-Acreage and Proportionate Extent of the Soils-Continued

| Map symbol | Soil name | Acres | $\begin{aligned} & \text { Per- } \\ & \text { cent } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| PtD | Plott loam, 15 to 30 percent slopes, stony | 5 | * |
| PtE | Plott loam, 30 to 50 percent slopes, stony | 5 | * |
| PtF | Plott loam, 50 to 95 percent slopes, stony | 53 | * |
| PuC | Porters gravelly loam, 8 to 15 percent slopes, stony | 345 | 0.2 |
| Pud | Porters gravelly loam, 15 to 30 percent slopes, stony | 4,815 | 3.0 |
| PuE | Porters gravelly loam, 30 to 50 percent slopes, stony | 15,213 | 9.6 |
| PuF |  | 911 | 0.6 |
| PwD | Porters loam, 15 to 30 percent slopes, stony | 15 | * |
| PwE | Porters loam, 30 to 50 percent slopes, sto | 65 | * |
| $\mathrm{P} \times$ | Pits, quarry | 461 | 0.3 |
| ReA | Reddies fine sandy loam, 0 to 3 percent slopes, frequently flooded------- | 553 | 0.3 |
| RoA | Rosman loam, 0 to 3 percent slopes, occasionally flooded | 623 | 0.4 |
| RsB | Rosman sandy loam, 0 to 5 percent slopes, frequently flood | 227 | 0.1 |
| SaB | Saunook loam, 2 to 8 percent slope | 380 | 0.2 |
| SaC | Saunook loam, 8 to 15 percent slope | 3,556 | 2.2 |
| SbD | Saunook loam, 15 to 30 percent slopes, very st | 2,642 | 1.7 |
| ScB | Saunook silt loam, 2 to 8 percent slope | 5 | * |
| SdC |  | 25 | * |
| SgC | Saunook-Nikwasi complex, 2 to 15 percent slopes | 600 | 0.4 |
| ShC | Saunook-Thunder complex, 8 to 15 percent slopes, very stony | 715 | 0.5 |
| ShD |  | 4,131 | 2.6 |
| SoD | Soco-Ditney complex, 15 to 30 percent slopes, very stony | 1,116 | 0.7 |
| SOE | Soco-Ditney complex, 30 to 50 percent slopes, very stony | 2,813 | 1.8 |
| SoF | Soco-Ditney complex, 50 to 95 percent slopes, very stony | 3,647 | 2.3 |
| SpD | Spivey cobbly loam, 15 to 30 percent slopes, extremely bouldery---------- | 2,786 | 1.8 |
| SpE | Spivey cobbly loam, 30 to 50 percent slopes, extremely bouldery | 1,457 | 0.9 |
| Src | Spivey-Whiteoak complex, 8 to 15 percent slopes, very bouldery | 1,332 | 0.8 |
| SsB | Statler loam, 0 to 6 percent slopes, rarely flooded | 291 | 0.2 |
| StD |  | 595 | 0.4 |
| StE | Stecoah-Soco complex, 30 to 50 percent slopes, stony | 1,735 | 1.1 |
| StF | Stecoah-Soco complex, 50 to 80 percent slopes, stony | 299 | 0.2 |
| TsC | Thunder-Saunook complex, 8 to 15 percent slopes, very bouldery----------- | 4 | * |
| TsD | Thunder-Saunook complex, 15 to 30 percent slopes, very bouldery---------- | 23 | * |
| TsE | Thunder-Saunook complex, 30 to 50 percent slopes, very boulder | 8 | * |
| Ua |  | 421 | 0.3 |
| UdC | Udorthents-Urban land complex, 2 to 15 percent slope | 676 | 0.4 |
| UnD | Unaka-Porters complex, 15 to 30 percent slopes, very rocky | 990 | 0.6 |
| UnE | Unaka-Porters complex, 30 to 50 percent slopes, very rocky | 4,668 | 3.0 |
| UnF | Unaka-Porters complex, 50 to 95 percent slopes, very rocky---------------1 | 4,307 | 2.7 |
| UoF | Unicoi-Rock outcrop complex, 30 to 95 percent slopes, extremely bouldery- | 195 | 0.1 |
| W | W | 223 | 0.1 |
| WaC |  | 213 | 0.1 |
| Wad | Watauga sandy loam, 15 to 30 percent slopes, stony | 1,207 | 0.8 |
| WbD | Wayah-Burton complex, windswept, 15 to 30 percent slopes, stony---------- | 104 | * |
| Wce | Wayah-Burton complex, windswept, 30 to 50 percent slopes, very stony----- | 14 | * |
| WcF | Wayah-Burton complex, windswept, 50 to 95 percent slopes, very stony----- | 113 | * |
| WhB |  | 471 | 0.3 |
| Wk C |  | 1,340 | 0.8 |
| WtD | Whiteoak fine sandy loam, 15 to 30 percent slopes, very stony------------1-1 | 530 | 0.3 |
|  | To | 158,124 | 100.0 |

* Less than 0.1 percent.

```
Table 4.-Ornamental Crops
(See text for definitions of "well suited," "suited," "poorly suited," and "unsuited." Suitability information in this table alone may not provide sufficient information for making land management recommendations. An onsite investigation is recommended to determine site-specific conditions)
```



See footnotes at end of table.

Table 4.-Ornamental Crops-Continued


See footnotes at end of table.

Table 4.-Ornamental Crops-Continued


Table 4.-Ornamental Crops-Continued


See footnotes at end of table.

Table 4.-Ornamental Crops-Continued


See footnotes at end of table.

Table 4.-Ornamental Crops-Continued

| Map symbol and soil name | Fraser fir | Ball and burlap harvesting* | Line-out beds** |
| :---: | :---: | :---: | :---: |
| EtF: <br> Edneyville | Unsuited: slope | Unsuited: slope | Unsuited: slope |
| Chestnut--------------- | ```Unsuited: slope depth to rock``` | ```Unsuited: slope depth to rock``` | ```Unsuited: slope depth to rock``` |
| FaC: <br> Fannin | Suited: high clay phytophthora | Well suited | ```Suited: high clay phytophthora slope``` |
| FaD: <br> Fannin | ```Suited: slope high clay phytophthora``` | Suited: slope | ```Poorly suited: slope high clay phytophthora``` |
| FeC2: <br> Fannin | Suited: <br> high clay phytophthora | Well suited | ```Poorly suited: surface clay phytophthora slope``` |
| FeD2: <br> Fannin | ```Suited: slope high clay phytophthora``` | Suited: slope | ```Poorly suited: slope surface clay phytophthora``` |
| FeE2: <br> Fannin | ```Poorly suited: slope high clay phytophthora``` | ```Poorly suited: slope``` | ```Poorly suited: slope surface clay phytophthora``` |
| Gre: <br> Greenlee | ```Unsuited: large stones small stones slope phytophthora``` | ```Unsuited: large stones small stones slope``` | Unsuited: <br> large stones small stones slope phytophthora |
| $\mathbf{M}-\mathbf{W} .$ <br> Miscellaneous water |  |  |  |
| NkA: <br> Nikwasi $\qquad$ | ```Unsuited: wetness flooding phytophthora``` | Unsuited: wetness flooding | ```Unsuited: wetness flooding phytophthora``` |
| NnE: <br> Northcove | ```Unsuited: large stones small stones slope phytophthora``` | ```Unsuited: large stones small stones slope``` | ```Unsuited: large stones small stones slope phytophthora``` |

Table 4.-Ornamental Crops-Continued

| Map symbol and soil name | Fraser fir | Ball and burlap <br> harvesting* | Line-out beds** |
| :---: | :---: | :---: | :---: |
| NoC: <br> Northcove | Unsuited: <br> large stones small stones phytophthora | Unsuited: <br> large stones small stones | Unsuited: <br> large stones small stones phytophthora slope |
| Maymead | Poorly suited: large stones phytophthora | Unsuited: <br> large stones small stones | Unsuited: <br> large stones phytophthora slope |
| NoD: <br> Northcove | Unsuited: <br> large stones small stones slope phytophthora | Unsuited: <br> large stones small stones slope | Unsuited: <br> large stones small stones slope phytophthora |
| Maymead----------------- | ```Poorly suited: large stones slope phytophthora``` | ```Unsuited: large stones small stones slope``` | ```Unsuited: large stones slope phytophthora``` |
| OsB: <br> Ostin | Unsuited: flooding small stones phytophthora droughty | ```Unsuited: flooding small stones low clay``` | Unsuited: flooding small stones phytophthora droughty |
| $\begin{gathered} \text { PaB, PnC: } \\ \text { Pineola- } \end{gathered}$ | Suited: <br> depth to rock <br> high clay <br> phytophthora | Poorly suited: depth to rock | Suited: <br> small stones <br> phytophthora <br> slope |
| ```PnD: Pineola``` | ```Suited: slope depth to rock high clay phytophthora``` | $\left\lvert\, \begin{aligned} & \text { Poorly suited: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}\right.$ | ```Poorly suited: slope small stones phytophthora``` |
| ```PtD: Plott``` | Suited: slope | $\begin{aligned} & \text { Suited: } \\ & \text { slope } \end{aligned}$ | $\left\lvert\, \begin{gathered} \text { Poorly suited: } \\ \text { slope } \end{gathered}\right.$ |
| PtE: <br> Plott | Suited: slope | ```Poorly suited:``` | $\left\lvert\, \begin{gathered} \text { Poorly suited: } \\ \text { slope } \end{gathered}\right.$ |
| PtF: <br> Plott | Unsuited: slope | $\begin{aligned} & \text { Unsuited: } \\ & \text { slope } \end{aligned}$ | $\left\lvert\, \begin{gathered} \text { Unsuited: } \\ \text { slope } \end{gathered}\right.$ |
| PuC: <br> Porters | Well suited | Well suited | $\begin{aligned} & \text { Suited: } \\ & \text { slope } \end{aligned}$ |
| PuD: <br> Porters | Suited: slope | $\begin{aligned} & \text { Suited: } \\ & \text { slope } \end{aligned}$ | $\left\lvert\, \begin{gathered} \text { Poorly suited: } \\ \text { slope } \end{gathered}\right.$ |

Table 4.-Ornamental Crops-Continued

| Map symbol and soil name | Fraser fir | Ball and burlap harvesting* | $\begin{aligned} & \text { Line-out } \\ & \text { beds** } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| PuE: <br> Porters | Suited: slope | $\left\lvert\, \begin{gathered} \text { Poorly suited: } \\ \text { slope } \end{gathered}\right.$ | Poorly suited: slope |
| PuF: <br> Porters | Unsuited: slope | $\left\lvert\, \begin{gathered} \text { Unsuited: } \\ \text { slope } \end{gathered}\right.$ | Unsuited: slope |
| PwD: <br> Porters | Suited: slope | $\left\lvert\, \begin{gathered} \text { Suited: } \\ \text { slope } \end{gathered}\right.$ | ```Poorly suited:``` |
| PwE: <br> Porters | Suited: slope | $\left\lvert\, \begin{gathered} \text { Poorly suited: } \\ \text { slope } \end{gathered}\right.$ | Poorly suited: slope |
| Px. <br> Pits, quarries |  |  |  |
| ReA: <br> Reddies | ```Poorly suited: flooding phytophthora droughty``` | $\left\lvert\, \begin{aligned} & \text { Poorly suited: } \\ & \text { flooding } \\ & \text { low clay } \end{aligned}\right.$ | ```Poorly suited: flooding phytophthora droughty``` |
| RoA: <br> Rosman | ```Poorly suited: flooding droughty phytophthora``` | $\left\lvert\, \begin{aligned} & \text { Poorly suited: } \\ & \text { flooding } \\ & \text { low clay } \end{aligned}\right.$ | ```Poorly suited: flooding droughty phytophthora``` |
| RsB: <br> Rosman | ```Unsuited: flooding phytophthora``` |  | ```Unsuited: flooding phytophthora``` |
| SaB: <br> Saunook | Well suited: phytophthora | Well suited | Suited: <br> surface clay phytophthora |
| SaC: <br> Saunook | Well suited: phytophthora | Well suited | Suited: <br> surface clay phytophthora slope |
| SbD: <br> Saunook | ```Poorly suited: large stones slope phytophthora``` | $\left\lvert\, \begin{aligned} & \text { Poorly suited: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}\right.$ | Poorly suited: <br> large stones slope surface clay phytophthora |
| ScB: <br> Saunook | Well suited: phytophthora | Well suited | Suited: <br> surface clay phytophthora |

See footnotes at end of table.

Table 4.-Ornamental Crops-Continued

| Map symbol and soil name | Fraser fir | Ball and burlap <br> harvesting* | Line-out beds** |
| :---: | :---: | :---: | :---: |
| SdC: <br> Saunook | Well suited: phytophthora | Well suited | ```Suited: surface clay phytophthora slope``` |
| SgC: <br> Saunook | Suited: phytophthora | Well suited | ```Suited: surface clay phytophthora slope``` |
| Nikwasi----------------- | ```Unsuited: flooding wetness phytophthora``` | Unsuited: flooding wetness | ```Unsuited: flooding wetness phytophthora``` |
| ShC: <br> Saunook | Suited: <br> large stones phytophthora | Suited: <br> large stones | ```Suited: large stones phytophthora slope``` |
| Thunder---------------- | Unsuited: <br> large stones small stones phytophthora | Unsuited: <br> large stones small stones | ```Unsuited: large stones small stones phytophthora``` |
| ShD: <br> Saunook | ```Suited: slope large stones phytophthora``` | ```Suited: slope large stones``` | ```Poorly suited: slope large stones phytophthora``` |
| Thunder---------------- | Unsuited: <br> large stones small stones slope phytophthora | ```Unsuited: large stones small stones slope``` | ```Unsuited: large stones small stones slope phytophthora``` |
| SOD, SOE: $\qquad$ | $\left\lvert\, \begin{aligned} & \text { Poorly suited: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}\right.$ | $\begin{aligned} & \text { Poorly suited: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | ```Poorly suited: slope depth to rock``` |
| Ditney------------------ | Unsuited: <br> slope <br> depth to rock | Unsuited: <br> slope <br> depth to rock | ```Unsuited: slope depth to rock``` |
| SoF: <br> Soco | ```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``` |

See footnotes at end of table.

Table 4.-Ornamental Crops-Continued

| Map symbol <br> and soil name | Fraser fir | Ball and burlap harvesting* | $\begin{gathered} \text { Line-out } \\ \text { beds** } \end{gathered}$ |
| :---: | :---: | :---: | :---: |
| SpD, SpE: <br> Spivey | ```Unsuited: large stones small stones slope phytophthora``` | ```Unsuited: large stones small stones slope``` | Unsuited: <br> large stones small stones slope phytophthora |
| SrC: <br> Spivey | Unsuited: <br> large stones small stones phytophthora | Unsuited: <br> large stones small stones | Unsuited: <br> large stones small stones phytophthora |
| Whiteoak---------------- | Suited: <br> large stones phytophthora | Unsuited: large stones small stones | Poorly suited: large stones phytophthora |
| SsB: <br> Statler | Suited: <br> flooding phytophthora | Suited: flooding | ```Suited: flooding surface clay phytophthora``` |
| StD: <br> Stecoah | ```Poorly suited: slope droughty``` | Suited: slope low clay | ```Poorly suited: slope droughty``` |
| Soco-------------------- | ```Poorly suited: slope depth to rock``` | ```Poorly suited: slope depth to rock``` | ```Poorly suited: slope depth to rock``` |
| StE: Stecoah- | ```Poorly suited: slope droughty``` | ```Poorly suited: slope low clay``` | ```Poorly suited: slope droughty``` |
| Soco | ```Poorly suited: slope depth to rock``` | ```Poorly suited: slope depth to rock``` | ```Poorly suited: slope depth to rock``` |
| StF: <br> Stecoah | Unsuited: slope droughty | ```Unsuited: slope low clay``` | ```Unsuited: slope droughty``` |
| Soco-------------------- | ```Unsuited: slope depth to rock``` | ```Unsuited: slope depth to rock``` | ```Unsuited: slope depth to rock``` |
| TsC: <br> Thunder | ```Unsuited: large stones small stones phytophthora``` | Unsuited: <br> large stones small stones | Unsuited: <br> large stones small stones phytophthora |
| Saunook----------------- | Suited: <br> large stones phytophthora | Poorly suited: <br> large stones | Poorly suited: large stones phytophthora |

See footnotes at end of table.

Table 4.-Ornamental Crops-Continued


Table 4.-Ornamental Crops-Continued

| Map symbol and soil name | Fraser fir | Ball and burlap <br> harvesting* | $\begin{aligned} & \text { Line-out } \\ & \text { beds** } \end{aligned}$ |
| :---: | :---: | :---: | :---: |
| WaC: <br> Watauga | Suited: <br> high clay phytophthora | Well suited | ```Suited: surface clay phytophthora slope``` |
| WaD : <br> Watauga | ```Suited: slope high clay phytophthora``` | $\begin{array}{\|c} \text { Suited: } \\ \text { slope } \end{array}$ | ```Poorly suited: slope surface clay phytophthora``` |
| WbD, WcE: <br> Wayah | ```Poorly suited: slope climate``` | Unsuited: slope climate | Unsuited: slope climate |
| Burton----------------- | ```Poorly suited: slope depth to rock climate``` | ```Unsuited: slope depth to rock climate``` | ```Unsuited: slope depth to rock climate``` |
| WcF: <br> Wayah | 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``` |
| WhB : <br> Whiteoak | Well suited: phytophthora | Well suited | Suited: phytophthora |
| WkC: <br> Whiteoak | Well suited: phytophthora | Well suited | ```Suited: phytophthora slope``` |
| WtD : <br> Whiteoak | ```Suited: slope phytophthora large stones``` | ```Suited: slope large stones``` | ```Poorly suited: slope large stones phytophthora``` |

* "Low clay," "high clay," and "small stones" limitations are
based on clay content and the quantity of coarse fragments in the upper 20 inches of the soil. "Large stones" limitations are based on a high quantity of surface stones and boulders.
** Limitations are based on the upper 10 inches of the soil. In general, elevations above 4,500 feet are considered marginal to unsuited for line-out beds, except in the production of Fraser fir, due to climatic conditions.

Table 5.-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 | Cool-season grasses | Corn | Grass-legume hay | Pasture | Tobacco |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AUM* | Bu | Tons | AUM* | Lbs |
| AcF: <br> Ashe | $7 e$ | -- | -- | --- | --- | -- |
| Cleveland----------- | $7 e$ | --- | -- | --- | -- | --- |
| Rock outcrop-------- | $8 s$ | --- | --- | - | --- | -- |
| BaD, BaE: <br> Balsam- | 7 s | --- | --- | --- | 3.00 | --- |
| BCE, BCF: <br> Balsam- | 7 s | - | -- | --- | --- | --- |
| Rubble land--------- | 8 s | --- | --- | --- | --- | --- |
| BuC: <br> Burton | 4 e | - | --- | --- | 6.00 | --- |
| Craggey------------- | 7 s | --- | --- | --- | -- | --- |
| Rock outcrop-------- | 8 s | - | - | -- | --- | --- |
| BuD: <br> Burton | $6 e$ | -- | --- | --- | 5.00 | --- |
| Craggey------------- | 7 s | --- | --- | - | --- | --- |
| Rock outcrop-------- | 8 s | - | -- | -- | --- | --- |
| BuF: <br> Burton | $7 e$ | -- | --- | --- | 4.00 | --- |
| Craggey------------- | $7 e$ | --- | --- | --- | --- | --- |
| Rock outcrop-------- | 8 s | - | -- | -- | --- | --- |
| BwC: <br> Burton | 4 e | - | -- | 2.50 | 6.00 | -- |
| Wayah--------------- | 4 e | - | --- | 3.00 | 6.00 | --- |
| BwD: <br> Burton | $6 e$ | --- | --- | 2.50 | 5.00 | --- |
| Wayah--------------- | $6 e$ | -- | --- | 3.00 | 5.00 | --- |
| BwE: <br> Burton | $7 e$ | - | -- | --- | 4.00 | --- |
| Wayah--------------- | $7 e$ | --- | --- | --- | 4.00 | --- |

See footnote at end of table.

Table 5.-Land Capability and Yields per Acre of Crops and Pasture-Continued

| Map symbol and soil name | Land capability | Cool-season grasses | Corn | Grass-legume hay | Pasture | Tobacco |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AUM* | Bu | Tons | AUM* | $\underline{L b s}$ |
| BwF: <br> Burton | 7 e | - | - | -- | 4.00 | - |
| Wayah--------------- | 7 e | --- |  | --- | --- | -- |
| CaC: <br> Cashiers | 4 e | --- | - | --- | 6.00 | --- |
| CaD: <br> Cashiers | 6 e | --- | -- | -- | 5.00 | - |
| CaE: <br> Cashiers | 7 e | --- | -- | - | 4.00 | - |
| CaF: <br> Cashiers | 7 e | --- |  | - | --- | - |
| CeD : <br> Chandler | 6 e | --- | - | --- | 4.50 | -- |
| Micaville----------- | $6 e$ | 3.00 |  | --- | --- | --- |
| CeE: <br> Chandler | 7 e | --- | - | --- | 3.50 | - |
| Micaville---------- | 7 e | 2.50 | - | --- | --- | --- |
| CeF: <br> Chandler | $7 e$ | --- |  | --- | --- | --- |
| Micaville----------- | $7 e$ | --- | - | -- | --- | --- |
| ChD : <br> Chestnut | $6 e$ | 4.50 | - | 2.50 | 4.50 | --- |
| Ashe---------------- | $6 e$ | 4.00 | - | 2.00 | 4.00 | - |
| Che, ChF: <br> Chestnut | $7 e$ | 4.00 | -- | - | 3.50 | --- |
| Ashe---------------- | $7 e$ | 3.50 | - | --- | 3.00 | -- |
| CnD : <br> Chestnut | $6 e$ | 4.50 | -- | 2.50 | 4.50 | - |
| Buladean------------ | 6 e | 5.80 | -- | 3.50 | 5.00 | --- |
| CnE: <br> Chestnut | 7 e | 4.00 | -- | --- | 4.00 | --- |
| Buladean------------ | $7 e$ | 4.00 | -- | --- | 4.50 | --- |
| CnF: <br> Chestnut $\qquad$ | $7 e$ | 4.00 | - | --- | --- | - |
| Buladean------------ | $7 e$ | 5.50 | - | --- | --- | --- |

See footnote at end of table.

Table 5.-Land Capability and Yields per Acre of Crops and Pasture-Continued


See footnote at end of table.

Table 5.-Land Capability and Yields per Acre of Crops and Pasture-Continued

| Map symbol and soil name | Land capability | Cool-season grasses | Corn | Grass-legume hay | Pasture | Tobacco |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AUM* | Bu | Tons | AUM* | Lbs |
| Fannin-------------- | 4 e | 5.00 | --- | 2.50 | --- | 2,800.00 |
| FaD: <br> Fannin | 6 e | 4.00 | --- | --- | --- | 2,600.00 |
| FeC2: <br> Fannin | 4 e | 4.50 | -- | 2.00 | --- | 2,700.00 |
| FeD2: <br> Fannin | $6 e$ | 3.50 | -- | --- | --- | 2,500.00 |
| FeE2: <br> Fannin | $7 e$ | 3.50 | -- | -- | --- | --- |
| Gre: <br> Greenlee | 7 s | -- | --- | --- | - | --- |
| M-W. <br> Miscellaneous water |  |  |  |  |  |  |
| NkA: <br> Nikwasi $\qquad$ | 6w | 6.00 | --- | 3.60 | 6.00 | --- |
| NnE: <br> Northcove | 7 s | --- | --- | --- | 2.50 | --- |
| NoC: <br> Northcove | 7 s | --- | --- | --- | 2.50 | --- |
| Maymead------------- | 4 e | --- | --- | --- | 6.50 | -- |
| NoD : <br> Northcove | 7 s | --- | --- | --- | 2.50 | --- |
| Maymead------------- | 6 e | --- | --- | - | 5.50 | -- |
| OsB : <br> Ostin | 4 s | - | --- | -- | --- | -- |
| PaB: <br> Pineola | 3 e | 7.00 | 90.00 | 4.50 | 7.00 | -- |
| PnC: |  |  |  |  |  |  |
| Pineola------------- | 4 e | 6.50 | 85.00 | 4.00 | 6.00 | -- |
| PnD: <br> Pineola | 6 e | 6.00 | - | 3.50 | 5.00 | -- |
| ```PtD: Plott``` | 6 e | 7.00 | - | -- | 8.50 | -- |
| PtE: <br> Plott | $7 e$ | 6.50 | - | --- | 8.00 | - |
| PtF: <br> Plott | 7 e | --- | -- | --- | --- | - |

See footnote at end of table.

Table 5.-Land Capability and Yields per Acre of Crops and Pasture-Continued

| Map symbol and soil name | Land capability | Cool-season grasses | Corn | Grass-legume hay | Pasture | Tobacco |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AUM* | Bu | Tons | AUM* | $\underline{L b s}$ |
| PuC: <br> Porters | 4 e | 7.50 | 85.00 | 4.50 | 8.50 | 2,500.00 |
| PuD: <br> Porters | 6 e | 7.00 | - | --- | 8.50 | --- |
| PuE: <br> Porters | $7 e$ | 6.50 | --- | -- | 7.00 | --- |
| PuF: <br> Porters | 7 e | --- | --- | --- | --- | --- |
| PwD: <br> Porters | 6 e | 7.00 | 100.00 | 4.00 | 8.50 | 2,700.00 |
| PwE: <br> Porters | $7 e$ | --- | --- | --- | 7.00 | --- |
| $\begin{aligned} & \text { Px. } \\ & \text { Pits, quarries } \end{aligned}$ |  |  |  |  |  |  |
| ReA: <br> Reddies | 3w | 8.50 | 110.00 | 5.50 | 8.00 | 2,900.00 |
| RoA: |  |  |  |  |  |  |
| Rosman-------------- | 2w | 8.50 | 135.00 | 6.00 | 8.50 | 3,200.00 |
| RsB: <br> Rosman | 3w | 8.50 | 120.00 | 5.50 | 8.00 | --- |
| SaB: <br> Saunook | 2 e | 8.70 | 120.00 | 5.30 | 8.00 | 3,000.00 |
| SaC: <br> Saunook | 4 e | 8.00 | 105.00 | 5.00 | 8.00 | 2,800.00 |
| SbD : |  |  |  |  |  |  |
| Saunook------------- | $6 e$ | 7.50 | --- | 4.70 | 7.00 | 2,600.00 |
| ScB: <br> Saunook | 2 e | 8.70 | 110.00 | 5.30 | 8.00 | 3,000.00 |
| SdC: <br> Saunook | 4 e | 8.00 | 90.00 | 5.00 | 8.00 | 2,800.00 |
| SgC: <br> Saunook | 3 e | 8.70 | 100.00 | 5.30 | 8.00 | 2,600.00 |
| Nikwasi------------- | 6w | 6.00 | -- | 3.60 | 6.00 | --- |
| ShC: <br> Saunook | 4 e | 8.00 | 90.00 | 5.00 | 8.00 | 2,400.00 |
| Thunder------------- | 6 s | 6.00 | --- | --- | 6.00 | --- |

See footnote at end of table.

Table 5.-Land Capability and Yields per Acre of Crops and Pasture-Continued

| Map symbol and soil name | Land capability | Cool-season grasses | Corn | Grass-legume hay | Pasture | Tobacco |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AUM* | Bu | Tons | AUM* | $\underline{L b s}$ |
| ShD: <br> Saunook | $6 e$ | 7.50 | -- | 4.70 | 7.50 | -- |
| Thunder------------- | 6 s | 6.00 | --- | --- | 6.00 | --- |
| SOD: <br> Soco | $6 e$ | -- | -- | 2.50 | 4.50 | --- |
| Ditney------------- | $6 e$ | --- | - | - | 3.50 | --- |
| SoE, SoF: <br> Soco | $7 e$ | -- | -- | --- | 4.00 | --- |
| Ditney-------------- | $7 e$ | --- | --- | --- | - | --- |
| SpD, SpE: <br> Spivey | 7 s | --- | --- | --- | 6.00 | --- |
| SrC: <br> Spivey | 7 s | --- | -- | --- | 6.00 | --- |
| Whiteoak------------ | 4 e | 7.00 | 90.00 | 3.50 | -- | 2,400.00 |
| SsB: <br> Statler | $2 e$ | 8.00 | 125.00 | 4.00 | 8.00 | 2,400.00 |
| StD: <br> Stecoah | $6 e$ | --- | - | 2.50 | 5.50 | - |
| Soco---------------- | $6 e$ | --- | --- | 2.50 | 4.50 | -- |
| StE, StF: <br> Stecoah | $7 e$ | -- | -- | --- | 5.00 | -- |
| Soco---------------- | $7 e$ | - | - | --- | 4.00 | -- |
| TsC: <br> Thunder | $6 s$ | - | - | - | -- | - |
| Saunook------------- | 4 e | 7.00 | 90.00 | 5.00 | 7.00 | 2,400.00 |
| TsD: <br> Thunder | $6 s$ | --- | --- | --- | --- | - |
| Saunook------------- | $6 e$ | 7.00 | - | 4.70 | 7.00 | -- |
| TSE: <br> Thunder | 7 s | --- | - | - | -- | -- |
| Saunook------------- | $7 e$ | 4.00 | -- | --- | 5.00 | --- |
| Ua: <br> Udorthents, loamy | $7 e$ | -- | -- | --- | --- | --- |
| UdC : <br> Udorthents | $7 e$ | -- | --- | --- | --- | --- |
| Urban land---------- | 8 s | --- | --- | --- | --- | --- |

See footnote at end of table.

Table 5.-Land Capability and Yields per Acre of Crops and Pasture-Continued

| Map symbol and soil name | Land capability | Cool-season grasses | Corn | Grass-legume hay | Pasture | Tobacco |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  | AUM* | Bu | Tons | AUM* | $\underline{L b s}$ |
| UnD: <br> Unaka | 6 e | 5.00 | --- | --- | 5.00 | --- |
| Porters------------- | $6 e$ | 6.00 | --- | - | 6.00 | -- |
| UnE: <br> Unaka | $7 e$ | 4.50 | --- | --- | 4.50 | --- |
| Porters------------- | 7 e | 5.50 | --- | --- | 5.50 | --- |
| UnF: <br> Unaka | 7 e | - | --- | -- | --- | --- |
| Porters------------- | $7 e$ | --- | -- | -- | --- | --- |
| UoF: <br> Unicoi | 7 s | --- | --- | - | - | --- |
| Rock outcrop-------- | 8 s | --- | --- | - | --- | --- |
| W. Water |  |  |  |  |  |  |
| WaC: <br> Watauga | 4 e | --- | 75.00 | 3.80 | 6.00 | 2,800.00 |
| WaD: <br> Watauga | $6 e$ | --- | -- | 3.50 | 5.50 | 2,600.00 |
| WbD : <br> Wayah | $6 e$ | --- | --- | --- | 5.00 | -- |
| Burton-------------- | $6 e$ | --- | - | --- | 5.00 | --- |
| WcE: <br> Wayah | $7 e$ | - | --- | --- | 4.00 | --- |
| Burton-------------- | $7 e$ | - | -- | --- | 4.00 | --- |
| WcF: <br> Wayah | $7 e$ | --- | --- | -- | --- | --- |
| Burton-------------- | 7 e | --- | - | -- | 4.00 | -- |
| WhB: <br> Whiteoak | 2 e | 8.00 | 110.00 | 4.00 | 8.00 | 2,800.00 |
| WkC: |  |  |  |  |  |  |
| Whiteoak------------ | 4 e | 7.00 | 90.00 | 3.50 | 7.00 | 2,400.00 |
| WtD: <br> Whiteoak | 6 e | 6.00 | --- | 3.00 | 6.50 | --- |

[^2]Table 6.-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 |
| :---: | :---: |
| CuA | Cullowhee loam, 0 to 3 percent slopes, frequently flooded (if drained and either protected from flooding or not frequently flooded during the growing season) |
| Pab | Pineola gravelly loam, 2 to 8 percent slopes |
| ReA | Reddies fine sandy loam, 0 to 3 percent slopes, frequently flooded (if protected from flooding or not frequently flooded during the growing season) |
| RoA | Rosman loam, 0 to 3 percent slopes, occasionally flooded |
| RsB | Rosman sandy loam, 0 to 5 percent slopes, frequently flooded (if protected from flooding or not frequently flooded during the growing season) |
| SaB | Saunook loam, 2 to 8 percent slopes |
| ScB | Saunook silt loam, 2 to 8 percent slopes |
| WhB | Whiteoak fine sandy loam, 2 to 8 percent slopes |

Table 7.-Forestland Management and Productivity
(Refer to the "Detailed Soil Map Units" section and the "Woodland Management and Productivity" section of this soil survey a professional forester)

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

| Map symbol and soil name | Management concerns |  |  |  |  | Potential productivity ${ }^{1}$ |  |  | Trees to manage ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Erosion hazard | $\|$Equip- <br> ment <br> limita- <br> tion | $\begin{gathered} \text { Seedling } \\ \text { mortal- } \\ \text { ity } \end{gathered}$ | Wind- <br> throw <br> hazard | Plant competition | Common trees | $\begin{array}{\|l} \text { Site } \\ \text { index } \end{array}$ | Volume of wood fiber |  |
|  |  |  |  |  |  |  |  | cu ft/ac |  |
| BCE, BCF: <br> Balsam- | Severe | Severe | Moderate | Slight | Moderate | red spruce <br> Fraser fir northern red oak---yellow birch-------sugar maple--------- | 64 --- --- --- ---1 | 150.00 ---- --- | See footnote 4. |
| Rubble land. |  |  |  |  |  |  |  |  |  |
| BuC: <br> Burton | Slight | Slight | Severe | Moderate | Slight | northern red oak red spruce Fraser fir $\qquad$ $\qquad$ | --- | --- | See footnote 4. |
| Craggey-------------- | Slight | Slight | Severe | Severe | Slight | northern red oak red spruce <br> Fraser fir---------- | --- | --- --- --- | See footnote 4. |
| Rock outcrop. |  |  |  |  |  |  |  |  |  |
| BuD: <br> Burton | Moderate | Moderate | Severe | Moderate | Slight | northern red oak red spruce $\qquad$ Fraser fir---------- | --- | --- | See footnote 4. |
| Craggey------------- | Moderate | Moderate | Severe | Severe | Slight | northern red oak red spruce Fraser fir---------- | --- --- -- | --- --- -- | See footnote 4. |
| Rock outcrop. |  |  |  |  |  |  |  |  |  |
| BuF: <br> Burton | Severe | Severe | Severe | Moderate | Slight | northern red oak---red spruce Fraser fir $\qquad$ | --- | --- | See footnote 4. |
| Craggey-------------- | Severe | Severe | Severe | Severe | Slight | northern red oak red spruce <br> Fraser fir $\qquad$ | --- | --- | See footnote 4. |
| Rock outcrop. |  |  |  |  |  |  |  |  |  |

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

| Map symbol and soil name | Management concerns |  |  |  |  | Potential productivity ${ }^{1}$ |  |  | Trees to manage ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Erosion hazard | Equip- ment limita- tion | $\begin{array}{\|c} \text { Seedling } \\ \text { mortal- } \\ \text { ity } \end{array}$ | Windthrow hazard | $\left\lvert\, \begin{gathered} \text { Plant } \\ \text { competi- } \\ \text { tion } \end{gathered}\right.$ | Common trees | Site index ${ }^{2}$ | Volume of wood fiber |  |
|  |  |  |  |  |  |  |  | cu ft/ac |  |
| CeE, CeF: Chandler- | Severe | Severe | Moderate | Slight | Moderate | eastern white pine chestnut oak Virginia pine pitch pine scarlet oak hickory yellow-poplar white oak | $\begin{array}{r}88 \\ 76 \\ ---- \\ ---- \\ \hline--- \\ \hline--\end{array}$ | $\begin{array}{r} 162.00 \\ 58.00 \\ \hline \end{array}$ | eastern white pine |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Micaville------------ | Severe | Severe | Moderate | slight | Moderate |  | ---- | --- | eastern white pine |
|  |  |  |  |  |  |  |  | --- |  |
|  |  |  |  |  |  |  |  | - |  |
|  |  |  |  |  |  |  |  | --- |  |
|  |  |  |  |  |  |  |  | --- |  |
|  |  |  | Moderate | Moderate |  | eastern white pine--yellow-poplar scarlet oak----_---- |  |  |  |
| ChD: <br> Chestnut $\qquad$ | Moderate | Moderate |  |  | Moderate |  |  |  | eastern white pine, yellow-poplar |
| Ashe----------------- |  |  |  |  |  |  | 78 97 | 139.00 |  |
|  |  |  |  |  |  |  | 97 | 102.00 |  |
|  | Moderate | Moderate | Moderate | Moderate | Moderate | white oak----------- | 70 | 52.00 |  |
|  |  |  |  |  |  | black oak----------- | 71 | 53.00 |  |
|  |  |  |  |  |  | chestnut oak-------- | 69 | 51.00 |  |
|  |  |  |  |  |  | shortleaf pine------ |  | , |  |
|  |  |  |  |  |  | chestnut oak-------- | 70 | 52.00 | eastern white pine |
|  |  |  |  |  |  | eastern white pine-- | 81 | 146.00 |  |
| ChE: <br> Chestnut | Severe | Severe | Moderate | Moderate | Moderate | hickory------------- | --- | --- |  |
|  |  |  |  |  |  | Virginia pine------- | --- | --- |  |
|  |  |  |  |  |  | pitch pine scarlet oak | ---- | --- |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  | eastern white pine-- | 78 | 139.00 | eastern white pine, |
|  |  |  |  |  |  | yellow-poplar------- | 97 | 102.00 | yellow-poplar |
|  |  |  |  |  |  | scarlet oak--------- | -- | -- |  |
|  |  |  |  |  |  | white oak----------- | 70 | 52.00 |  |
|  |  |  |  |  |  | black oak----------- | 71 | 53.00 |  |
|  |  |  |  |  |  | chestnut oak-------- | 69 | 51.00 |  |
|  |  |  |  |  |  | shortleaf pine------ | --- | --- |  |
|  |  |  |  |  |  |  |  |  |  |

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

| Map symbol and soil name | Management concerns |  |  |  |  | Potential productivity ${ }^{1}$ |  |  | Trees to manage ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Erosion hazard | $\begin{gathered} \text { Equip- } \\ \text { ment } \\ \text { limita- } \\ \text { tion } \end{gathered}$ | Seedling mortality | Windthrow hazard | Plant competition | Common trees | $\begin{aligned} & \text { Site } \\ & \text { index } \end{aligned}$ | Volume of wood fiber |  |
|  |  |  |  |  |  |  |  | cu ft/ac |  |
| ChE: <br> Ashe | Severe | Severe | Severe | Moderate | Moderate | chestnut oak-------eastern white pine--hickory------------Virginia pine------pitch pine scarlet oak $\qquad$ $\qquad$ | 70 81 --- --- --- -- |  | eastern white pine |
| ChF: |  |  |  |  |  | eastern white pine-- |  |  | eastern white pine |
| Chestnut | Severe | Severe | Severe | Moderate | Moderate | eastern white pine--yellow-poplar------scarlet oak--------white oak black oak chestnut oak $\qquad$ $\qquad$ shortleaf pine------ | 78 97 -- 70 71 69 --- | $\begin{array}{r} 139.00 \\ 102.00 \\ --0 \\ 52.00 \\ 53.00 \\ 51.00 \end{array}$ | eastern white pine, yellow-poplar |
| Ashe----------------- | Severe | Severe | Severe | Moderate | Moderate | chestnut oak-------eastern white pine--hickory------------Virginia pine------pitch pine scarlet oak | 70 81 --- --- --- --- | $\begin{array}{r} 52.00 \\ 146.00 \\ ---- \\ \text {--- } \end{array}$ | eastern white pine |
| CnD : |  |  |  |  |  |  |  |  |  |
| Chestnut | Moderate | Moderate | Moderate | Moderate | Moderate | eastern white pine--yellow-poplar------scarlet oak--------white oak----------black oak----------chestnut oak-------shortleaf pine------ | $\begin{array}{r} 78 \\ 97 \\ --- \\ 70 \\ 71 \\ 69 \\ --- \end{array}$ | $\begin{array}{r} 139.00 \\ 102.00 \\ --0 \\ 52.00 \\ 53.00 \\ 51.00 \\ -\quad- \end{array}$ | eastern white pine, yellow-poplar |
| Buladean------------- | Moderate | Moderate | Moderate | Slight | Moderate | eastern white pine-chestnut oak <br> white oak scarlet oak black oak yellow-poplar------red maple hickory------------black locust sourwood- | 97 --- --- --- --- 97 --- --- --- --- |  | eastern white pine, yellow-poplar, chestnut oak, white oak, scarlet oak |

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

| Map symbol and soil name | Management concerns |  |  |  |  | Potential productivity ${ }^{1}$ |  |  | Trees to manage ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\text { \| Erosion } \begin{array}{r} \text { hazard } \end{array}$ | $\|$Equip- <br> ment <br> limita- <br> tion | Seedling mortality | Wind- <br> throw <br> hazard | Plant competition | Common trees | \|Site | Volume of wood fiber |  |
|  |  |  |  |  |  |  |  | cu ft/ac |  |
| PtD: <br> Plott | Moderate | Moderate | Slight | Slight | Moderate | northern red oak----yellow-poplar------black cherry-------American beech-----sugar maple--------eastern hemlock----black oak----------yellow birch-------black locust-------- | 85 97 87 --- --- --- --- --- --- | $\text { \|r } \begin{array}{r} 67.00 \\ 102.00 \\ ---- \\ ---- \\ \\ ---- \\ \\ ---- \end{array}$ | northern red oak, yellow-poplar, black cherry |
| PtE, PtF: <br> Plott----------------- | Severe | Severe | Slight | Slight | Moderate | northern red oak----yellow-poplar------black cherry-------American beech-----sugar maple--------eastern hemlock----black oak----------yellow birch-------black locust-------- | 85 97 87 --- --- --- --- --- --- |  | northern red oak, yellow-poplar, black cherry |
| PuC: <br> Porters | Slight | Slight | Slight | Slight | Moderate | northern red oak ${ }^{5}$ $\qquad$ yellow-poplar------eastern white pine-black cherry-------white ash----------- | 82 97 88 --- --- | $\left\lvert\, \begin{array}{r} 64.00 \\ 102.00 \\ 162.00 \\ --- \end{array}\right.$ | ```yellow-poplar, northern red oak, black cherry, white ash``` |
| PuD: <br> Porters | Moderate | Moderate | Slight | Slight | Moderate | northern red oak5_--yellow-poplar------eastern white pine-black cherry-------white ash----------- | 82 97 88 --- --- | $\left\lvert\, \begin{array}{r} 64.00 \\ 102.00 \\ 162.00 \\ ---- \\ --- \end{array}\right.$ | ```yellow-poplar, northern red oak, black cherry, white ash``` |
| PuE, PuF: <br> Porters | Severe | Severe | Slight | Slight | Moderate | northern red oak ${ }^{5}$ $\qquad$ yellow-poplar------eastern white pine-black cherry-------white ash----------- | 82 97 88 --- --- | $\left\lvert\, \begin{array}{r} 64.00 \\ 102.00 \\ 162.00 \\ --- \\ --- \end{array}\right.$ | ```yellow-poplar, northern red oak, black cherry, white ash``` |

Table 7.-Forestland Management and Productivity-Continued

| Map symbol and soil name | Management concerns |  |  |  |  | Potential productivity ${ }^{1}$ |  |  | Trees to manage ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Erosion hazard | Equip- ment limita- tion | Seedling mortality | Wind- <br> throw <br> hazard | Plant competition | Common trees | Site <br> index ${ }^{2}$ | Volume of wood fiber |  |
|  |  |  |  |  |  |  |  | cu ft/ac |  |
| PwD: <br> Porters | Moderate | Moderate | Slight | Slight | Moderate | northern red oak ${ }^{5}$ yellow-poplar------eastern white pine-black cherry-------white ash----------- | 82 97 88 | $\begin{array}{r} 64.00 \\ 102.00 \\ 162.00 \end{array}$ | ```yellow-poplar, northern red oak, black cherry, white ash``` |
| PwE: <br> Porters | Severe | Severe | Slight | Slight | Moderate | northern red oak ${ }^{5}$ yellow-poplar------eastern white pine-black cherry-------white ash----------- | 82 97 88 --- --- | $\left\lvert\, \begin{array}{r} 64.00 \\ 102.00 \\ 162.00 \\ --- \\ --- \end{array}\right.$ | ```yellow-poplar, northern red oak, black cherry, white ash``` |
| Px. <br> Pits, quarries |  |  |  |  |  |  |  |  |  |
| ReA: <br> Reddies | Slight | Slight | Slight | Slight | Severe | yellow-poplar------American sycamore--red maple----------eastern white pine-river birch--------- | 105 --- --- --- -- | 115.00 --- ---- --- | yellow-poplar, eastern white pine, black walnut |
| RoA: <br> Rosman | Slight | Slight | Slight | Slight | Severe | yellow-poplar------American sycamore--black walnut-------red maple----------river birch American beech-----black locust-------- | 40 --- --- --- --- --- -- | 114.00 ---- ---- ---- --- --- | $\begin{gathered} \text { yellow-poplar, } \\ \text { black walnut } \end{gathered}$ |
| RsB: <br> Rosman | Slight | Slight | Moderate | Slight | Severe | yellow-poplar------American sycamore--black walnut-------red maple----------river birch--------American beech black locust-------- | 40 --- --- --- --- --- | 114.00 ---- ---- ---- ---- | $\begin{gathered} \text { yellow-poplar, } \\ \text { black walnut } \end{gathered}$ |

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

| Map symbol and soil name | Management concerns |  |  |  |  | Potential productivity ${ }^{1}$ |  |  | Trees to manage ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Erosion hazard | $\begin{array}{\|c} \text { Equip- } \\ \text { ment } \\ \text { limita- } \\ \text { tion } \end{array}$ | Seedling mortality | Windthrow hazard | Plant competition | Common trees | $\begin{aligned} & \text { Site } \\ & \text { index } \end{aligned}$ | Volume of wood fiber |  |
|  |  |  |  |  |  |  |  | cu ft/ac |  |
| SgC : <br> Nikwasi $\qquad$ | Slight | Severe | Severe | Slight | Severe | yellow-poplar------eastern white pine-American sycamore--red maple----------yellow birch-------eastern hemlock----- | --- --- --- --- --- --- | --- | See footnote 4. |
| ShC: |  |  |  |  |  |  |  |  |  |
| Saunook-------------- | Slight | Slight | Slight | Slight | Moderate | yellow-poplar------eastern white pine-northern red oak---white oak----------eastern hemlock----red maple----------black cherry-------white ash----------- | 107 104 --- --- --- --- --- --- |  | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |
| Thunder-------------- | Slight | Severe | Moderate | Slight | Moderate | yellow-poplar ${ }^{5}$ _----- <br> northern red oak---- <br> sugar maple--------- <br> white ash----------- <br> black cherry-------- | 105 92 --- --- | $\text { \|r } \begin{array}{r} 115.00 \\ 74.00 \\ - \\ ---- \\ \\ ---- \end{array}$ | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |
| ShD : |  |  |  |  |  |  |  |  |  |
| Saunook-------------- | Moderate | Moderate | Slight | Slight | Moderate | yellow-poplar------eastern white pine-northern red oak---white oak----------eastern hemlock----red maple----------black cherry-------white ash----------- | 107 104 --- --- --- --- --- --- |  | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |
| Thunder-------------- | Moderate | Severe | Moderate | Slight | Moderate | yellow-poplar ${ }^{5}$ $\qquad$ northern red oak---sugar maple--------white ash----------black cherry-------- | 105 92 --- --- --- | $\left\lvert\, \begin{array}{r} 115.00 \\ 74.00 \\ - \\ \text {---- } \\ \\ ---- \end{array}\right.$ | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

|  |  | Manage | ement conc | cerns |  | Potential produ | uctivity |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Map symbol and soil name | Erosion hazard | $\|$Equip- <br> ment <br> limita- <br> tion | $\begin{array}{\|c} \text { Seedling } \\ \text { mortal- } \\ \text { ity } \end{array}$ | Windthrow hazard | $\begin{gathered} \text { Plant } \\ \text { competi- } \\ \text { tion } \end{gathered}$ | Common trees | Site index ${ }^{2}$ | Volume of wood fiber | Trees to manage ${ }^{3}$ |
|  | Moderate | Moderate | Moderate | Moderate | Moderate | eastern white pine-shortleaf pine <br> pitch pine <br> Virginia | $\begin{array}{r} 85 \\ 61 \\ --- \end{array}$ | cu ft/ac | eastern white pine, chestnut oak, white oak |
| SoD: Soco |  |  |  |  |  |  |  | $\begin{array}{\|r} 155.00 \\ 90.00 \\ \hline \end{array}$ |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | --- |  |  |
|  |  |  |  |  |  | chestnut oak-------- | 68 | 50.00 |  |
|  |  |  |  |  |  | scarlet oak--------- | 76 | 58.00 |  |
|  |  |  |  |  |  | white oak--------------- | --- | -- |  |
|  |  |  |  |  |  | yellow-poplar------- | --- | --- |  |
| Ditney---------------- | Moderate | Moderate | Moderate | Moderate | Moderate | shortleaf pineVirginia pine-pitch pine--- | $\begin{aligned} & \text {--- } \\ & \text {---- } \end{aligned}$ | --- | eastern white pine |
|  |  |  |  |  |  |  |  | --- |  |
|  |  |  |  |  |  |  |  | --- |  |
| SoE:Soco- | Severe | Severe | Moderate | Moderate | Moderate | eastern white pine-shortleaf pine pitch pineVirginia pine chestnut oak scarlet oak white oak black oak yellow-poplar$\qquad$$\qquad$ |  |  | eastern white pine, chestnut oak, white oak |
|  |  |  |  |  |  |  | 85 | 155.00 |  |
| Soco- |  |  |  |  |  |  | 61 | 90.00 |  |
|  |  |  |  |  |  |  | --- | --- |  |
|  |  |  |  |  |  |  | 68 | . |  |
|  |  |  |  |  |  |  | 68 | 50.00 |  |
|  |  |  |  |  |  |  | 76 | 58.00 |  |
|  |  |  |  |  |  |  | --- | ---- |  |
|  |  |  |  |  |  |  | --- | --- |  |
| Ditney--------------- | Severe | Severe | Severe | Moderate | Moderate | \|shortleaf pine--------------- |  | --- | eastern white pine |
|  |  |  |  |  |  |  |  | --- |  |
|  | Severe |  | Severe |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  | eastern white pine, chestnut oak, white oak |
| Soco |  |  |  | Moderate | Moderate |  | 85 61 | 155.0090.00 |  |
|  | Severe | Severe | Severe |  |  | shortleaf pine------ <br> pitch pine | 61 |  |  |
|  |  |  |  |  |  |  | --- |  |  |
|  |  |  |  |  |  | chestnut oak------- | 68 | 50.00 |  |
|  |  |  |  |  |  | scarlet oak--------- | 76 | 58.00 |  |
|  |  |  |  |  |  | white oak--------- | --- |  |  |
|  |  |  |  |  |  | black oak----------- | --- |  |  |
|  |  |  |  |  |  | yellow-poplar------- | --- |  |  |
| Ditney---------------- | Severe | Severe | Severe | Moderate | Moderate | shortleaf pine------ | - | - | eastern white pine |
|  |  |  |  |  |  | Virginia pine------- | -- | --- |  |
|  |  |  |  |  |  | \|pitch pine- | --- | --- |  |

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

See footnotes at end of table.
Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

| Map symbol and soil name | Management concerns |  |  |  |  | Potential productivity ${ }^{1}$ |  |  | Trees to manage ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Erosion hazard | $\begin{array}{\|c} \text { Equip- } \\ \text { ment } \\ \text { limita- } \\ \text { tion } \\ \hline \end{array}$ | ```Seedling mortal- ity``` | Windthrow hazard | Plant competition | Common trees | Site index ${ }^{2}$ | Volume of wood fiber |  |
|  |  |  |  |  |  |  |  | cu ft/ac |  |
| TsC: <br> Thunder | Slight | Severe | Moderate | Slight | Moderate | yellow-poplar ${ }^{5}$ $\qquad$ northern red oak---sugar maple--------white ash----------black cherry-------- | 105 92 --- --- --- | $\begin{array}{r} 115.00 \\ 74.00 \\ --- \end{array}$ | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |
| Saunook-------------- | Slight | Slight | Slight | Slight | Moderate | yellow-poplar------eastern white pine-northern red oak---white oak----------eastern hemlock----red maple----------black cherry-------white ash----------- | 107 104 --- --- --- --- --- --- | $\begin{array}{\|l\|l} 119.00 \\ 194.00 \end{array}$ | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |
| TsD: <br> Thunder | Moderate | Severe | Moderate | Slight | Moderate | yellow-poplar ${ }^{5}$ $\qquad$ northern red oak---- <br> sugar maple--------- <br> white ash----------- <br> black cherry-------- | 105 92 --- --- | $\text { \| } \begin{array}{r} 115.00 \\ 74.00 \end{array}$ | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |
| Saunook-------------- | Moderate | Moderate | Slight | Slight | Moderate | yellow-poplar------eastern white pine-northern red oak---white oak----------eastern hemlock----red maple----------black cherry-------white ash----------- | 107 104 --- --- --- --- --- --- |  | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |
| TsE: <br> Thunder | Severe | Severe | Moderate | Slight | Moderate | yellow-poplar ${ }^{5}$ _----- <br> northern red oak---- <br> sugar maple--------- <br> white ash----------- <br> black cherry-------- | 105 92 --- --- | $\text { \|r } \begin{array}{r} 115.00 \\ 74.00 \\ ---- \\ ---- \end{array}$ | yellow-poplar, eastern white pine, northern red oak, black cherry, white ash |

Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

Table 7.-Forestland Management and Productivity-Continued

| Map symbol and soil name | Management concerns |  |  |  |  | Potential productivity ${ }^{1}$ |  |  | Trees to manage ${ }^{3}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Erosion hazard | $\begin{array}{\|c} \text { Equip- } \\ \text { ment } \\ \text { limita- } \\ \text { tion } \\ \hline \end{array}$ | $\begin{gathered} \begin{array}{c} \text { Seedling } \\ \text { mortal- } \\ \text { ity } \end{array} \\ \hline \end{gathered}$ | Windthrow hazard | $\begin{array}{\|c} \text { Plant } \\ \text { competi- } \\ \text { tion } \end{array}$ | Common trees | Site index ${ }^{2}$ | Volume of wood fiber |  |
| WhB, WkC: Whiteoak | Slight | Slight | Slight | Slight | Moderate | yellow-poplar------eastern white pine-northern red oak---- |  | cu ft/ac | ```yellow-poplar, eastern white pine, northern red oak``` |
|  |  |  |  |  |  |  | 100 | 107.00 |  |
|  |  |  |  |  |  |  | 110 | 206.00 |  |
|  |  |  |  |  |  |  | --- | --- |  |
|  |  |  |  |  |  | scarlet oak | -- | -- |  |
|  |  |  |  |  |  | American beech------ | --- | --- |  |
|  |  |  |  |  |  | red maple----------- | ---- | --- |  |
| WtD : <br> Whiteoak | Moderate | Moderate | Slight | Slight | Moderate | yellow-popla eastern white pine-northern red oak white oak scarlet oak American beech red maple eastern hemlock |  |  | ```yellow-poplar, eastern white pine, northern red oak``` |
|  |  |  |  |  |  |  | 100 | 107.00 |  |
|  |  |  |  |  |  |  | 110 | 206.00 |  |
|  |  |  |  |  |  |  | --- | --- |  |
|  |  |  |  |  |  |  | --- |  |  |
|  |  |  |  |  |  |  | --- | --- |  |
|  |  |  |  |  |  |  | - | --- |  |

[^3]Table 8.-Recreational Development
(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable)

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
| :---: | :---: | :---: | :---: | :---: | :---: |
| AcF: <br> Ashe | ```Severe: slope large stones``` | Severe: <br> slope <br> large stones |  | ```Severe: slope depth to rock large stones``` | Severe: <br> slope <br> large stones |
| Cleveland------- | ```Severe: slope depth to rock large stones``` | ```Severe: slope depth to rock large stones``` | Severe: <br> slope <br> small stones depth to rock large stones | ```Severe: slope depth to rock large stones``` | ```Severe: slope depth to rock large stones``` |
| Rock outcrop. |  |  |  |  |  |
| BaD: <br> Balsam | ```Severe: slope large stones``` | Severe: <br> slope <br> large stones | Severe: <br> large stones <br> slope <br> small stones | $\left\lvert\, \begin{aligned} & \text { Moderate: } \\ & \text { slope } \\ & \text { large stones } \end{aligned}\right.$ | Severe: <br> slope <br> large stones |
| BaE: <br> Balsam | Severe: <br> slope <br> large stones | ```Severe: slope large stones``` | Severe: <br> large stones slope small stones | Severe: <br> slope <br> large stones | Severe: <br> slope <br> large stones |
| BcE, BcF: <br> Balsam- | ```Severe: slope large stones``` | ```Severe: slope large stones``` | Severe: <br> large stones <br> slope <br> small stones | $\left\lvert\, \begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { large stones } \end{aligned}\right.$ | Severe: <br> slope <br> large stones |
| Rubble land. |  |  |  |  |  |
| BuC: |  | Severe: |  | Severe: |  |
| Burton---------- | Severe: <br> large stones | Severe: <br> large stones | Severe: <br> slope <br> small stones <br> large stones | Severe: <br> large stones depth to rock | ```Moderate: large stones slope depth to rock``` |
| Craggey--------- | Severe: <br> depth to rock large stones | Severe: depth to rock large stones | Severe: <br> slope <br> small stones depth to rock | Severe: <br> fragile <br> large stones depth to rock | ```Severe: depth to rock large stones slope``` |
| Rock outcrop. |  |  |  |  |  |
| BuD : <br> Burton | Severe: <br> slope <br> large stones | ```Severe: slope large stones``` | ```Severe: slope small stones large stones``` |  | ```Severe: slope large stones depth to rock``` |

Table 8.-Recreational Development-Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
| :---: | :---: | :---: | :---: | :---: | :---: |
| BuD : <br> Craggey | ```Severe: slope depth to rock large stones``` | ```Severe: slope depth to rock large stones``` | Severe: <br> slope <br> small stones <br> depth to rock <br> large stones | Severe: <br> fragile <br> large stones <br> slope <br> depth to rock | Severe: <br> slope <br> depth to rock <br> large stones |
| Rock outcrop. |  |  |  |  |  |
| BuF: <br> Burton | Severe: <br> slope <br> large stones | $\left\lvert\, \begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { large stones } \end{aligned}\right.$ | Severe: <br> slope <br> small stones <br> large stones | Severe: <br> slope <br> large stones depth to rock | ```Severe: slope large stones depth to rock``` |
| Craggey--------- | ```Severe: slope depth to rock large stones``` | ```Severe: slope depth to rock large stones``` | Severe: <br> slope <br> small stones <br> depth to rock large stones | Severe: <br> slope <br> fragile <br> large stones depth to rock | ```Severe: slope depth to rock large stones``` |
| Rock outcrop. |  |  |  |  |  |
| BwC : |  |  |  |  |  |
| Burton---------- | Moderate: <br> slope <br> small stones |  | Severe: <br> slope <br> small stones |  | Moderate: <br> slope <br> depth to rock |
| Wayah----------- | Moderate: small stones | Moderate: small stones | ```Severe: slope small stones``` | Slight | $\begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}$ |
| BwD : |  |  |  |  |  |
| Burton---------- | ```Severe: slope small stones``` | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}$ | ```Severe: slope small stones``` | $\left\lvert\, \begin{aligned} & \text { Moderate: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}\right.$ | ```Severe: slope depth to rock``` |
| Wayah----------- | Severe: <br> slope <br> small stones | ```Severe: slope small stones``` | Severe: slope small stones | Moderate: slope | Severe: slope |
| BwE, BwF: |  |  |  |  |  |
| Burton---------- | $\begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}$ | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | ```Severe: slope small stones``` | Severe: slope depth to rock | Severe: slope depth to rock |
| Wayah----------- | Severe: slope | Severe: slope | Severe: slope small stones | Severe: slope | Severe: slope |
| CaC : |  |  |  |  |  |
| Cashiers-------- | Moderate: slope | $\begin{array}{\|c} \text { Moderate: } \\ \text { slope } \end{array}$ | Severe: slope |  | Moderate: slope |
| CaD: <br> Cashiers | Severe: slope | Severe: slope | Severe: slope | ```Moderate: slope erodes easily``` | Severe: slope |

Table 8.-Recreational Development-Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
| :---: | :---: | :---: | :---: | :---: | :---: |
| CaE, CaF: <br> Cashiers | Severe: slope | Severe: slope | Severe: slope | Severe: slope erodes easily | Severe: slope |
| CeD : <br> Chandler | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | ```Moderate: slope erodes easily``` | $\begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}$ |
| Micaville------- | Severe: slope | Severe: slope | Severe: slope | ```Moderate: slope erodes easily``` | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ |
| CeE, Cef: <br> Chandler | Severe: slope | Severe: slope | Severe: slope | $\left\lvert\, \begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { erodes easily } \end{aligned}\right.$ | Severe: slope |
| Micaville------- | Severe: slope | Severe: slope | Severe: slope | ```Severe: slope erodes easily``` | Severe: slope |
| ChD : |  |  |  |  |  |
| Chestnut-------- | ```Severe: slope large stones``` | ```Severe: slope large stones``` | ```Severe: slope small stones large stones``` | Moderate: slope large stones | ```Severe: slope large stones depth to rock``` |
| Ashe------------ | ```Severe: slope large stones``` | ```Severe: slope large stones``` | ```Severe: slope small stones large stones``` | ```Moderate: slope large stones``` | ```Severe: slope large stones depth to rock``` |
| Che, ChF: <br> Chestnut | Severe: <br> slope <br> large stones | Severe: <br> slope <br> large stones | Severe: <br> slope <br> small stones <br> large stones | ```Severe: slope depth to rock large stones``` | ```Severe: slope large stones depth to rock``` |
| Ashe------------ | ```Severe: slope large stones``` | ```Severe: slope large stones``` | Severe: <br> slope <br> small stones <br> large stones | ```Severe: slope depth to rock large stones``` | ```Severe: slope large stones depth to rock``` |
| CnD : <br> Chestnut $\qquad$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: slope | Severe: <br> slope <br> small stones | ```Moderate: slope depth to rock``` | ```Severe: slope depth to rock``` |
| Buladean-------- | Severe: slope | Severe: slope | Severe: slope small stones | $\begin{aligned} & \text { Moderate: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | Severe: slope |
| CnE, CnF: <br> Chestnut | $\begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}$ | Severe: slope | ```Severe: slope small stones``` | Severe: <br> slope <br> depth to rock | Severe: slope depth to rock |
| Buladean-------- | $\begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}$ | Severe: slope | ```Severe: slope small stones``` | $\begin{array}{\|l} \text { Severe: } \\ \text { slope } \\ \text { depth to rock } \end{array}$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ |

Table 8.-Recreational Development-Continued


Table 8.-Recreational Development-Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
| :---: | :---: | :---: | :---: | :---: | :---: |
| EpD : <br> Edneytown | Severe: slope | Severe: slope | Severe: slope | Moderate: slope | Severe: slope |
| Pigeonroost----- | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | ```Severe: slope small stones``` | ```Moderate: slope depth to rock``` | ```Severe: slope depth to rock``` |
| Epe: <br> Edneytown | Severe: slope | Severe: slope | Severe: slope | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: slope |
| Pigeonroost----- | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | ```Severe: slope small stones``` | ```Severe: slope depth to rock``` | ```Severe: slope depth to rock``` |
| EtE, EtF: <br> Edneyville | Severe: slope | Severe: slope | Severe: slope | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: slope |
| Chestnut-------- | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | ```Severe: slope small stones``` | ```Severe:``` | ```Severe: slope depth to rock``` |
| FaC: <br> Fannin | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: slope |
| FaD: <br> Fannin | Severe: slope | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: slope | $\begin{array}{\|c} \text { Moderate: } \\ \text { slope } \end{array}$ | Severe: slope |
| FeC2 : <br> Fannin | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: slope |
| FeD2: <br> Fannin | Severe: slope | Severe: slope | Severe: slope | Moderate: slope | Severe: slope |
| FeE2: <br> Fannin | Severe: slope | Severe: slope | Severe: slope | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: slope |
| Gre: <br> Greenlee | Severe: <br> slope <br> large stones | Severe: <br> slope <br> large stones | ```Severe: large stones slope small stones``` | Severe: <br> large stones slope | ```Severe: large stones slope droughty``` |
| M-W . <br> Miscellaneous water |  |  |  |  |  |
| NkA: <br> Nikwasi | Severe: flooding wetness | Severe: wetness flooding | Severe: flooding wetness | Severe: wetness flooding | Severe: flooding wetness |
| NnE: <br> Northcove | ```Severe: slope large stones``` | ```Severe: slope large stones``` | ```Severe: large stones slope small stones``` | Severe: <br> large stones | Severe: <br> large stones <br> slope |

Table 8.-Recreational Development-Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
| :---: | :---: | :---: | :---: | :---: | :---: |
| NoC: <br> Northcove | Severe: <br> large stones | Severe: <br> large stones | ```Severe: large stones slope small stones``` | Severe: <br> large stones | Moderate: <br> large stones <br> slope |
| Maymead--------- | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: slope |
| NoD : <br> Northcove | Severe: <br> large stones <br> slope | Severe: <br> large stones <br> slope | ```Severe: large stones slope small stones``` | Severe: <br> large stones | Severe: slope |
| Maymead--------- | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: slope | Severe: slope | $\begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}$ | Severe: slope |
| OsB : <br> Ostin | Severe: flooding | Moderate: flooding large stones | Severe: <br> small stones flooding | ```Slight: flooding small stones``` | Severe: <br> small stones <br> flooding |
| PaB: <br> Pineola | Moderate: small stones | Moderate: small stones | Severe: <br> small stones | Slight: <br> depth to rock | Moderate: depth to rock |
| PnC: <br> Pineola | Moderate: slope small stones | Moderate: slope | ```Severe: slope small stones``` | slight: <br> depth to rock | Moderate: <br> slope <br> depth to rock |
| PnD: <br> Pineola | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: <br> slope <br> small stones | Moderate: slope depth to rock | Severe: <br> slope <br> depth to rock |
| PtD: <br> Plott | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: slope | $\begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}$ | $\begin{array}{\|c} \text { Severe: } \\ \text { slope } \end{array}$ |
| PtE, PtF: <br> Plott | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: slope |
| PuC: <br> Porters | Moderate: slope | Moderate : slope | ```Severe: slope small stones``` | Slight | Moderate: slope |
| PuD: <br> Porters | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | ```Severe: slope small stones``` | $\begin{array}{\|l} \text { Moderate: } \\ \text { slope } \end{array}$ | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ |
| PuE, PuF: <br> Porters | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: <br> slope <br> small stones | Severe: slope | $\begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}$ |

Table 8.-Recreational Development-Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
| :---: | :---: | :---: | :---: | :---: | :---: |
| PwD: <br> Porters | Severe: slope | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: slope | Moderate: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ |
| Porters | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope |
| Px. <br> Pits, quarries |  |  |  |  |  |
| ReA: <br> Reddies | Severe: flooding | Moderate: flooding wetness | Severe: flooding | Moderate: flooding | Severe: flooding |
| RoA: <br> Rosman | Severe: flooding | Moderate: flooding | Moderate: flooding | Moderate: flooding | Moderate: flooding |
| RsB: <br> Rosman | Severe: flooding | Moderate: flooding | Severe: flooding | Moderate: flooding | Severe: flooding |
| SaB: <br> Saunook | Slight | Slight | Moderate: slope | Slight | Slight |
| SaC: <br> Saunook | Moderate: slope | Moderate: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Slight | Moderate: slope |
| SbD : <br> Saunook | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Moderate: slope | Severe: slope |
| ScB : <br> Saunook | Slight | Slight | Moderate: slope | Slight | Slight |
| SdC: <br> Saunook | Moderate: slope | $\left\lvert\, \begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}\right.$ | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Slight | Moderate: slope |
| SgC: <br> Saunook | Moderate: slope | Moderate: slope | Moderate: slope | Slight | Moderate: slope |
| Nikwasi--------- | Severe: flooding wetness | Severe: wetness flooding | Severe: flooding wetness | Severe: wetness flooding | Severe: flooding wetness |
| ShC: <br> Saunook | Moderate: slope | $\left\lvert\, \begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}\right.$ | Moderate: slope | Slight | Moderate: slope |
| Thunder--------- | ```Moderate: large stones slope small stones``` | ```Moderate: large stones slope small stones``` | ```Severe: large stones slope small stones``` | Moderate: large stones | Severe: <br> large stones |

Table 8.-Recreational Development-Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
| :---: | :---: | :---: | :---: | :---: | :---: |
| ShD: <br> Saunook | Severe: slope | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Moderate: slope | Severe: slope |
| Thunder--------- | ```Severe: large stones slope``` | ```Severe: large stones slope``` | Severe: <br> large stones slope | Moderate: <br> large stones slope | ```Severe: large stones slope``` |
| SOD : <br> Soco | Severe: slope | Severe: slope | Severe: <br> slope <br> small stones | Moderate: slope | Severe: slope |
| Ditney---------- | Severe: slope | Severe: slope | Severe: slope small stones | Moderate: slope | Severe: slope |
| SoE, SoF: <br> Soco | Severe: slope | Severe: slope | Severe: <br> slope <br> small stones | Severe: slope | Severe: slope |
| Ditney---------- | Severe: slope | Severe: slope | Severe: slope small stones | Severe: slope | Severe: slope |
| SpD : <br> Spivey | Severe: <br> slope <br> large stones | Severe: <br> slope <br> large stones | Severe: <br> large stones slope small stones | Moderate: large stones | Severe: <br> slope <br> large stones |
| Spe: <br> Spivey | Severe: <br> slope <br> large stones | Severe: <br> slope <br> large stones | Severe: <br> large stones <br> slope <br> small stones |  | Severe: <br> slope <br> large stones |
| SrC: <br> Spivey | ```Moderate: slope small stones large stones``` | ```Moderate: slope small stones large stones``` | ```Severe: large stones slope small stones``` | Moderate: <br> large stones | Severe: <br> large stones |
| Whiteoak-------- | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: slope |
| SsB: <br> Statler | Severe: flooding | Slight | Moderate: slope | Slight | $\begin{aligned} & \text { Slight: } \\ & \text { flooding } \end{aligned}$ |
| StD: <br> Stecoah | Severe: slope | Severe: slope | Severe: <br> slope <br> small stones | $\begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}$ | Severe: slope |
| Soco------------ | Severe: slope | Severe: slope | Severe: slope small stones | Moderate: slope depth to rock | ```Severe: slope depth to rock``` |

Table 8.-Recreational Development-Continued

| Map symbol and soil name | Camp areas | Picnic areas | Playgrounds | Paths and trails | Golf fairways |
| :---: | :---: | :---: | :---: | :---: | :---: |
| StE, StF: <br> Stecoah | Severe: slope | Severe: slope |  | Severe: slope | Severe: slope |
| Soco------------ | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | $\begin{array}{\|l} \text { Severe }: \\ \text { slope } \\ \text { small stones } \end{array}$ | Severe: slope depth to rock | Severe: slope depth to rock |
| TsC: <br> Thunder | Moderate: <br> large stones slope | Moderate: large stones | Severe: <br> large stones <br> slope | Moderate: large stones | Severe: <br> large stones |
| Saunook--------- | Moderate: slope | Moderate: slope | Severe: slope | Slight | Moderate: slope |
| TsD: <br> Thunder | Severe: <br> slope <br> large stones | Severe: <br> large stones <br> slope | Severe: <br> large stones <br> slope | Moderate: <br> large stones slope | ```Severe: large stones slope``` |
| Saunook--------- | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | $\begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}$ | Moderate: slope | Severe: slope |
| TsE: |  |  |  |  |  |
| Thunder--------- | Severe: <br> large stones slope | Severe: <br> large stones slope | Severe: <br> large stones slope | Severe: <br> large stones <br> slope | Severe: <br> large stones <br> slope |
| Saunook--------- | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: slope | Severe: slope |
| Ua: |  |  |  |  |  |
|  | Limitation: variable | Limitation: variable | Limitation: variable | Limitation: variable | Limitation: variable |
| UdC : <br> Udorthents | Limitation: variable | Limitation: variable | $\begin{gathered} \text { Limitation: } \\ \text { variable } \end{gathered}$ | Limitation: variable | Limitation: variable |
| Urban land. |  |  |  |  |  |
| UnD : <br> Unaka | Severe: <br> slope <br> large stones | Severe: <br> slope <br> large stones | Severe: <br> large stones slope | Moderate: <br> slope <br> depth to rock <br> large stones | ```Severe: slope depth to rock large stones``` |
| Porters--------- | ```Severe: slope large stones``` | ```Severe: slope large stones``` | ```Severe: slope large stones``` | ```Moderate: slope large stones``` | ```Severe: slope large stones``` |
| UnE, UnF: <br> Unaka | Severe: <br> slope <br> large stones | Severe: <br> slope <br> large stones | Severe: <br> large stones slope | Severe: <br> slope <br> depth to rock <br> large stones | ```Severe: slope depth to rock large stones``` |
| Porters--------- | ```Severe: slope large stones``` | ```Severe: slope large stones``` | ```Severe:``` | ```Severe: slope large stones``` | ```Severe: slope large stones``` |

Table 8.-Recreational Development-Continued

Table 9.-Building Site Development


Table 9.-Building Site Development-Continued

Table 9.-Building Site Development-Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | $\begin{gathered} \text { Small } \\ \text { commercial } \\ \text { buildings } \\ \hline \end{gathered}$ | Local roads and streets | Lawns and landscaping |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CtC: <br> Cullasaja | Severe: <br> large stones cutbanks cave | Severe: <br> large stones | Severe: <br> large stones | Severe: <br> large stones slope | Severe: <br> large stones | Severe: <br> large stones |
| CtD, CtE: <br> Cullasaja | Severe: <br> large stones slope cutbanks cave | Severe: <br> large stones slope | Severe: <br> large stones slope | Severe: <br> large stones slope | Severe: large stones slope | $\begin{array}{\|l} \text { Severe: } \\ \text { large stones } \\ \text { slope } \end{array}$ |
| CuA: <br> Cullowhee | Severe: <br> wetness <br> cutbanks cave | Severe: <br> flooding wetness | Severe: flooding wetness | Severe: flooding wetness | Severe: flooding wetness | Severe: <br> flooding wetness |
| DAM. Dam |  |  |  |  |  |  |
| DeB: <br> Dellwood $\qquad$ | Severe: <br> wetness <br> cutbanks cave | Severe: flooding | Severe: flooding wetness | Severe: flooding | $\begin{array}{\|c} \text { Severe: } \\ \text { flooding } \end{array}$ | Severe: droughty flooding |
| EpC: <br> Edneytown | Moderate : slope | Moderate: slope | Moderate: slope | Severe: <br> slope | Moderate: slope | Moderate: slope |
| Pigeonroost-- | Moderate: <br> slope <br> depth to rock | Moderate: <br> slope <br> depth to rock | Moderate: slope depth to rock | Severe: <br> slope <br> depth to rock | Moderate: slope depth to rock | Moderate: slope depth to rock |
| EpD, EPE: <br> Edneytown | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope |
| Pigeonroost--- | Severe: <br> slope <br> depth to rock | Severe: slope depth to rock | Severe: slope depth to rock | Severe: slope depth to rock | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ |
| EtE, EtF: <br> Edneyville | Severe: slope | Severe: slope | Severe: slope | Severe: slope | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: slope |
| Chestnut------- | ```Severe: slope depth to rock``` | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | ```Severe: slope depth to rock``` | Severe: <br> slope <br> depth to rock | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | $\begin{array}{\|l} \text { Severe: } \\ \text { slope } \\ \text { depth to rock } \end{array}$ |

Table 9.-Building Site Development-Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small <br> commercial buildings | Local roads and streets | Lawns and landscaping |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| FaC: <br> Fannin | Moderate: slope | Moderate: slope | Moderate: slope | Severe: slope | Severe: <br> low strength | Moderate: slope |
| FaD: <br> Fannin | Severe: slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: slope | Severe: slope | Severe: <br> low strength slope | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ |
| FeC2: <br> Fannin | Moderate: slope | Moderate: slope | Moderate: slope | Severe: slope | Severe: <br> low strength | $\left\lvert\, \begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}\right.$ |
| ```FeD2, FeE2: Fannin``` | Severe: slope | $\begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}$ | Severe: slope | Severe: slope | Severe: <br> low strength slope | Severe: slope |
| Gre: <br> Greenlee | ```Severe: large stones slope cutbanks cave``` | Severe: <br> large stones <br> slope | Severe: <br> large stones <br> slope | ```Severe: large stones slope``` | Severe: <br> large stones <br> slope | ```Severe: large stones slope droughty``` |
| $\mathrm{M}-\mathrm{W} .$ <br> Miscellaneous water |  |  |  |  |  |  |
| NkA: |  |  |  |  |  |  |
| Nikwasi----------------- | ```Severe: wetness cutbanks cave flooding``` | Severe: flooding wetness | Severe: flooding wetness | Severe: flooding wetness | Severe: flooding wetness | Severe: <br> flooding wetness |
| NnE: |  |  |  |  |  |  |
| Northcove--------------- | ```Severe: large stones slope cutbanks cave``` | Severe: <br> large stones slope | Severe: <br> large stones slope | ```Severe: large stones slope``` | Severe: <br> large stones slope | Severe: <br> large stones slope |
| NoC: <br> Northcove | Severe: <br> large stones cutbanks cave | Severe: <br> large stones | Severe: <br> large stones | ```Severe: large stones slope``` | Severe: <br> large stones | Moderate: <br> large stones slope |
| Maymead----------------- | ```Moderate: slope``` | ```Moderate: slope``` | ```Moderate: slope``` | Severe: slope | ```Moderate: frost action slope``` | Moderate: slope |

Table 9.-Building Site Development-Continued

| Map symbol and soil name | Shallow excavations | Dwellings without basements | $\begin{aligned} & \text { Dwellings } \\ & \text { with } \\ & \text { basements } \\ & \hline \end{aligned}$ | Small commercial buildings | Local roads and streets | Lawns and landscaping |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| NoD: <br> Northcove | ```Severe: large stones slope cutbanks cave``` | Severe: <br> large stones <br> slope | Severe: <br> large stones slope | Severe: <br> large stones slope | Severe: <br> large stones slope | Severe: slope large stones |
| Maymead------------------ | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope |
| OsB: <br> Ostin | Severe: <br> wetness cutbanks cave flooding | Severe: flooding | Severe: flooding wetness | Severe: flooding | Severe: flooding | Severe: large stones droughty flooding |
| PaB: <br> Pineola | Moderate: depth to rock | Slight: <br> depth to rock | Moderate: depth to rock | ```Moderate: slope depth to rock``` | Moderate: <br> low strength depth to rock | Moderate: depth to rock |
| PnC: <br> Pineola | ```Moderate: slope depth to rock``` | ```Moderate: slope depth to rock``` | ```Moderate: slope depth to rock``` | ```Severe: slope depth to rock``` | ```Moderate: low strength slope depth to rock``` | ```Moderate: slope depth to rock``` |
| PnD: <br> Pineola | Severe: <br> slope <br> 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 depth to rock``` |
| PtD, PtE, PtF: <br> Plott | ```Severe: slope cutbanks cave``` | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope |
| PuC: <br> Porters | ```Moderate: slope depth to rock``` | Moderate: slope | ```Moderate: slope depth to rock``` | Severe: slope | ```Moderate: frost action slope``` | Moderate: slope |
| PuD, PuE, PuF, PwD, PwE: <br> Porters | Severe: <br> slope <br> depth to rock | ```Severe: slope depth to rock``` | ```Severe: slope depth to rock``` | ```Severe: slope depth to rock``` | ```Severe: slope depth to rock``` | ```Severe: slope depth to rock``` |

Table 9.-Building Site Development-Continued

| Map symbol and soil name | $\begin{gathered} \text { Shallow } \\ \text { excavations } \end{gathered}$ | Dwellings <br> without <br> basements | $\begin{aligned} & \text { Dwellings } \\ & \text { with } \\ & \text { basements } \end{aligned}$ | $\begin{gathered} \text { Small } \\ \text { commercial } \\ \text { buildings } \\ \hline \end{gathered}$ | Local roads and streets | Lawns and landscaping |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Px. <br> Pits, quarries |  |  |  |  |  |  |
| ReA: $\qquad$ | Severe: wetness cutbanks cave flooding | Severe: <br> flooding | Severe: <br> flooding wetness | Severe: flooding | Severe: flooding | Severe: flooding droughty |
| RoA: $\qquad$ | Severe: <br> cutbanks cave flooding | Severe: <br> flooding | Severe: <br> flooding | Severe: flooding | Severe: flooding | Moderate: flooding |
| RsB: Rosman----- | Severe: <br> cutbanks cave <br> flooding | Severe: <br> flooding | Severe: <br> flooding | Severe: flooding | Severe: flooding | Severe: <br> flooding <br> droughty |
| SaB: <br> Saunook--- | Slight | Slight | Slight | $\begin{aligned} & \text { Moderate: } \\ & \text { slope } \end{aligned}$ | Moderate: <br> low strength | Slight |
| sac: <br> Saunook | Moderate : slope | Moderate: slope | Moderate: slope | Severe: slope | Moderate: <br> low strength <br> slope | Moderate: <br> slope |
| SbD: <br> Saunook | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: <br> slope <br> low strength | Severe: <br> slope <br> large stones |
| ScB: <br> Saunook | Slight | Slight | Slight | $\begin{aligned} & \text { Moderate: } \\ & \text { slope } \end{aligned}$ | Severe: <br> low strength | Slight |
| SdC: <br> Saunook | Moderate: | Moderate: <br> slope | Moderate: slope | Severe: <br> slope | Severe: <br> low strength | Moderate: |
| sgc: <br> Saunook | Moderate : slope | Moderate : slope | $\begin{aligned} & \text { Moderate: } \\ & \text { slope } \end{aligned}$ | Severe: slope | Moderate: <br> low strength <br> slope | Moderate: slope |


| Map symbol and soil name | Shallow excavations | Dwellings without basements | Dwellings with basements | Small commercial buildings | Local roads and streets | Lawns and landscaping |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| SgC: <br> Nikwasi | Severe: <br> wetness <br> cutbanks cave | Severe: <br> flooding wetness | Severe: flooding wetness | Severe: <br> flooding wetness | Severe: <br> flooding wetness | Severe: <br> flooding wetness |
| ShC: Saunook- | Moderate: slope | Moderate: slope | Moderate: slope | Severe: slope | Moderate: <br> low strength slope | Moderate: slope |
| Thunder-- | Severe: <br> large stones cutbanks cave | Severe: <br> large stones | Severe: <br> large stones | Severe: <br> large stones slope | Severe: <br> large stones | Severe: <br> large stones |
| ShD: <br> Saunook | Severe: slope | Severe: slope | Severe: slope | Severe: slope | Severe: slope low strength | Severe: slope |
| Thunder----- | ```Severe: large stones slope cutbanks cave``` | $\begin{aligned} & \text { Severe: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}$ | Severe: large stones slope | Severe: large stones slope | $\begin{aligned} & \text { Severe: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}$ | $\begin{aligned} & \text { Severe: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}$ |
| SoD, SoE, Sof: Soco | Severe: <br> slope <br> depth to rock | Severe: <br> slope depth to rock | Severe: <br> slope depth to rock | Severe: <br> slope depth to rock | Severe: <br> slope <br> depth to rock | Severe: <br> slope <br> large stones <br> depth to rock |
| Ditney-- | ```Severe: slope depth to rock``` | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | ```Severe: slope large stones depth to rock``` |
| SpD, SpE: <br> Spivey | ```Severe: large stones slope cutbanks cave``` | Severe: large stones slope | ```Severe:``` | $\begin{array}{\|l} \text { Severe: } \\ \text { large stones } \\ \text { slope } \end{array}$ | Severe: large stones slope | Severe: <br> slope <br> large stones |
| SrC: <br> Spivey | Severe: <br> large stones cutbanks cave | Severe: <br> large stones | Severe: <br> large stones | $\begin{array}{\|l} \text { Severe: } \\ \text { large stones } \\ \text { slope } \end{array}$ | $\begin{array}{\|l} \text { Severe: } \\ \text { large stones } \end{array}$ | Severe: <br> large stones |
| Whiteoak--- | $\begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}$ | $\begin{array}{\|c} \text { Moderate: } \\ \text { slope } \end{array}$ | Moderate: slope | $\left\lvert\, \begin{gathered} \text { severe: } \\ \text { slope } \end{gathered}\right.$ | Moderate: slope | Moderate: slope |

Table 9.-Building Site Development-Continued



Table 10.-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)


Table 10.-Sanitary Facilities-Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | Trench sanitary landfill | Area sanitary <br> landfill | Daily cover for landfill |
| :---: | :---: | :---: | :---: | :---: | :---: |
| BwC : <br> Wayah | $\left\lvert\, \begin{gathered} \text { Moderate: } \\ \text { slope } \end{gathered}\right.$ | Severe: seepage slope | Severe: seepage | Severe: seepage | $\begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}$ |
| BwD, BwE, BwF: Burton | ```Severe: slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}\right.$ |
| Wayah---------- | Severe: slope | Severe: seepage slope | Severe: seepage slope | Severe: seepage slope | $\begin{aligned} & \text { \|Poor: } \\ & \text { slope } \end{aligned}$ |
| CaC : |  |  |  |  |  |
| Cashiers------- | $\begin{array}{\|l} \text { Moderate: } \\ \text { slope } \end{array}$ | Severe: seepage slope | Severe: seepage | Severe: seepage | ```Poor: slope hard to pack``` |
| Cad, CaE, CaF: <br> Cashiers------- | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: seepage slope | Severe: seepage slope | Severe: seepage slope | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { hard to pack } \end{aligned}\right.$ |
| CeD, CeE, CeF: <br> Chandler------- | $\left\lvert\, \begin{gathered} \text { Severe: } \\ \text { slope } \end{gathered}\right.$ | Severe: seepage slope | Severe: seepage slope | Severe: seepage slope | Poor: <br> hard to pack slope |
| Micaville----- | $\begin{array}{\|l} \text { Severe: } \\ \text { slope } \\ \text { depth to rock } \end{array}$ | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Poor: slope hard to pack depth to rock``` |
| ChD, Che, ChF: <br> Chestnut | $\left\lvert\, \begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}\right.$ | ```Severe: seepage slope depth to rock``` | Severe: <br> seepage slope depth to rock | ```Severe: seepage slope depth to rock``` | ```Poor: slope small stones depth to rock``` |
| Ashe---------- | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}$ | Severe: <br> seepage <br> slope <br> depth to rock | Severe: <br> seepage <br> slope <br> depth to rock | ```Severe: seepage slope depth to rock``` | ```Poor: slope small stones depth to rock``` |
| CnD, CnE, CnF: <br> Chestnut | $\begin{array}{\|l} \text { Severe: } \\ \text { slope } \\ \text { depth to rock } \end{array}$ | Severe: <br> seepage slope depth to rock | Severe: <br> seepage slope depth to rock | Severe: <br> seepage slope depth to rock | ```Poor: slope small stones depth to rock``` |
| Buladean------- | $\begin{array}{\|l} \text { Severe: } \\ \text { slope } \\ \text { depth to rock } \end{array}$ | ```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``` |
| CoF: <br> Clingman | $\begin{array}{\|l} \text { Severe: } \\ \text { slope } \\ \text { depth to rock } \end{array}$ | ```Severe: seepage slope depth to rock``` | Severe: <br> seepage slope depth to rock | ```Severe: slope depth to rock``` | ```Poor: excess humus slope depth to rock``` |

Table 10.-Sanitary Facilities-Continued

| Map symbol and soil name | Septic tank absorption fields | Sewage lagoon areas | $\begin{gathered} \text { Trench sanitary } \\ \text { landfill } \end{gathered}$ | Area sanitary landfill | Daily cover for landfill |
| :---: | :---: | :---: | :---: | :---: | :---: |
| CoF: <br> Craggey | Severe: slope depth to rock | Severe: <br> slope depth to rock | ```Severe: seepage slope depth to rock``` | Severe: <br> slope depth to rock | ```Poor: slope small stones depth to rock``` |
| Rock outcrop. |  |  |  |  |  |
| Cre, CrF: <br> Crossnore | Severe: slope depth to rock | Severe: <br> seepage <br> slope <br> depth to rock | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Poor: slope small stones depth to rock``` |
| Jeffrey-------- | Severe: slope depth to rock | Severe: <br> seepage slope depth to rock | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Poor: slope small stones depth to rock``` |
| CsD: |  |  |  |  |  |
| Cullasaja- | Severe: <br> large stones slope | Severe: <br> large stones seepage slope | Severe: <br> large stones seepage slope | Severe: seepage slope | ```Poor: large stones seepage slope``` |
| CtC : |  |  |  |  |  |
| Cullasaja- | Severe: <br> large stones | Severe: <br> large stones seepage slope | Severe: <br> large stones seepage | Severe: seepage | Poor: <br> large stones seepage |
| CtD, CtE: |  |  |  |  |  |
| Cullasaja------ | Severe: <br> large stones <br> slope | Severe: <br> large stones <br> seepage <br> slope | Severe: <br> large stones <br> seepage <br> slope | Severe: seepage slope | Poor: <br> large stones seepage slope |
| CuA: |  |  |  |  |  |
| Cullowhee------ | Severe: <br> flooding <br> wetness poor filter | Severe: flooding seepage wetness | Severe: flooding seepage wetness | Severe: flooding seepage wetness | ```Poor: seepage small stones too sandy``` |
| DAM. Dam |  |  |  |  |  |
| DeB: <br> Dellwood | Severe: | Severe: | Severe: | Severe: | Poor: |
|  | ```flooding wetness poor filter``` | flooding seepage wetness | flooding seepage wetness | flooding seepage wetness | seepage small stones too sandy |
| EpC: |  |  |  |  |  |
| Edneytown------ | $\begin{array}{\|c} \text { Moderate: } \\ \text { slope } \end{array}$ | Severe: seepage slope | Severe: seepage | Severe: seepage | $\begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}$ |
| Pigeonroost---- | Severe: depth to rock | ```Severe: slope depth to rock``` | Severe: <br> depth to rock | Severe: <br> depth to rock | Poor: <br> depth to rock |

Table 10.-Sanitary Facilities-Continued


Table 10.-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 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| NoC: <br> Northcove | Severe: <br> large stones poor filter | ```Severe: large stones seepage slope``` | Severe: <br> large stones seepage | Severe: seepage | Poor: large stones |
| Maymead-------- | Moderate: slope | Severe: seepage slope | Severe: seepage | Severe: seepage | $\begin{aligned} & \text { Poor: } \\ & \text { small stones } \end{aligned}$ |
| NoD : |  |  |  |  |  |
|  | ```Severe: large stones slope poor filter``` | ```Severe: large stones seepage slope``` | ```Severe: large stones seepage slope``` | Severe: seepage slope | $\begin{aligned} & \text { Poor: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}$ |
| Maymead-------- | Severe: slope | Severe: seepage slope | Severe: seepage slope | Severe: seepage slope | ```Poor:``` |
| OsB: |  |  |  |  |  |
| Ostin---------- | Severe: <br> flooding wetness poor filter | Severe: flooding seepage wetness | Severe: flooding seepage wetness | Severe: flooding seepage wetness | ```Poor: seepage small stones too sandy``` |
| PaB: <br> Pineola | Severe: <br> depth to rock | Severe: <br> depth to rock | Severe: <br> depth to rock | Severe: <br> depth to rock | Poor: <br> small stones depth to rock |
| PnC: |  |  |  |  |  |
| Pineola-- | Severe: <br> depth to rock | ```Severe: slope depth to rock``` | Severe: <br> depth to rock | Severe: <br> depth to rock | ```Poor: small stones depth to rock``` |
| PnD: |  |  |  |  |  |
| Pineola-- | Severe: slope depth to rock | ```Severe: slope depth to rock``` | ```Severe: slope depth to rock``` | Severe: slope depth to rock | ```Poor: slope small stones depth to rock``` |
| Plott-------- | Severe: slope | Severe: seepage slope | Severe: seepage slope | Severe: seepage slope | $\begin{array}{\|l} \text { \|Poor: } \\ \text { slope } \end{array}$ |
| PuC: | Moderate: | Severe: | Severe: | Severe: | Fair: |
| Porters-------- | Moderate: slope depth to rock | ```Severe: seepage slope depth to rock``` | Severe: seepage depth to rock | Severe: seepage depth to rock | ```Fair: slope small stones depth to rock``` |
| Porters-------- | 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 10.-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 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| PwD, PwE: <br> Porters-------- | ```Severe: slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | Severe: <br> seepage <br> slope <br> depth to rock | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}\right.$ |
| $\begin{aligned} & \text { Px. } \\ & \text { Pits, quarries } \end{aligned}$ |  |  |  |  |  |
| ReA: |  |  |  |  |  |
| Reddies-------- | Severe: <br> flooding <br> wetness <br> poor filter | Severe: <br> flooding seepage wetness | Severe: flooding seepage wetness | Severe: <br> flooding seepage wetness | ```Poor: seepage small stones too sandy``` |
| RoA, RsB: |  |  |  |  |  |
| Rosman--------- | Severe: flooding wetness | Severe: flooding seepage wetness | Severe: flooding seepage wetness | Severe: flooding seepage wetness | $\left\lvert\, \begin{aligned} & \text { Fair: } \\ & \text { wetness } \\ & \text { too sandy } \end{aligned}\right.$ |
| SaB: |  |  |  |  |  |
| Saunook-------- | Moderate: <br> percs slowly | Severe: seepage | Severe: seepage | Severe: seepage | $\begin{array}{\|l} \text { Fair: } \\ \text { small stones } \end{array}$ |
| SaC: |  |  |  |  |  |
| Saunook-------- | ```Moderate: percs slowly slope``` | Severe: seepage slope | Severe: seepage | Severe: seepage | $\left\lvert\, \begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}\right.$ |
| SbD: |  |  | Severe: |  |  |
|  |  | Severe: seepage slope | Severe: <br> seepage slope | Severe: <br> seepage slope | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| ScB : |  |  |  |  |  |
| Saunook-------- | Moderate: percs slowly | Severe: seepage | Severe: seepage | Severe: seepage | Good |
| SdC : |  |  |  |  |  |
| Saunook-------- | ```Moderate: percs slowly slope``` | Severe: seepage slope | Severe: seepage | Severe: seepage | $\begin{array}{\|l} \text { Poor: } \\ \text { slope } \end{array}$ |
| SgC: |  |  |  |  |  |
| Saunook-------- | ```Moderate: percs slowly slope``` | Severe: seepage slope | Severe: seepage | Severe: seepage | $\begin{array}{r} \text { Poor: } \\ \text { slope } \end{array}$ |
| Nikwasi-------- | Severe: <br> flooding <br> wetness <br> poor filter | Severe: flooding seepage wetness | Severe: flooding seepage wetness | Severe: flooding seepage wetness | ```Poor: seepage small stones too sandy``` |
| ShC, ShD: <br> Saunook | ```Moderate: percs slowly slope``` | Severe: seepage slope | Severe: seepage | Severe: seepage slope | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { small stones } \\ & \text { slope } \end{aligned}\right.$ |
| Thunder-------- | Severe: <br> large stones poor filter | ```Severe: large stones seepage slope``` | Severe: <br> large stones seepage | Severe: seepage slope | $\begin{array}{\|l} \text { Poor: } \\ \text { large stones } \\ \text { slope } \end{array}$ |

Table 10.-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 |
| :---: | :---: | :---: | :---: | :---: | :---: |
| SOD, SOE, SOF: <br> Soco----------- | Severe: slope depth to rock | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}\right.$ |
| 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``` |
| SpD, SpE: |  |  |  |  |  |
| Spivey--------- | ```Severe: large stones slope poor filter``` | Severe: <br> large stones seepage slope | ```Severe: large stones seepage slope``` | Severe: seepage slope | ```Poor: large stones slope``` |
| SrC : |  |  |  |  |  |
| Spivey--------- | Severe: <br> large stones poor filter | Severe: <br> large stones seepage slope | Severe: <br> large stones seepage | Severe: seepage | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}\right.$ |
| Whiteoak------- | ```Moderate: percs slowly slope``` | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | ```Moderate: large stones slope``` | Moderate: slope | ```Poor: small stones slope``` |
| SsB: |  |  |  |  |  |
| Statler-------- | Moderate: flooding percs slowly | Severe: seepage | Severe: seepage | Moderate: flooding | $\begin{aligned} & \text { Fair: } \\ & \text { flooding } \end{aligned}$ |
| StD, StE, StF: Stecoah-------- | ```Severe: slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Severe: seepage slope depth to rock``` | ```Poor: slope small stones depth to rock``` |
| Soco----------- | ```Severe: slope depth to rock``` | Severe: <br> seepage slope depth to rock | ```Severe: seepage slope depth to rock``` | Severe: <br> seepage slope depth to rock | ```Poor: slope small stones depth to rock``` |
| TsC, TsD, TsE: <br> Thunder-------- | Severe: <br> large stones poor filter | Severe: <br> large stones seepage slope | Severe: <br> large stones seepage | Severe: <br> seepage slope | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}\right.$ |
| Saunook-------- | ```Moderate: percs slowly slope``` | Severe: seepage slope | Severe: seepage | Severe: seepage | $\begin{aligned} & \text { Poor: } \\ & \text { slope } \end{aligned}$ |
| Ua: |  |  |  |  |  |
| Udorthents, loamy--------- | Limitation: variable | Limitation: variable | Limitation: variable | Limitation: variable | Limitation: variable |
| UdC : <br> Udorthents | Limitation: variable | Limitation: variable | Limitation: variable | Limitation: variable | Limitation: variable |
| Urban land. |  |  |  |  |  |

Table 10.-Sanitary Facilities-Continued


Table 11.-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: <br> Ashe | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| Cleveland---------- | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones depth to rock``` |
| Rock outcrop. |  |  |  |  |
| BaD, BaE: <br> Balsam- | ```Poor: slope large stones``` | Improbable: <br> large stones small stones | Improbable: <br> large stones small stones | Poor: <br> area reclaim <br> large stones <br> slope |
| BCE, BCF: <br> Balsam- | ```Poor: slope large stones``` | Improbable: <br> large stones small stones | Improbable: <br> large stones small stones | ```Poor: area reclaim large stones slope``` |
| Rubble land. |  |  |  |  |
| BuC: <br> Burton | Poor: <br> depth to rock | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: small stones |
| Craggey------------ | $\mid \text { Poor: } \quad \text { depth to rock }$ | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones depth to rock``` |
| Rock outcrop. |  |  |  |  |
| BuD : <br> Burton | Poor: <br> depth to rock | Improbable: <br> excess fines | Improbable: <br> excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| Craggey------------ | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { depth to rock } \end{aligned}\right.$ | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones depth to rock``` |
| Rock outcrop. |  |  |  |  |
| Burton | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| BuF: <br> Craggey | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones depth to rock``` |
| Rock outcrop. |  |  |  |  |
| BwC: <br> Burton | Poor: <br> depth to rock | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> small stones |
| Wayah-------------- | Good | Improbable: excess fines | Improbable: excess fines | ```Poor: area reclaim small stones``` |
| BwD: <br> Burton | ```Poor: depth to rock``` | Improbable: <br> excess fines | ```Improbable: excess fines``` | ```Poor: slope small stones``` |
| Wayah-------------- | $\left\lvert\, \begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}\right.$ | Improbable: <br> excess fines | Improbable: excess fines | ```Poor: area reclaim slope small stones``` |
| Bwe, BwF: <br> Burton | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | ```Improbable: excess fines``` | ```Poor: slope small stones``` |
| Wayah-------------- | $\text { \|Poor: } \begin{array}{r} \text { slope } \end{array}$ | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: area reclaim slope small stones``` |
| CaC: <br> Cashiers | ```Poor: low strength``` | ```Improbable: excess fines``` | ```Improbable: excess fines``` | Poor: <br> area reclaim small stones |
| CaD : <br> Cashiers | Poor: <br> low strength | Improbable: excess fines | ```Improbable: excess fines``` | ```Poor: area reclaim slope small stones``` |
| CaE, CaF: <br> Cashiers | ```Poor: low strength slope``` | Improbable: excess fines | Improbable: excess fines | ```Poor: area reclaim slope small stones``` |
| CeD : <br> Chandler | $\mid \text { Poor: }$ | Improbable: excess fines | Improbable: excess fines | ```Poor: slope small stones``` |
| Micaville--------- | ```Fair: slope thin layer depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: area reclaim small stones``` |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| CeE, Cef: <br> Chandler | Poor: <br> low strength slope | Improbable: <br> excess fines | Improbable: <br> excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| Micaville---------- | ```Poor: slope depth to rock``` | Improbable: excess fines | Improbable: excess fines | ```Poor: area reclaim small stones``` |
| ChD : <br> Chestnut | Poor: <br> depth to rock | Improbable: thin layer excess fines | Improbable: thin layer excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| Ashe--------------- | Poor: <br> depth to rock | Improbable: <br> excess fines | Improbable: excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| Che, ChF: <br> Chestnut | ```Poor: slope depth to rock``` | Improbable: thin layer excess fines | Improbable: thin layer excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| Ashe--------------- | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| CnD : |  |  |  |  |
| Chestnut----------- | Poor: <br> depth to rock | Improbable: thin layer excess fines | Improbable: thin layer excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| Buladean----------- | ```Fair: slope depth to rock``` | Improbable: excess fines | Improbable: excess fines | $\begin{array}{\|l} \text { Poor: } \\ \text { slope } \\ \text { small stones } \end{array}$ |
| CnE, CnF: <br> Chestnut | ```Poor: slope depth to rock``` | Improbable: thin layer excess fines | Improbable: thin layer excess fines | $\begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}$ |
| Buladean----------- | ```Poor: slope depth to rock``` | Improbable: thin layer excess fines | Improbable: thin layer excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| CoF: |  |  |  |  |
| Clingman----------- | ```Poor: slope depth to rock``` | Improbable: excess humus | Improbable: excess humus | Poor: excess humus depth to rock |
| Craggey------------ | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: excess fines | ```Poor: slope small stones depth to rock``` |
| Rock outcrop. |  |  |  |  |
| Cre, CrF: <br> Crossnore | ```Poor: slope depth to rock``` | Improbable: excess fines | Improbable: excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| Cre, CrF: <br> Jeffrey | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { depth to rock } \end{aligned}\right.$ | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |
| CsD: <br> Cullasaja | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { large stones } \end{aligned}\right.$ | Improbable: large stones small stones | Improbable: large stones small stones | ```Poor: area reclaim large stones slope``` |
| CtC, CtD: <br> Cullasaja | $\begin{aligned} & \text { Poor: } \\ & \text { large stones } \end{aligned}$ | Improbable: large stones small stones | Improbable: <br> large stones small stones | Poor: <br> area reclaim <br> large stones |
| CtE: <br> Cullasaja | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}\right.$ | Improbable: <br> large stones | Improbable: <br> large stones | ```Poor: area reclaim large stones slope``` |
| CuA: <br> Cullowhee | Fair: wetness | Probable | Probable | ```Poor: area reclaim small stones too sandy``` |
| DAM. Dam |  |  |  |  |
| DeB: <br> Dellwood | Fair: <br> large stones wetness | Probable | Probable | ```Poor: area reclaim small stones too sandy``` |
| EpC: <br> Edneytown | Good | Improbable: excess fines | Improbable: <br> excess fines | ```Fair: slope small stones``` |
| Pigeonroost-------- | ```Poor:``` | Improbable: excess fines | Improbable: excess fines | ```Poor: small stones``` |
| EpD: <br> Edneytown | $\begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}$ | Improbable: excess fines | Improbable: <br> excess fines | $\begin{aligned} & \text { Poor: } \\ & \text { slope } \end{aligned}$ |
| Pigeonroost-------- | ```Poor: ``` | Improbable: excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |
| EpE: <br> Edneytown | $\text { \|Poor: } \begin{array}{r} \text { slope } \end{array}$ | Improbable: excess fines | Improbable: excess fines | $\begin{array}{\|l} \text { Poor: } \\ \text { slope } \end{array}$ |
| Pigeonroost-------- | ```Poor:``` | Improbable: excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| EtE, EtF: <br> Edneyville | $\left\lvert\, \begin{aligned} \text { Poor: } \\ \text { slope } \end{aligned}\right.$ | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |
| Chestnut----------- | ```Poor: slope depth to rock``` | Improbable: thin layer excess fines | Improbable: thin layer excess fines | ```Poor: slope small stones``` |
| FaC: <br> Fannin | ```Poor: ``` | Improbable: excess fines | Improbable: excess fines | Fair: <br> small stones |
| FaD: <br> Fannin | Poor: <br> low strength | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |
| FeC2, FeD2: <br> Fannin | Poor: low strength | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> too clayey |
| Fee2: <br> Fannin | Poor: <br> low strength slope | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> too clayey |
| Gre: <br> Greenlee | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { large stones } \\ & \text { slope } \end{aligned}\right.$ | Improbable: large stones excess fines | Improbable: large stones excess fines | Poor: <br> area reclaim <br> large stones |
| M-W . <br> Miscellaneous water |  |  |  |  |
| NkA: <br> Nikwasi $\qquad$ | $\begin{aligned} & \text { Poor: } \\ & \text { wetness } \end{aligned}$ | Probable | Probable | ```Poor: area reclaim small stones wetness``` |
| NnE: <br> Northcove | Poor: <br> large stones slope | Improbable: large stones excess fines | Improbable: large stones excess fines | Poor: <br> area reclaim <br> large stones |
| NoC: <br> Northcove | Poor: large stones | ```Improbable: large stones excess fines``` | ```Improbable: large stones excess fines``` | Poor: <br> area reclaim <br> large stones |
| Maymead------------ | Good | Improbable: excess fines | Improbable: excess fines | Poor: <br> area reclaim small stones |
| NoD : <br> Northcove | Poor: large stones | ```Improbable: large stones excess fines``` | ```Improbable: large stones excess fines``` | Poor: <br> area reclaim <br> large stones |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| NoD: <br> Maymead $\qquad$ | $\begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}$ | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: area reclaim slope small stones``` |
| OsB: <br> Ostin | Fair: <br> large stones wetness | Probable | Probable | ```Poor: area reclaim small stones too sandy``` |
| PaB, PnC, PnD: <br> Pineola------------ | Poor: <br> depth to rock | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor:``` |
| ```PtD: Plott``` | $\begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}$ | Probable | Probable | $\text { \|Poor: } \begin{array}{r} \text { slope } \end{array}$ |
| ```PtE, PtF: Plott``` | $\left\lvert\, \begin{aligned} \text { Poor: } \\ \text { slope } \end{aligned}\right.$ | Probable | Probable | $\left\lvert\, \begin{array}{r} \text { Poor: } \\ \text { slope } \end{array}\right.$ |
| PuC, PuD: <br> Porters | Fair: <br> depth to rock | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> area reclaim small stones |
| PuE, PuF: <br> Porters | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: area reclaim slope small stones``` |
| PwD: <br> Porters | ```Fair: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: area reclaim slope small stones``` |
| PwE: <br> Porters | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: area reclaim slope small stones``` |
| Px. <br> Pits, quarries |  |  |  |  |
| ReA: <br> Reddies | Fair: wetness | Probable | Probable | Poor: <br> area reclaim small stones |
| RoA, RsB: <br> Rosman | Fair: wetness | Probable | Probable | Fair: <br> area reclaim small stones |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| SaB, SaC: <br> Saunook | Good | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> area reclaim small stones |
| SbD : <br> Saunook | $\begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}$ | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: area reclaim slope small stones``` |
| ScB, SdC: <br> Saunook | Good | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> area reclaim small stones |
| SgC: <br> Saunook | Good | Improbable: excess fines | ```Improbable: excess fines``` | Poor: <br> area reclaim small stones |
| Nikwasi------------ | $\begin{aligned} & \text { Poor: } \\ & \text { wetness } \end{aligned}$ | Probable | Probable | ```Poor: area reclaim small stones wetness``` |
| ShC: <br> Saunook | Good | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> area reclaim small stones |
| Thunder------------ | $\begin{aligned} & \text { Poor: } \\ & \text { large stones } \end{aligned}$ | Improbable: large stones excess fines | Improbable: large stones excess fines | Poor: <br> area reclaim large stones |
| ShD: <br> Saunook | $\begin{array}{\|l} \text { Fair: } \\ \text { slope } \end{array}$ | Improbable: excess fines | Improbable: excess fines | ```Poor: area reclaim slope small stones``` |
| Thunder------------ | ```Poor: large stones slope``` | Improbable: large stones excess fines | Improbable: large stones excess fines | ```Poor: area reclaim large stones slope``` |
| SOD: <br> Soco | Poor: <br> depth to rock | Improbable: excess fines | Improbable: excess fines | ```Poor: slope small stones``` |
| Ditney------------- | ```Poor: depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |
| SoE, SoF: <br> Soco | ```Poor: slope depth to rock``` | Improbable: excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |
| Ditney------------ | ```Poor: slope depth to rock``` | Improbable: excess fines | Improbable: excess fines | ```Poor: slope small stones``` |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| SpD : <br> Spivey | Poor: <br> large stones | Improbable: large stones excess fines | Improbable: <br> large stones excess fines | ```Poor: area reclaim slope small stones``` |
| SpE: <br> Spivey | Poor: <br> large stones slope | Improbable: large stones excess fines | Improbable: <br> large stones excess fines | ```Poor: area reclaim slope small stones``` |
| SrC: <br> Spivey | Poor: <br> large stones | Improbable: <br> large stones excess fines | Improbable: <br> large stones excess fines | Poor: <br> area reclaim small stones |
| Whiteoak----------- | Good | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> area reclaim small stones |
| SsB: <br> Statler | Good | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Fair: small stones``` |
| StD : <br> Stecoah | ```Fair: slope thin layer depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> area reclaim small stones |
| Soco--------------- | ```Poor: depth to rock``` | Improbable: excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |
| StE, StF: <br> Stecoah | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | Poor: <br> area reclaim small stones |
| Soco--------------- | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: excess fines | ```Poor: slope small stones``` |
| TsC: <br> Thunder | Poor: large stones | Improbable: large stones excess fines | Improbable: <br> large stones excess fines | Poor: <br> area reclaim <br> large stones |
| Saunook------------ | Good | Improbable: excess fines | Improbable: <br> excess fines | Poor: <br> area reclaim small stones |
| TsD: <br> Thunder | Poor: <br> large stones | Improbable: large stones excess fines | Improbable: large stones excess fines | ```Poor: area reclaim large stones slope``` |
| Saunook------------ | $\begin{array}{r} \text { Fair: } \\ \text { slope } \end{array}$ | Improbable: excess fines | Improbable: excess fines | ```Poor: area reclaim slope small stones``` |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| TsE: <br> Thunder | Poor: <br> large stones slope | Improbable: large stones excess fines | Improbable: <br> large stones excess fines | ```Poor: area reclaim large stones slope``` |
| Saunook------------ | $\begin{array}{\|l} \text { Poor: } \\ \text { slope } \end{array}$ | Improbable: <br> excess fines | Improbable: excess fines | ```Poor: area reclaim slope small stones``` |
| Ua: <br> Udorthents, loamy-- | $\text { \|Poor: } \begin{array}{r} \text { slope } \end{array}$ | Improbable: <br> excess fines | Improbable: <br> excess fines | Limitation: variable |
| UdC: <br> Udorthents | $\text { \|Poor: } \begin{gathered} \text { slope } \end{gathered}$ | Improbable: <br> excess fines | ```Improbable: excess fines``` | Limitation: variable |
| Urban land. |  |  |  |  |
| UnD: <br> Unaka | ```Poor: reclaim``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones``` |
| Porters------------ | ```Fair: slope depth to rock``` | Improbable: excess fines | Improbable: <br> excess fines | ```Poor: area reclaim slope small stones``` |
| UnE, UnF: <br> Unaka | ```Poor: area reclaim slope``` | Improbable: <br> excess fines | ```Improbable: excess fines``` | ```Poor: slope small stones``` |
| Porters------------ | $\left\lvert\, \begin{aligned} \text { Poor: } \\ \text { slope } \end{aligned}\right.$ | Improbable: excess fines | Improbable: excess fines | ```Poor: area reclaim slope small stones``` |
| UOF: <br> Unicoi | ```Poor: slope depth to rock``` | Improbable: excess fines | Improbable: <br> excess fines | ```Poor: slope small stones depth to rock``` |
| Rock outcrop. |  |  |  |  |
| W. Water |  |  |  |  |
| WaC: <br> Watauga | $\begin{aligned} & \text { \|Poor: } \\ & \text { low strength } \end{aligned}$ | Improbable: excess fines | Improbable: <br> excess fines | Poor: <br> small stones |

Table 11.-Construction Materials-Continued

| Map symbol and soil name | Roadfill | Sand | Gravel | Topsoil |
| :---: | :---: | :---: | :---: | :---: |
| WaD: <br> Watauga | Poor: <br> low strength | Improbable: <br> excess fines | Improbable: <br> excess fines | $\left\lvert\, \begin{aligned} & \text { Poor: } \\ & \text { slope } \\ & \text { small stones } \end{aligned}\right.$ |
| WbD : <br> Wayah | $\begin{aligned} & \text { Fair: } \\ & \text { slope } \end{aligned}$ | Improbable: excess fines | Improbable: excess fines | ```Poor: area reclaim slope small stones``` |
| Burton------------- | Poor: <br> depth to rock | Improbable: <br> excess fines | ```Improbable: excess fines``` | ```Poor: slope small stones depth to rock``` |
| WcE, WcF: Wayah | $\begin{array}{\|l} \text { Poor: } \\ \text { slope } \end{array}$ | Improbable: <br> excess fines | ```Improbable: excess fines``` | ```Poor: area reclaim slope small stones``` |
| Burton------------- | ```Poor: slope depth to rock``` | Improbable: <br> excess fines | Improbable: <br> excess fines | ```Poor: slope small stones depth to rock``` |
| WhB, WkC: <br> Whiteoak | Good | ```Improbable: excess fines``` | ```Improbable: excess fines``` | Poor: <br> area reclaim small stones |
| WtD : <br> Whiteoak | $\begin{aligned} & \text { Fair: } \\ & \text { slope } \end{aligned}$ | Improbable: <br> excess fines | ```Improbable: excess fines``` | Poor: <br> area reclaim <br> slope <br> small stones |

Table 12.-Water Management
(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite rating is applicable)

Table 12.-Water Management-Continued

|  | Limitations for-- |  | Features affecting-- |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Map symbol and soil name | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| BwC, BwD, BwE, BwF: <br> Wayah- | Severe: seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | Limitation: slope |
| Cashiers-------------- | ```Severe: seepage slope``` | ```Severe: piping hard to pack``` | Limitation: <br> deep to water | ```Limitation: slope erodes easily``` | ```Limitation: slope erodes easily``` | ```Limitation: slope erodes easily``` |
| CeD, CeE, CeF: <br> Chandler | Severe: seepage slope | Severe: <br> hard to pack piping | Limitation: deep to water | ```Limitation: slope erodes easily``` | ```Limitation: slope erodes easily``` | Limitation: <br> slope <br> erodes easily |
| Micaville------------- | Severe: seepage slope | Severe: piping hard to pack | Limitation: <br> deep to water | ```Limitation: rooting depth slope erodes easily``` | ```Limitation: large stones slope erodes easily``` | Limitation: <br> large stones rooting depth slope erodes easily |
| ChD, Che, ChF: <br> Chestnut | Severe: seepage slope | Severe: <br> piping <br> thin layer | Limitation: deep to water | ```Limitation: slope depth to rock droughty``` | ```Limitation: large stones slope depth to rock``` | Limitation: <br> large stones slope depth to rock |
| Ashe------------------- | Severe: seepage slope | Severe: piping thin layer | Limitation: deep to water | ```Limitation: slope depth to rock droughty``` | ```Limitation: large stones slope depth to rock``` | ```Limitation: large stones slope depth to rock``` |
| CnD, CnE, CnF: <br> Chestnut | Severe: seepage slope | ```Severe: piping thin layer``` | Limitation: <br> deep to water | ```Limitation: slope depth to rock droughty``` | ```Limitation: large stones slope depth to rock``` | ```Limitation: large stones slope depth to rock``` |
| Buladean--------------- | Severe: seepage slope | Severe: piping | Limitation: deep to water | Limitation: rooting depth slope | Limitation: slope too sandy | Limitation: rooting depth slope |
| CoF: <br> Clingman | Severe: slope depth to rock | Severe: <br> excess humus thin layer | Limitation: deep to water | ```Limitation: rooting depth slope depth to rock``` | ```Limitation: slope depth to rock``` | ```Limitation: rooting depth slope depth to rock``` |

Table 12.-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 |
| CoF: <br> Craggey | Severe: slope depth to rock | Severe: <br> thin layer | Limitation: deep to water | Limitation: slope depth to rock | Limitation: <br> slope <br> depth to rock | Limitation: slope depth to rock |
| Rock outcrop. |  |  |  |  |  |  |
| Cre, CrF: <br> Crossnore | Severe: seepage slope | Severe: piping thin layer | Limitation: deep to water | ```Limitation: slope depth to rock droughty``` | ```Limitation: large stones slope depth to rock``` | ```Limitation: large stones slope droughty``` |
| Jeffrey---------------- | Severe: seepage slope | Severe: <br> piping <br> thin layer | Limitation: deep to water | ```Limitation: slope depth to rock droughty``` | ```Limitation: large stones slope depth to rock``` | ```Limitation: large stones slope droughty``` |
| CsD, CtC, CtD, CtE: Cullasaja | Severe: seepage slope | Severe: <br> large stones seepage | Limitation: deep to water | ```Limitation: large stones slope droughty``` | ```Limitation: large stones slope too sandy``` | Limitation: <br> large stones slope |
| CuA: <br> Cullowhee | Severe: seepage flooding | Severe: seepage wetness flooding | Limitation: <br> flooding <br> large stones cutbanks cave | Limitation: flooding wetness | Limitation: too sandy wetness flooding | Limitation: wetness flooding |
| DAM. Dam |  |  |  |  |  |  |
| DeB: <br> Dellwood | Severe: seepage flooding | Severe: <br> large stones seepage | ```Limitation: flooding large stones slope``` | ```Limitation: large stones slope wetness``` | Limitation: <br> large stones <br> too sandy <br> wetness | Limitation: <br> large stones droughty |
| EpC, EpD, EpE: <br> Edneytown | Severe: seepage slope | Severe: seepage piping | Limitation: deep to water | Limitation: slope | Limitation: slope | Limitation: slope |
| Pigeonroost------------ | Severe: slope thin layer | Severe: piping | Limitation: deep to water | Limitation: slope depth to rock | ```Limitation: large stones slope depth to rock``` | ```Limitation: large stones slope depth to rock``` |

Table 12.-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 |
| EtE, EtF: <br> Edneyville | Severe: <br> seepage slope | Severe: piping | Limitation: deep to water | ```Limitation: slope droughty``` | Limitation: slope | Limitation: slope |
| Chestnut-------------- | Severe: <br> seepage slope | ```Severe: piping thin layer``` | Limitation: deep to water | Limitation: <br> slope <br> depth to rock droughty | Limitation: <br> large stones slope depth to rock | ```Limitation: large stones slope depth to rock``` |
| ```FaC, FaD, FeC2, FeD2, FeE2: Fannin----------------``` | Severe: slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | Limitation: slope |
| Gre: |  |  |  |  |  |  |
| Greenlee-------------- | Severe: <br> seepage slope | Severe: <br> large stones seepage | Limitation: deep to water | Limitation: <br> large stones slope droughty | Limitation: <br> large stones slope too sandy | Limitation: <br> large stones slope droughty |
| $\mathbf{M}-\mathbf{W} .$ <br> Miscellaneous water |  |  |  |  |  |  |
| NkA: |  |  |  |  |  |  |
| Nikwasi | Severe: <br> seepage flooding | Severe: <br> seepage <br> wetness | Limitation: <br> flooding <br> large stones cutbanks cave | Limitation: <br> flooding wetness | Limitation: <br> large stones too sandy wetness | Limitation: <br> large stones wetness |
| NnE: |  |  |  |  |  |  |
| Northcove | Severe: <br> seepage slope | Severe: <br> large stones | Limitation: deep to water | Limitation: <br> large stones slope droughty | Limitation: <br> large stones slope | Limitation: <br> large stones slope droughty |
| NoC, NoD: |  |  |  |  |  |  |
| Northcove------------- | Severe: <br> seepage slope | Severe: <br> large stones | Limitation: deep to water | Limitation: <br> large stones slope droughty | Limitation: <br> large stones slope | Limitation: <br> large stones slope droughty |
| Maymead--------------- | Severe: <br> seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: <br> large stones slope | Limitation: <br> large stones slope |

Table 12.-Water Management-Continued

|  | Limitati | ions for-- |  | Features af | fecting-- |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Map symbol and soil name | Pond reservoir areas | Embankments, dikes, and levees | Drainage | Irrigation | Terraces and diversions | Grassed waterways |
| OsB: <br> Ostin | Severe: <br> seepage flooding | Severe: <br> large stones seepage | Limitation: <br> flooding <br> large stones | Limitation: <br> flooding <br> large stones wetness | Limitation: <br> large stones too sandy wetness | Limitation: <br> large stones droughty |
| PaB: <br> Pineola | Moderate: <br> seepage <br> slope <br> depth to rock | Severe: thin layer | Limitation: deep to water | ```Limitation: slope depth to rock``` | Limitation: <br> large stones depth to rock | Limitation: <br> large stones depth to rock |
| ```PnC, PnD: Pineola``` | Severe: slope | Severe: thin layer | Limitation: deep to water | ```Limitation: slope depth to rock``` | Limitation: <br> large stones slope depth to rock | Limitation: <br> large stones slope <br> depth to rock |
| PtD, PtE, PtF: <br> Plott | Severe: seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | ```Limitation: slope``` |
| PuC, PuD, PuE, PuF, PwD, PwE: <br> Porters | Severe: <br> seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | Limitation: slope |
| Px. <br> Pits, quarries |  |  |  |  |  |  |
| ReA: <br> Reddies | Severe: <br> seepage flooding | Severe: seepage | Limitation: <br> flooding <br> large stones cutbanks cave | ```Limitation: flooding wetness``` | Limitation: <br> large stones too sandy wetness | Limitation: <br> large stones |
| RoA: <br> Rosman | Severe: <br> seepage flooding | Severe: piping | Limitation: flooding | Limitation: <br> flooding wetness | Limitation: wetness | Favorable |
| RsB: <br> Rosman | Severe: <br> seepage flooding | Severe: piping | Limitation: flooding | Limitation: <br> flooding wetness soil blowing | Limitation: <br> wetness soil blowing | Favorable |

Table 12.-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 |
| SaB, SaC: <br> Saunook | Severe: seepage | Severe: piping | Limitation: deep to water | Limitation: slope | Favorable | Favorable |
| SbD: <br> Saunook | Severe: <br> seepage slope | ```Severe: piping large stones``` | Limitation: deep to water | Limitation: slope | Limitation: <br> slope <br> large stones | Limitation: <br> slope <br> large stones |
| ```ScB, SdC: Saunook``` | Severe: seepage | Severe: seepage | Limitation: deep to water | Limitation: slope | Favorable | Favorable |
| SgC: <br> Saunook $\qquad$ | Severe: seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | Limitation: slope |
| Nikwasi--------------- | Severe: <br> seepage flooding | Severe: <br> seepage wetness | Limitation: <br> flooding <br> large stones cutbanks cave | Limitation: flooding wetness | Limitation: <br> large stones too sandy wetness | Limitation: <br> large stones wetness |
| ShC, ShD: <br> Saunook | Severe: <br> seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | Limitation: slope |
| Thunder--------------- | Severe: <br> seepage slope | Severe: <br> large stones | Limitation: <br> deep to water | Limitation: <br> large stones slope | Limitation: <br> large stones slope | Limitation: <br> large stones slope |
| SOD, SOE, SOF: <br> Soco | Severe: seepage slope | ```Severe: piping thin layer``` | Limitation: deep to water | ```Limitation: slope depth to rock``` | ```Limitation: slope depth to rock``` | ```Limitation: slope depth to rock``` |
| Ditney---------------- | Severe: <br> seepage slope | ```Severe: piping thin layer``` | Limitation: <br> deep to water | Limitation: <br> slope <br> depth to rock droughty | ```Limitation: slope depth to rock``` | Limitation: <br> slope <br> depth to rock droughty |
| SpD, SpE: <br> Spivey---ー------------- | Severe: <br> seepage slope | Severe: <br> large stones | Limitation: <br> deep to water | Limitation: <br> large stones slope | Limitation: <br> large stones slope | Limitation: <br> large stones slope |

Table 12.-Water Management-Continued

Table 12.-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 |
| UnD, UnE, UnF: <br> Porters | Severe: seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | slope <br> Limitation: slope |
| UoF: <br> Unicoi | Severe: slope depth to rock | Severe: <br> large stones | Limitation: deep to water | ```Limitation: large stones slope droughty``` | Limitation: <br> large stones <br> slope <br> depth to rock | ```Limitation: large stones slope droughty``` |
| Rock outcrop. <br> W. <br> Water |  |  |  |  |  |  |
| WaC, WaD: <br> Watauga | $\begin{aligned} & \text { Severe: } \\ & \text { slope } \end{aligned}$ | Severe: seepage piping | Limitation: deep to water | ```Limitation: slope soil blowing``` | Limitation: slope | Limitation: slope |
| WbD, WcE, WcF: <br> Wayah | Severe: seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | ```Limitation: slope``` | $\begin{aligned} & \text { Limitation: } \\ & \text { slope } \end{aligned}$ |
| Burton----------------- | ```Severe: seepage slope``` | ```Severe: piping thin layer``` | Limitation: <br> deep to water | ```Limitation: slope depth to rock``` | Limitation: <br> large stones slope depth to rock | Limitation: <br> large stones slope depth to rock |
| WhB: <br> Whiteoak | Moderate: seepage slope | Severe: piping | Limitation: deep to water | Limitation: slope | Favorable | Favorable |
| WkC: <br> Whiteoak | Severe: slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | Limitation: slope |
| WtD: <br> Whiteoak | Severe: slope | Severe: piping | Limitation: deep to water | Limitation: slope | Limitation: slope | Limitation: slope large stones |

Table 13.-Engineering Index Properties

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | Liquid <br> limit | $\left\lvert\, \begin{array}{r} \text { Plas- } \\ \text { ticity } \\ \text { index } \end{array}\right.$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | 3-10 <br> inches | 4 | 10 | 40 | 200 |  |  |
| BCE, BcF: <br> Balsam- | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | 0-15 | Very cobbly loam | GM, SM | A-1-b, A-2-5 | 20-40 | 10-20 | 55-85 | 50-75 | 35-60 | 15-35 | 41-70 | NP-7 |
|  | 15-62 | Extremely cobbly loam, extremely bouldery loam, extremely bouldery fine sandy loam, extremely bouldery sandy loam | GM, SM, SP-SM | A-1-a, A-2-4 | 30-50 | 15-25 | 29-70 | 26-55 | 15-30 | 5-20 | 15-40 | NP-7 |
| Rubble land----- | 0-60 | Fragmental material | GW | A-1-a | 25-80 | 75-90 | 0-10 | 0-5 | 0-5 | 0 | 0-14 | NP |
| BuC, BuD, BuF: Burton$\qquad$ |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-18 | Gravelly loam | GM, SM | $\left\lvert\, \begin{gathered} \mathrm{A}-1-\mathrm{b}, \mathrm{~A}-2-4, \\ \mathrm{~A}-4, \mathrm{~A}-5 \end{gathered}\right.$ | 2-10 | 5-15 | 65-90 | 60-75 | 30-65 | 20-49 | 30-50 | NP-7 |
|  | 18-24 | ```Gravelly loam, sandy loam, gravelly sandy loam, loam``` | SC-SM, SM | A-2, A-4 | 0-5 | 5-15 | 73-100 | 70-95 | 57-95 | 25-49 | 25-35 | NP-7 |
|  | 24-29 | Unweathered bedrock | - | - | - | --- | --- | --- | --- | --- | --- | --- |
| Craggey--------- | $\begin{array}{r} 0-13 \\ 13-18 \end{array}$ | Gravelly loam Unweathered bedrock | GM, $\underset{-}{\text { SC-SM, }}$ SM | A-1-b, A-2 | 0-5 | 5-15 --- | 55-95 | 50-90 | 30-60 | 15-35 | 25-50 | NP-7 ---1 |
| Rock outcrop---- | 0-60 | Unweathered bedrock | --- | --- | 0 | 0 | 0 | 0 | 0 | 0 | 0-0 | NP |
| ```BwC, BwD, BwE: BwF : Burton``` |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-18 | Gravelly loam | SM, GM | $\left\lvert\, \begin{aligned} & \mathrm{A}-1-\mathrm{b}, \mathrm{~A}-2-4, \\ & \mathrm{~A}-4, \mathrm{~A}-5 \end{aligned}\right.$ | 2-10 | 5-15 | 65-90 | 60-75 | 30-65 | 20-49 | 30-50 | NP-7 |
|  | 18-24 | Gravelly loam, sandy loam, gravelly sandy loam, loam | SC-SM, SM | A-2, A-4 | 0-5 | 5-15 | 73-100 | 70-95 | 57-95 | 25-49 | 25-35 | NP-7 |
|  | 24-29 | Unweathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | $\begin{aligned} & \text { \| Liquid } \\ & \text { limit } \end{aligned}$ | $\left\lvert\, \begin{array}{r} \text { Plas- } \\ \text { ticity } \\ \text { index } \end{array}\right.$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | $\begin{gathered} 3-10 \\ \text { inches } \end{gathered}$ | 4 | 10 | 40 | 200 |  |  |
| BwC, BwD, BwE, BwF : <br> Wayah | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | 0-18 | Gravelly loam | GM, SM | $\left\lvert\, \begin{array}{cc} A-1, & A-2-4, \\ A-4, & A-5 \end{array}\right.$ | 0-5 | 3-15 | 53-90 | 50-75 | 30-65 | 20-50 | 30-50 | NP-10 |
|  | 18-38 | Gravelly loam, sandy loam, fine sandy loam, gravelly sandy loam | $\left\lvert\, \begin{array}{cc} \text { SM, } & \text { SC-SM, } \\ \text { ML, } & \text { GM } \end{array}\right.$ | $\left\lvert\, \begin{gathered} \mathrm{A}-1-\mathrm{b}, \mathrm{~A} \\ \mathrm{~A}-4 \end{gathered}\right.$ | 0-5 | 3-15 | 53-99 | 50-97 | 30-87 | 20-55 | 25-35 | NP-10 |
|  | 38-62 | Gravelly fine sandy loam, gravelly sandy loam, gravelly loamy sand | SM, GM | A-1-b, A-2-4 | 0-5 | 3-15 | 53-87 | 50-80 | 20-50 | 10-30 | 20-35 | NP-4 |
| CaC, CaD, CaE, CaF: Cashiers------- |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-7 | Sandy loam | ML, SC-SM, SM | $\left\lvert\, \begin{gathered} \mathrm{A}-2-4, \\ \mathrm{~A}-5 \end{gathered}\right.$ | 0-2 | 0-5 | 90-100 | 85-100 | 60-85 | 25-65 | 30-50 | NP-7 |
|  | 7-31 | Loam, sandy loam, fine sandy loam, gravelly sandy loam | SC-SM, SM, ML | A-2-4, A-4 | 0-2 | 0-5 | 70-95 | 60-95 | 50-85 | 25-65 | 30-50 | NP-7 |
|  | 31-62 | Gravelly sandy <br> loam, gravelly <br> fine sandy <br> loam, sandy <br> loam | SC-SM, SM | $\left\lvert\, \begin{gathered} \mathrm{A}-1-\mathrm{b}, \quad \mathrm{~A}-2-4, \\ \mathrm{~A}-4 \end{gathered}\right.$ | 0-2 | 0-15 | 70-95 | 60-95 | 30-75 | 20-50 | 30-50 | NP-7 |
| CeD : <br> Chandler |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-5 | Sandy loam | SC-SM, SM, ML | $\left\lvert\, \begin{gathered} A-4, \\ A-5 \end{gathered}\right.$ | 0-1 | 0-5 | 90-100 | 85-100 | 60-85 | 25-65 | 30-76 | NP-7 |
|  | 5-62 | Loam, fine sandy loam, sandy loam | SM, ML, MH | A-2, A-4, A-5 | 0-5 | 0-15 | 90-100 | 85-100 | 60-85 | 25-65 | 30-60 | NP-7 |

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

\begin{tabular}{|c|c|c|c|c|c|c|c|c|c|c|c|c|}
\hline \multirow[t]{2}{*}{Map symbol and soil name} \& \multirow[t]{2}{*}{Depth} \& \multirow[t]{2}{*}{USDA texture} \& \multicolumn{2}{|l|}{Classification} \& \multicolumn{2}{|l|}{Fragments} \& \multicolumn{4}{|l|}{Percentage passing sieve number--} \& \multirow[t]{2}{*}{\[
\begin{aligned}
\& \text { Liquid } \\
\& \text { limit }
\end{aligned}
\]} \& \multirow[t]{2}{*}{\[
\left\lvert\, \begin{array}{r}
\text { Plas- } \\
\text { ticity } \\
\text { index }
\end{array}\right.
\]} \\
\hline \& \& \& Unified \& AASHTO \& \[
\begin{gathered}
>10 \\
\text { inches }
\end{gathered}
\] \& \[
\begin{gathered}
3-10 \\
\text { inches }
\end{gathered}
\] \& 4 \& 10 \& 40 \& 200 \& \& \\
\hline \multirow[t]{4}{*}{\begin{tabular}{l}
ChD, ChE, ChF: \\
Ashe------------
\end{tabular}} \& In \& \& \& \& Pct \& Pct \& \& \& \& \& Pct \& \\
\hline \& 0-5 \& Gravelly sandy loam \& SM, SC-SM \& A-2, A-4 \& 0-5 \& 5-10 \& 80-90 \& 75-90 \& 60-90 \& 30-49 \& 25-35 \& NP-7 \\
\hline \& 5-31 \& \begin{tabular}{l}
Gravelly sandy \\
loam, cobbly \\
sandy loam, \\
loam, sandy \\
loam
\end{tabular} \& SM \& A-2, A-4 \& 0-2 \& 5-20 \& 75-95 \& 65-95 \& 55-95 \& 30-49 \& 0-25 \& NP \\
\hline \& 31-36 \& Unweathered bedrock \& --- \& -- \& --- \& -- \& --- \& - \& --- \& --- \& --- \& --- \\
\hline \multirow[t]{4}{*}{\begin{tabular}{l}
CnD: \\
Chestnut
\end{tabular}} \& \& \& \& \& \& \& \& \& \& \& \& \\
\hline \& 0-3 \& Gravelly sandy loam \& SC-SM, SM \& A-2, A-4, A-5 \& 0-5 \& 5-15 \& 75-95 \& 65-90 \& 60-85 \& 30-49 \& 20-50 \& NP-7 \\
\hline \& 3-28 \& Gravelly loam, gravelly fine sandy loam, loam, 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 \\
\hline \& 28-62 \& Weathered bedrock \& -- \& --- \& --- \& --- \& --- \& --- \& --- \& -- \& --- \& --- \\
\hline \multirow[t]{4}{*}{Buladean--------} \& 0-8 \& Gravelly sandy loam \& ML, SC-SM, SM \& A-2-4, A-4 \& 0-3 \& 5-15 \& 70-95 \& 60-90 \& 40-75 \& 25-70 \& 25-40 \& NP-10 \\
\hline \& 8-32 \& \begin{tabular}{l}
Loam, sandy \\
loam, coarse sandy loam
\end{tabular} \& SM, SC-SM, ML \& A-2-4, A-4 \& 0-1 \& 0-5 \& 90-100 \& 85-100 \& 60-90 \& 30-75 \& 25-40 \& NP-10 \\
\hline \& 32-42 \& Loamy sand, sandy loam, coarse sandy loam \& SC-SM, SM \& A-2-4, A-4 \& 0-1 \& 0-5 \& 80-100 \& 75-100 \& 60-95 \& 20-49 \& 15-30 \& NP-7 \\
\hline \& 42-62 \& Weathered bedrock \& --- \& - \& --- \& --- \& - \& -- \& --- \& - \& -- \& --- \\
\hline \multirow[t]{4}{*}{\begin{tabular}{l}
CnE: \\
Chestnut
\end{tabular}} \& \& \& \& \& \& \& \& \& \& \& \& \\
\hline \& 0-3 \& Gravelly sandy loam \& SC-SM, SM \& A-2, A-4, A-5 \& 0-5 \& 5-15 \& 75-95 \& 65-90 \& 60-85 \& 30-49 \& 20-50 \& NP-7 \\
\hline \& \(3-28\)
\(28-62\) \& Gravelly loam, gravelly fine sandy loam, loam, 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 \& $\underbrace{N P-10}$ <br>
\hline \& 28-62 \& Weathered bedrock \& --- \& --- \& --- \& --- \& --- \& --- \& --- \& --- \& --- \& --- <br>
\hline
\end{tabular}

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | $\begin{array}{\|l\|} \mid \text { Liquid } \\ \mid \text { limit } \end{array}$ | $\begin{array}{r} \text { Plas- } \\ \text { ticity } \\ \text { index } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | $\begin{gathered} 3-10 \\ \text { inches } \end{gathered}$ | 4 | 10 | 40 | 200 |  |  |
| CnE: <br> Buladean | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | 0-8 | $\begin{aligned} & \text { Gravelly sandy } \\ & \text { loam } \end{aligned}$ | SC-SM, SM | A-2, A-4, A-5 | 0-5 | 5-15 | 75-95 | 65-90 | 60-85 | 30-49 | 20-50 | NP-7 |
|  | 8-32 | Gravelly loam, gravelly fine sandy loam, 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 |
|  | 32-42 | Loamy sand, sandy loam, coarse sandy loam | SM, SC-SM | A-2-4, A-4 | 0-1 | 0-5 | 80-100 | 75-100 | 60-95 | 20-49 | 15-30 | NP-7 |
|  | 42-62 | Weathered bedrock | --- | -- | --- | --- | --- | -- | --- | --- | --- | --- |
| CnF: <br> Chestnut |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-3 | Gravelly sandy loam | SC-SM, SM | A-2, A-4, A-5 | 0-5 | 5-15 | 75-95 | 65-90 | 60-85 | 30-49 | 20-50 | NP-7 |
|  | 3-28 | Gravelly loam, gravelly fine sandy loam, loam, sandy loam | SM, SC-SM | A-2, A-4, A-5 | 0-5 | 0-25 | 75-98 | 65-97 | 60-85 | 34-49 | 20-45 | NP-10 |
|  | 28-62 | Weathered bedrock | -- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Buladean-------- | 0-8 | Gravelly sandy loam | ML, SC-SM, SM | A-2-4, A-4 | 0-3 | 5-15 | 70-95 | 60-90 | 40-75 | 25-70 | 25-40 | NP-10 |
|  | 8-32 | Loam, sandy loam, coarse sandy loam | SM, SC-SM, ML | A-2-4, A-4 | 0-1 | 0-5 | 90-100 | 85-100 | 60-90 | 30-75 | 25-40 | NP-10 |
|  | 32-42 | Loamy sand, sandy loam, coarse sandy loam | SM, SC-SM | A-2-4, A-4 | 0-1 | 0-5 | 80-100 | 75-100 | 60-95 | 20-49 | 15-30 | NP-7 |
|  | 42-62 | Weathered bedrock | -- | -- | --- | --- | --- | --- | --- | --- | --- | --- |
| CoF: <br> Clingman |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-10 | Peat | PT, GP | A-8, A-1-a | 0-2 | 0-5 | --- | --- | --- | -- | --- | --- |
|  | 10-14 | ```Loamy sand, sandy loam, loam``` | SM, SC-SM, ML | $\left\lvert\, \begin{gathered} \mathrm{A}-1-\mathrm{b}, \mathrm{~A}-2-4 \\ \mathrm{~A}-4 \end{gathered}\right.$ | 0-2 | 0-5 | 85-100 | 75-95 | 35-85 | 15-75 | 15-30 | NP-5 |
|  | 14-21 | Unweathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | -- | --- |

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | $\begin{aligned} & \text { \| Liquid } \\ & \text { limit } \end{aligned}$ | $\left\lvert\, \begin{array}{r} \text { Plas- } \\ \text { ticity } \\ \text { index } \end{array}\right.$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $>10$ <br> inches | $\begin{gathered} 3-10 \\ \text { inches } \\ \hline \end{gathered}$ | 4 | 10 | 40 | 200 |  |  |
| CoF: <br> Craggey | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | $\begin{array}{r} 0-13 \\ 13-18 \end{array}$ | Gravelly loam Unweathered bedrock | GM, $\underset{\sim}{\text { SC-S }}$ SM, SM | A-1-b, A-2 | 0-5 | 5-15 -- | 55-95 | 50-90 | 30-60 | 15-35 | 25-50 | NP-7 ---1 |
| Rock outcrop---- | 0-60 | Unweathered bedrock | --- | --- | 0 | 0 | 0 | 0 | 0 | 0 | 0-0 | NP |
| Cre, CrF: <br> Crossnore | 0-7 | Gravelly sandy loam | SC-SM, SM | A-2, A-4 | 0-5 | 2-15 | 75-95 | 65-90 | 60-85 | 30-49 | 15-30 | NP-7 |
|  | 7-22 | Gravelly sandy loam, gravelly loam, loam | SC, SC-SM, SM | A-2, A-4 | 0-2 | 0-20 | 75-98 | 65-95 | 60-85 | 30-49 | 15-30 | NP-10 |
|  | 22-30 | Gravelly loamy sand, gravelly sandy loam, gravelly loam | SC-SM, SM | A-2-4, A-4 | 0-5 | 0-20 | 75-95 | 65-90 | 50-85 | 15-49 | 15-30 | NP-7 |
|  | 30-61 | Weathered bedrock | - | - | --- | --- | - | --- | --- | --- | --- | --- |
| Jeffrey--------- | 0-9 | Gravelly sandy loam | SM, ML | A-4 | 0 | 0-10 | 80-95 | 70-90 | 65-80 | 40-60 | 0-30 | NP-7 |
|  | 9-31 | ```Gravelly loam, gravelly sandy loam, loam, sandy loam``` | GM, ML, SM | A-2, A-4 | 0 | 2-5 | 65-95 | 65-90 | 45-75 | 30-60 | 0-30 | NP-7 |
|  | 31-36 | Unweathered bedrock | --- | -- | --- | --- | --- | --- | --- | --- | --- | --- |
| CsD: <br> Cullasaja |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-18 | $\begin{array}{\|r} \text { Cobbly fine } \\ \text { sandy loam } \end{array}$ | SM | A-2-5, A-5 | 5-10 | 15-35 | 70-95 | 65-85 | 55-70 | 25-40 | 41-70 | NP-7 |
|  | 18-60 | Very stony sandy loam, very cobbly fine sandy loam, very stony fine sandy loam, very stony loam | SM, GM | A-1-b, A-2-4 | 5-20 | 30-60 | 55-85 | 50-75 | 35-60 | 15-30 | 25-40 | NP-7 |

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | \|Liquid <br> limit | $\begin{aligned} & \text { Plas- } \\ & \text { ticity } \\ & \text { index } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | $\begin{array}{\|c\|} \hline 3-10 \\ \text { inches } \end{array}$ | 4 | 10 | 40 | 200 |  |  |
| DeB: <br> Dellwood | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | 0-11 | Cobbly sandy loam | SM | $\begin{aligned} & A-1-b, \quad A-2-4, \\ & A-4 \end{aligned}$ | 0-5 | 15-30 | 70-83 | 70-81 | 30-75 | 20-50 | 15-37 | NP-4 |
|  | 11-16 | Very cobbly loamy sand, extremely gravelly sand, very gravelly sand, very gravelly loamy sand | $\begin{gathered} \text { SP, GP-GM, } \\ \text { GP, GM } \end{gathered}$ | A-1-a | 0-5 | 10-40 | 13-75 | 10-65 | 4-40 | 1-15 | 10-20 | NP |
|  | 16-62 | Extremely <br> cobbly loamy sand, extremely gravelly sand, very cobbly sand, extremely gravelly coarse sand | $\begin{gathered} \text { GP-GM, GP, } \\ \text { GM, SP } \end{gathered}$ | A-1-a | 0-5 | 30-50 | 13-75 | 10-60 | 4-40 | 1-15 | 10-15 | NP |
| EpC, EpD, EpE: <br> Edneytown------- | 0-3 | Fine sandy loam | $\begin{gathered} \text { CL-ML, } \quad \text { ML, } \\ \text { SC-SM, } \quad \text { SM } \end{gathered}$ | A-4 | 0-1 | 0-2 | 95-100 | 90-100 | 70-85 | 40-70 | 0-25 | NP-7 |
|  | 3-32 | ```Sandy clay loam, clay loam``` | SC, CL-ML, CL | A-4, A-6 | 0 | 0 | 98-100 | 95-100 | 80-97 | 45-75 | 25-35 | 5-15 |
|  | 32-62 | Loamy sand, sandy loam, loam | $\begin{gathered} \text { SC-SM, SM, } \\ \text { ML, CL-ML } \end{gathered}$ | A-2, A-4 | 0 | 0 | 98-100 | 95-100 | 50-90 | 15-70 | 0-25 | NP-7 |
| Pigeonroost----- | 0-6 | Gravelly loam | $\begin{gathered} \text { CL, } M L, \quad S C, \\ \text { SM } \end{gathered}$ | A-2, A-4 | 0-1 | 5-25 | 70-95 | 60-90 | 40-75 | 25-70 | 20-30 | NP-10 |
|  | 6-20 | Loam, sandy clay loam, gravelly sandy clay loam | $\begin{gathered} \text { CL, } \\ \text { SM } \end{gathered}$ | A-4, A-6 | 0-1 | 0-15 | 85-100 | 70-100 | 65-90 | 40-80 | 25-40 | 7-14 |
|  | 20-32 | Sandy loam, <br> loam, gravelly <br> sandy loam | $\begin{aligned} & \text { SM, SC, ML, } \\ & \text { CL } \end{aligned}$ | A-2, A-4 | 0-1 | 0-15 | 85-100 | 65-100 | 65-95 | 30-75 | 20-30 | NP-10 |
|  | 32-62 | Weathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | $\begin{aligned} & \text { \| Liquid } \\ & \text { \| limit } \end{aligned}$ | $\left\lvert\, \begin{gathered} \text { Plas- } \\ \text { ticity } \\ \text { index } \end{gathered}\right.$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | $\begin{gathered} 3-10 \\ \text { inches } \end{gathered}$ | 4 | 10 | 40 | 200 |  |  |
| NnE: <br> Northcove | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | 0-4 | ```Very cobbly loam``` | $\left\lvert\, \begin{array}{rr} \text { SC-SM, } & \text { GM, } \\ \text { GC-GM, } & \text { SM } \end{array}\right.$ | $\left\lvert\, \begin{aligned} & \mathrm{A}-1-\mathrm{b}, \mathrm{~A}-2-4, \\ & \mathrm{~A}-4 \end{aligned}\right.$ | 5-10 | 25-65 | 50-90 | 50-85 | 30-70 | 20-45 | 15-30 | NP-7 |
|  | 4-36 | Very cobbly sandy loam, very stony loam, very flaggy loam | SM, SC-SM, GM, GC-GM | $\begin{aligned} & \mathrm{A}-1-\mathrm{b}, \mathrm{~A}-2-4, \\ & \mathrm{~A}-4 \end{aligned}$ | 15-40 | 25-65 | 50-90 | 50-85 | 30-70 | 20-45 | 15-30 | NP-7 |
|  | 36-62 | Very cobbly sandy loam, extremely cobbly sandy loam, very stony loamy sand, extremely stony sand | GC-GM, GM, SM | A-1-b, A-2-4 | 20-50 | 25-80 | 50-85 | 35-60 | 20-50 | 15-30 | 10-30 | NP-7 |
| NoC, NoD: <br> Northcove | 0-4 | $\begin{array}{\|l} \text { Very cobbly } \\ \text { loam } \end{array}$ | $\begin{array}{\|cc} \text { GC-GM, } & \text { SM, } \\ \text { SC-SM, } \end{array}$ | $\begin{aligned} & \mathrm{A}-1-\mathrm{b}, \mathrm{~A}-2-4, \\ & \mathrm{~A}-4 \end{aligned}$ | 5-10 | 25-65 | 50-90 | 50-85 | 30-70 | 20-45 | 15-30 | NP-7 |
|  | 4-36 | Very cobbly sandy loam, very stony loam, very flaggy loam | SM, SC-SM, GM, GC-GM | $\left\lvert\, \begin{aligned} & \mathrm{A}-1-\mathrm{b}, \mathrm{~A}-2-4, \\ & \mathrm{~A}-4 \end{aligned}\right.$ | 15-40 | 25-65 | 50-90 | 50-85 | 30-70 | 20-45 | 15-30 | NP-7 |
|  | 36-62 | Very cobbly sandy loam, extremely cobbly sandy loam, very stony loamy sand, extremely stony sand | GC-GM, GM, SM | A-1-b, A-2-4 | 20-50 | 25-80 | 50-85 | 35-60 | 20-50 | 15-30 | 10-30 | NP-7 |
| Maymead--------- | $\begin{aligned} & 0-4 \\ & 4-62 \end{aligned}$ | Loam <br> Gravelly loam, <br> loam, cobbly <br> loam, cobbly <br> sandy loam, <br> very cobbly <br> sandy loam | CL-ML, ML SM, ML, GM, CL-ML | $\left\lvert\, \begin{aligned} & A-4 \\ & A-4 \end{aligned}\right.$ | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ | $\left\lvert\, \begin{gathered} 0-3 \\ 10-40 \end{gathered}\right.$ | 80-95 | $75-90$ $55-90$ | 65-80 | $50-60$ $40-60$ | $\begin{aligned} & 0-25 \\ & 0-25 \end{aligned}$ | $\left\lvert\, \begin{aligned} & N P-7 \\ & N P-7 \end{aligned}\right.$ |

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | Liquid limit | $\begin{array}{\|l} \text { Plas- } \\ \text { ticity } \\ \text { index } \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | $\begin{gathered} 3-10 \\ \text { inches } \end{gathered}$ | 4 | 10 | 40 | 200 |  |  |
| ShC, ShD: <br> Thunder | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | 0-12 | Cobbly loam | $\left\lvert\, \begin{gathered} \text { SC-SM, } \\ \text { GC-GM } \end{gathered}\right.$ | A-2, A-4 | 0-5 | 35-62 | 60-75 | 55-65 | 40-50 | 20-40 | 25-35 | 6-15 |
|  | 12-51 | Very cobbly loam, extremely cobbly loam, extremely cobbly sandy | $\left\lvert\, \begin{gathered} \text { SC-SM, } \\ \text { GC-GM } \end{gathered}\right.$ | A-2, A-4, A-6 | 3-50 | 0-72 | 65-75 | 55-65 | 40-50 | 20-40 | 25-35 | 6-15 |
|  | 51-62 | Very cobbly coarse sandy loam, extremely cobbly sandy loam, extremely cobbly loamy sand | $\left\lvert\, \begin{gathered} \text { SC-SM, } \\ \text { GC-GM } \end{gathered}\right.$ | A-1-b | 3-50 | 0-72 | 40-60 | 30-45 | 25-35 | 15-20 | 0-30 | NP-10 |
| SOD, SOE, SOF: <br> SOCO------------ | 0-7 | Channery loam | $\begin{gathered} \text { GM, MH, ML, } \\ \text { SM } \end{gathered}$ | A-4, A-5 | 2-10 | 5-15 | 70-96 | 55-92 | 40-83 | 36-65 | 20-55 | NP-7 |
|  | 7-15 | Loam, fine sandy loam, silt loam | ML, SC-SM, SM | A-4, A-6 | 0-2 | 0-5 | 85-100 | 80-100 | 65-92 | 36-77 | 25-40 | NP-11 |
|  | 15-35 | Channery loam, channery fine sandy loam, channery silt loam | SM, SC-SM, ML | A-4, A-6 | 0-5 | 5-15 | 70-95 | 55-91 | 40-91 | 35-65 | 25-40 | NP-11 |
|  | 35-62 | Weathered bedrock | -- | --- | --- | --- | --- | -- | -- | - | --- | --- |
| Ditney---------- | 0-8 | Gravelly sandy loam | SC-SM, SM | $\begin{aligned} & A-1-b, \quad A-2-4 \\ & A-4 \end{aligned}$ | 0 | 0-10 | 70-85 | 60-80 | 30-65 | 15-45 | 0-30 | NP-10 |
|  | 8-20 | Gravelly sandy <br> loam, loam, <br> sandy loam, <br> fine sandy <br> loam | $\begin{array}{rr} \mathrm{CL}-\mathrm{ML}, & \mathrm{ML}, \\ \mathrm{SC}-\mathrm{SM}, & \mathrm{SM} \end{array}$ | A-2-4, A-4 | 0 | 0-5 | 90-100 | 65-95 | 50-80 | 30-60 | $0-30$ | NP-10 |
|  | 20-30 | Gravelly loamy sand, loam, sandy loam, cobbly loam | $\begin{aligned} & \text { SM, } \quad \text { CL-ML, } \\ & \text { ML, SC-SM } \end{aligned}$ | A-2-4, A-4 | 0 | 5-30 | 65-100 | 60-100 | 45-75 | 15-60 | 0-30 | NP-10 |
|  | 30-35 | Unweathered bedrock | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | Liquid <br> limit | $\begin{array}{\|l} \text { Plas- } \\ \text { ticity } \\ \text { index } \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | $\begin{gathered} 3-10 \\ \text { inches } \end{gathered}$ | 4 | 10 | 40 | 200 |  |  |
| SpD, SpE: <br> Spivey | $\begin{gathered} \text { In } \\ 0-11 \\ 11-62 \end{gathered}$ | Cobbly loam Cobbly loam, very cobbly sandy loam, very cobbly loam, very stony loam | $\begin{array}{lll} \text { GM, } & \text { ML, } & \text { SM } \\ \text { SM, } & \text { GM } & \end{array}$ | $\left\lvert\, \begin{aligned} A-4, & A-5 \\ A-1, & A-2-4 \\ A-4 & \end{aligned}\right.$ | Pct |  |  |  |  |  | Pct$\begin{aligned} & 15-45 \\ & 25-40 \end{aligned}$ | $\begin{aligned} & N P-10 \\ & N P-10 \end{aligned}$ |
|  |  |  |  |  | $\begin{aligned} & 0-2 \\ & 0-2 \end{aligned}$ | 15-30 | $\begin{aligned} & 70-95 \\ & 55-85 \end{aligned}$ | $\begin{aligned} & 65-85 \\ & 40-75 \end{aligned}$ | $\begin{aligned} & 40-80 \\ & 30-60 \end{aligned}$ |  |  |  |
|  |  |  |  |  |  |  |  |  |  | $\begin{aligned} & 36-65 \\ & 20-50 \end{aligned}$ |  |  |
| $\mathrm{SrC}:$ <br> Spivey---------- | $\begin{array}{r} 0-11 \\ 11-62 \end{array}$ | Cobbly loam Cobbly loam, very cobbly sandy loam, very cobbly loam, very stony loam | $\begin{array}{lll} \text { GM, } & \text { ML, } & \text { SM } \\ \text { GM, } & \text { SM } & \end{array}$ | $\left\lvert\, \begin{aligned} A-4, & A-5 \\ A-1, & A-2-4, \\ A-4 & \end{aligned}\right.$ | $\begin{aligned} & 0-2 \\ & 0-2 \end{aligned}$ | $\begin{aligned} & 15-30 \\ & 20-60 \end{aligned}$ | $\begin{array}{\|} 70-95 \\ 55-85 \end{array}$ | $\begin{aligned} & 65-85 \\ & 40-75 \end{aligned}$ | $\begin{array}{r} 40-80 \\ 30-60 \end{array}$ | $\begin{array}{\|l} 36-65 \\ 20-50 \end{array}$ | $\text { \|l\|l\|l\|} \begin{aligned} & 15-45 \\ & 25-40 \end{aligned}$ | $\begin{aligned} & N P-10 \\ & N P-10 \end{aligned}$ |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| Whiteoak-------- | $\begin{aligned} & 0-9 \\ & 9-62 \end{aligned}$ | $\begin{aligned} & \text { Fine sandy loam } \\ & \text { Loam, clay } \\ & \text { loam, sandy } \\ & \text { clay loam } \end{aligned}$ | $\left\lvert\, \begin{array}{cl} \text { SM, } & \text { ML } \\ \text { SM, } & \text { SC, } \\ \text { CL } & \end{array}\right.$ | $\begin{array}{ll} A-4 \\ A-4, & A-6 \end{array}$ | $\begin{aligned} & 0-1 \\ & 0-1 \end{aligned}$ | $\begin{aligned} & 0-5 \\ & 0-10 \end{aligned}$ | $\begin{array}{\|c} 85-100 \\ 87-100 \end{array}$ | $\begin{aligned} & 80-100 \\ & 81-100 \end{aligned}$ | $\begin{aligned} & 65-85 \\ & 66-90 \end{aligned}$ | $\begin{array}{\|l} 35-65 \\ 45-75 \end{array}$ | $\left\lvert\, \begin{aligned} & 25-35 \\ & 25-40 \end{aligned}\right.$ | $\begin{array}{r} N P-10 \\ 7-14 \end{array}$ |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
| SsB : <br> Statler | $\begin{aligned} & 0-9 \\ & 9-30 \end{aligned}$ |  |  |  |  | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ |  |  |  |  |  |  |
|  |  | $\begin{aligned} & \text { Loam } \\ & \text { Clay loam, silt } \\ & \text { loam, loam } \end{aligned}$ | $\begin{aligned} & \mathrm{CL}-\mathrm{ML}, \quad \mathrm{ML}, \quad \mathrm{CL} \\ & \mathrm{CL}, \quad \mathrm{CL}-\mathrm{ML} \end{aligned}$ | $\begin{array}{ll} A-4, & A-6 \\ A-4, & A-6 \end{array}$ | $\begin{aligned} & 0 \\ & 0 \end{aligned}$ |  | $\left\|\begin{array}{c} 95-100 \\ 95-100 \end{array}\right\|$ | $\begin{aligned} & 75-100 \\ & 75-100 \end{aligned}$ | $\left\|\begin{array}{llll} 7 & 0-1 & 0 & 0 \\ 7 & 0-1 & 0 & 0 \end{array}\right\|$ | $\left\lvert\, \begin{aligned} & 53-75 \\ & 60-80 \end{aligned}\right.$ | $\begin{aligned} & 25-37 \\ & 25-52 \end{aligned}$ | $\begin{aligned} & 3-14 \\ & 5-27 \end{aligned}$ |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 30-38 | Loam, clay <br> loam, sandy clay loam | CL-ML, CL | A-4, A-6, A-7 | 0 | 0-5 | 95-100 | 75-100\| | 65-98 | 50-75 | 25-52 | 5-27 |
|  | 38-62 | Loam, fine sandy loam, clay loam | $\begin{array}{cc} S C-S M, & S C, \\ C L-M L, & C L \end{array}$ | A-4, A-6 | 0 | 0-10 | 90-100 | 65-100 | 55-95 | 40-75 | 25-40 | 4-27 |

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | $\begin{array}{\|l\|} \text { Liquid } \\ \mid \text { limit } \end{array}$ | $\begin{array}{\|r} \text { Plas- } \\ \text { ticity } \\ \text { index } \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | $\begin{gathered} 3-10 \\ \text { inches } \end{gathered}$ | 4 | 10 | 40 | 200 |  |  |
| StD, StE, StF: Stecoah--------- | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | 0-4 | Channery loam | $\left\lvert\, \begin{gathered} \text { GM, MH, ML, } \\ \text { SM } \end{gathered}\right.$ | A-4, A-5 | 0-5 | 5-15 | 70-96 | 55-92 | 40-83 | 36-65 | 30-55 | NP-7 |
|  | 4-28 | Channery loam, sandy loam, channery fine sandy loam, loam | SC-SM, SM, ML | A-4, A-6 | 0-2 | 0-15 | 70-100 | 55-100 | 40-94 | 36-77 | 25-40 | NP-12 |
|  | 28-50 | Channery loam, channery loamy sand, channery fine sandy loam, loam | SM, SC-SM, ML | A-4 | 0-5 | 5-15 | 70-100 | 55-100 | 40-91 | 20-69 | 24-40 | NP-10 |
|  | 50-62 | Weathered bedrock | --- | -- | - | --- | -- | --- | -- | - | --- | --- |
| Soco------------ | 0-7 | Channery loam | $\underset{\text { GM, ML, MH, }}{\text { GM }}$ | A-4, A-5 | 2-10 | 5-15 | 70-96 | 55-92 | 40-83 | 36-65 | 20-55 | NP-7 |
|  | 7-15 | Loam, fine sandy loam, silt loam | ML, SC-SM, SM | A-4, A-6 | 0-2 | 0-5 | 85-100 | 80-100 | 65-92 | 36-77 | 25-40 | NP-11 |
|  | 15-35 | Channery loam, channery fine sandy loam, channery silt loam | ML, SC-SM, SM | A-4, A-6 | 0-5 | 5-15 | 70-95 | 55-91 | 40-91 | 35-65 | 25-40 | NP-11 |
|  | 35-62 | Weathered bedrock | -- | -- | --- | --- | --- | --- | --- | --- | --- | --- |

Table 13.-Engineering Index Properties-Continued

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | Liquid <br> limit | $\begin{array}{r} \text { Plas- } \\ \text { ticity } \\ \text { index } \\ \hline \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $>10$ <br> inches | 3-10 <br> inches | 4 | 10 | 40 | 200 |  |  |
| UnD, UnE, UnF: Unaka | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | 0-7 | Gravelly fine sandy loam | CL-ML, ML, SM | A-4 | --- | 2-20 | 85-95 | 70-90 | 55-80 | 30-65 | 0-30 | NP-7 |
|  | 7-21 | ```Loam, gravelly sandy loam, cobbly loam, clay loam``` | SM, ML, CL-ML | A-4 | --- | 2-20 | 85-95 | 70-90 | 55-80 | 30-65 | 0-30 | NP-7 |
|  | 21-25 | Weathered bedrock | --- | -- | --- | --- | --- | --- | --- | --- | - | --- |
|  | 25-30 | Unweathered bedrock | -- | --- | --- | --- | -- | -- | --- | --- | --- | --- |
| Porters--------- | 0-9 | Gravelly loam | SM, SC-SM | A-4, A-2 | 0-2 | 2-15 | 75-95 | 65-90 | 60-85 | 30-49 | 20-35 | NP-10 |
|  | 9-54 | Loam, sandy loam, gravelly sandy loam, fine sandy loam | $\begin{gathered} S M, \quad S C-S M, \\ C L-M L, ~ M L \end{gathered}$ | A-2, A-4 | 0-5 | 5-25 | 75-99 | 60-99 | 50-90 | 30-70 | 15-25 | NP-7 |
|  | 54-62 | Unweathered bedrock | -- | --- | --- | --- | -- | -- | --- | --- | --- | --- |
| UoF: <br> Unicoi |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-5 | Gravelly fine sandy loam | SM, SC-SM | A-1-b, A-2-4 | 0 | 0-10 | 70-85 | 50-70 | 30-50 | 20-35 | 0-25 | NP-6 |
|  | 5-19 | Very cobbly loam, very cobbly sandy loam, very stony loam | $\begin{gathered} \text { GC-GM, GM, } \\ \text { SC-SM, } \end{gathered}$ | A-1-b, A-2-4 | 0 | 20-50 | 60-75 | 40-65 | 30-50 | 20-35 | 0-25 | NP-6 |
|  | 19-24 | Unweathered bedrock | -- | - | --- | --- | --- | --- | --- | --- | --- | --- |
| Rock outcrop---- | 0-60 | Unweathered bedrock | --- | --- | 0 | 0 | 0 | 0 | 0 | 0 | 0-0 | NP |
| W. Water |  |  |  |  |  |  |  |  |  |  |  |  |

Table 13.-Engineering Index Properties-Continued

| Map symbol and soil name | Depth | USDA texture | Classification |  | Fragments |  | Percentage passing sieve number-- |  |  |  | $\begin{aligned} & \text { \| Liquid } \\ & \text { limit } \end{aligned}$ | $\begin{array}{r} \text { Plas- } \\ \text { ticity } \\ \text { index } \end{array}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  | Unified | AASHTO | $\begin{gathered} >10 \\ \text { inches } \end{gathered}$ | $3-10$ <br> inches | 4 | 10 | 40 | 200 |  |  |
| WaC, WaD: <br> Watauga | In |  |  |  | Pct | Pct |  |  |  |  | Pct |  |
|  | $\begin{aligned} & 0-5 \\ & 5-26 \end{aligned}$ | Sandy loam Clay loam, loam, sandy clay loam | $\left\lvert\, \begin{array}{lll} S C, & S C-S M, & S M \\ C L & M L, & S C \end{array}\right.$ | A-2-4, $\quad$ A-4 $A-6, ~ A-7$ | $0-2$ 0 | $0-15$ $0-15$ | 90-100 | 85-98 | $50-75$ $75-95$ | $25-49$ $40-75$ | $15-35$ $30-65$ | $\text { \| } \mathrm{NP} \text { 12-10 }$ |
|  | 26-62 | Loam, sandy loam, fine sandy loam | SM | A-2-4, A-4 | 0 | 0-15 | 75-100 | 70-95 | 60-90 | 15-50 | 15-40 | NP-12 |
| WbD, WcE, WcF: <br> Wayah $\qquad$ |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | Clay loam |  |  |  |  | 90-100 | 90-100 | 65-95 | 60-80 | 35-55 |  |
|  | $18-77$ | Gravelly loam, loam, sandy loam, gravelly fine sandy loam, fine sandy loam, gravelly sandy loam | $\begin{array}{\|l} \text { GM, ML, } \\ \text { SC-SM, SM } \end{array}$ | $\left\lvert\, \begin{gathered} \mathrm{A}-1-\mathrm{b}, \mathrm{~A}-2-4, \\ \mathrm{~A}-4 \end{gathered}\right.$ | 0-5 | 3-15 | 53-99 | 50-97 | 30-87 | 20-55 | 25-35 | NP-10 |
| Burton---------- | 0-18 | Gravelly sandy loam | GM, SM | $\left\|\begin{array}{c} A-1-b, \quad A-2-4, \\ A-4, \\ A-5 \end{array}\right\|$ | 2-10 | 5-15 | 65-90 | 60-75 | 30-65 | 20-49 | 30-50 | NP-7 |
|  | 18-30 | Sandy loam, gravelly loam, gravelly sandy loam, cobbly loam, loam | SC-SM, SM | A-2, A-4 | 0-5 | 5-20 | 73-100 | 70-95 | 57-95 | 25-49 | 25-35 | NP-7 |
|  | 30-41 | Unweathered bedrock | - | --- | -- | --- | --- | --- | --- | - | - | -- |
| WhB, WkC, WtD: <br> Whiteoak | $\begin{aligned} & 0-9 \\ & 9-62 \end{aligned}$ | Fine sandy loam Loam, clay loam, sandy clay loam | $\left\lvert\, \begin{array}{rll} M L, & S M & \\ C L, & M L, & S C, \\ S M & \end{array}\right.$ | $\begin{array}{ll}\text { A-4 } \\ \text { A-4, } & \\ \end{array}$ | $\begin{aligned} & 0-1 \\ & 0-1 \end{aligned}$ | $\begin{aligned} & 0-5 \\ & 0-10 \end{aligned}$ | $\begin{aligned} & 85-100 \\ & 87-100 \end{aligned}$ | 80-100 | $\begin{aligned} & 65-85 \\ & 66-90 \end{aligned}$ | $\begin{aligned} & 35-65 \\ & 45-75 \end{aligned}$ | $\begin{aligned} & 25-35 \\ & 25-40 \end{aligned}$ | $\left\lvert\, \begin{array}{r} N P-10 \\ 7-14 \end{array}\right.$ |


(Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind

|  |  |  |  |  |  |  |  | \|Erosi | f | rs | Wind | Wind |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Map symbol and soil name | Depth | Sand | ```Moist bulk density``` | Permeability (Ksat) | ```Available water capacity``` | Linear extensibility | Organic matter | Kw | Kf | T | $\begin{aligned} & \text { erodi- } \\ & \text { bility } \\ & \text { group } \end{aligned}$ | $\begin{aligned} & \text { erodi- } \\ & \text { bility } \\ & \text { index } \end{aligned}$ |
|  | $\underline{I} \mathrm{n}$ | Pct | $\mathrm{g} / \mathrm{cc}$ | In/hr | In/in | Pct | Pct |  |  |  |  |  |
| AcF: |  |  |  |  |  |  |  |  |  |  |  |  |
| Ashe---------------- | 0-5 | 7-20 | 1.35-1.60 | 2-6 | 0.10-0.13 | 0.0-2.9 | 1.0-8.0 | . 17 | . 24 | 2 | 5 | 56 |
|  | 5-31 | 5-15 | 1.45-1.65 | 2-6 | 0.08-0.12 | 0.0-2.9 | --- | . 17 | . 24 |  |  |  |
|  | 31-36 | --- | --- | 0.0000-0.01 | 0.00-0.00 | --- | --- | --- | --- |  |  |  |
| Cleveland----------- | 0-17 | 6-20 | 1.20-1.50 | 2-6 | 0.05-0.10 | 0.0-2.9 | 0.5-8.0 | . 17 | . 28 | 1 | 8 | 0 |
|  | 17-22 | --- | --- | 0.0000-0.01 | 0.00-0.01 | --- | --- | --- | -- |  |  |  |
| Rock outcrop. |  |  |  |  |  |  |  |  |  |  |  |  |
| BaD, BaE: |  |  |  |  |  |  |  |  |  |  |  |  |
| Balsam-------------- | 0-15 | 7-25 | 0.50-1.00 | 2-6 | 0.14-0.21 | 0.0-2.9 | 8. 0-20 |  |  | 5 | 8 | 0 |
|  | 15-62 | 7-25 | 1.00-1.50 | 2-6 | 0.05-0.09 | 0.0-2.9 | --- | $.02$ | $\text { . } 10$ |  |  |  |
| BCE, BCF : |  |  |  |  |  |  |  |  |  |  |  |  |
| Balsam------------- | 0-15 | 7-25 | 0.50-1.00 | 2-6 | 0.14-0.21 | 0.0-2.9 | 8. 0-20 |  |  | 5 | 8 | 0 |
|  | 15-62 | 7-25 | 1.00-1.50 | 2-6 | 0.05-0.09 | 0.0-2.9 | --- | $.02$ | $.10$ |  |  |  |
| Rubble land. |  |  |  |  |  |  |  |  |  |  |  |  |
| Buc, Bud, BuF: |  |  |  |  |  |  |  |  |  |  |  |  |
| Burton------------- | 0-18 | 7-25 | 1.10-1.30 | 2-6 | 0.13-0.18 | 0.0-2.9 | 8. 0-20 |  |  | 2 | 5 | 56 |
|  | 18-24 | 7-25 | 1.35-1.60 | $2-6$ | $0.10-0.15$ | 0.0-2.9 | --- | . 15 | . 24 |  |  |  |
|  | 24-29 | --- | --- | 0.0000-0.01 | 0.00-0.01 |  | --- | --- | --- |  |  |  |
| Craggey------------- | 0-13 | 7-25 | 1.10-1.30 | 2-6 | 0.10-0.15 | 0.0-2.9 | 8. 0-20 | . 15 | . 20 | 1 | 5 | 56 |
|  | 13-18 | --- | --- | 0.0000-0.01 | 0.00-0.01 | --- | --- | --- | --- |  |  |  |
| Rock outcrop. |  |  |  |  |  |  |  |  |  |  |  |  |
| BwC, BwD, Bwe, BwF: |  |  |  |  |  |  |  |  |  |  |  |  |
| Burton-------------- | 0-18 | 7-25 | 1.10-1.30 | 2-6 | 0.13-0.18 | 0.0-2.9 | 8. 0-20 | . 15 | . 24 | 2 | 5 | 56 |
|  | 18-24 | 7-25 | 1.35-1.60 | 2-6 | 0.10-0.15 | 0.0-2.9 | --- | . 15 | . 24 |  |  |  |
|  | 24-29 | --- | --- | 0.0000-0.01 | 0.00-0.01 | --- | - | -- | --- |  |  |  |
| Wayah-------------- | 0-18 | 7-25 | 1.00-1.20 | 2-6 | 0.13-0.18 | 0.0-2.9 | 8. 0-20 | . 15 | . 24 | 3 | 5 | 56 |
|  | 18-38 | 7-25 | 1.20-1.60 | 2-6 | 0.09-0.13 | 0.0-2.9 | --- | . 15 | . 24 |  |  |  |
|  | 38-62 | 5-18 | 1.40-1.65 | 2-6 | 0.05-0.09 | 0.0-2.9 | --- | . 10 | . 24 |  |  |  |

Table 14.-Physical Properties of the Soils-Continued

Table 14.-Physical Properties of the Soils-Continued

| Map symbol and soil name | Depth | Sand | ```Moist bulk density``` | $\begin{gathered} \text { Permea- } \\ \text { bility } \\ \text { (Ksat) } \end{gathered}$ | ```Available water capacity``` | Linear extensibility | Organic matter | Erosion factors |  |  | Wind erodibility group | Wind erodibility index |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  |  |  |  |  |  |  |  | Kw | Kf | T |  |  |
| $\mathrm{CnF}:$ <br> Chestnut | In | Pct | $\mathrm{g} / \mathrm{cc}$ | $\underline{I n / h r}$ | In/in | Pct | Pct |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-3 | 5-20 | 1.35-1.60 | 2-6 | 0.08-0.12 | 0.0-2.9 | 1.0-8.0 | . 17 | . 24 | 3 | 5 | 56 |
|  | 3-28 | 5-25 | 1.35-1.60 | 2-6 | 0.08-0.12 | 0.0-2.9 | --- | . 15 | . 24 |  |  |  |
|  | 28-62 | --- | --- | 0.0000-2 | 0.00-0.01 | --- | - | --- | --- |  |  |  |
| Buladean------------ | 0-8 | 5-20 | 1.30-1.65 | 2-6 | 0.10-0.15 | 0.0-2.9 | 1.0-8.0 | . 15 | . 24 | 4 | 5 | 56 |
|  | 8-32 | 5-18 | 1.30-1.65 | 2-6 | 0.12-0.18 | 0.0-2.9 | --- | . 20 | . 20 |  |  |  |
|  | 32-42 | 2-18 | 1.45-1.75 | 2-6 | 0.07-0.14 | 0.0-2.9 | --- | . 15 | . 15 |  |  |  |
|  | 42-62 | --- | --- | 0.0000-2 | 0.00-0.01 | --- | - |  | --- |  |  |  |
| CoF: <br> Clingman |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-10 | --- | 0.15-0.40 | 2-6 | 0.45-0.65 | 0.0-2.9 | 20-90 | --- | --- | 1 | 7 | 38 |
|  | 10-14 | 5-18 | 1.50-1.80 | 0.6-6 | 0.09-0.20 | 0.0-2.9 | 5.0-15 | . 17 | . 17 |  |  |  |
|  | 14-21 | --- | --- | 0.0000-0.01 | 0.00-0.01 | --- | --- | --- | --- |  |  |  |
| Craggey------------- | 0-13 | 7-25 | 1.10-1.30 | 2-6 | 0.10-0.15 | 0.0-2.9 | 8. 0-20 | . 15 | . 20 | 1 | 5 | 56 |
|  | 13-18 | --- | - | 0.0000-0.01 | 0.00-0.01 | --- | - | - | --- |  |  |  |
| Rock outcrop. |  |  |  |  |  |  |  |  |  |  |  |  |
| Cre, CrF: <br> Crossnore |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-7 | 7-25 | 1.35-1.60 | 2-6 | 0.08-0.12 | 0.0-2.9 | 5.0-8.0 | . 15 |  | 3 | 5 | 56 |
|  | 7-22 | 7-25 | 1.35-1.60 | 2-6 | 0.08-0.15 | 0.0-2.9 | --- | . 17 | . 24 |  |  |  |
|  | 22-30 | 5-18 | 1.35-1.60 | 2-6 | 0.07-0.12 | 0.0-2.9 | --- | . 15 | . 24 |  |  |  |
|  | 30-61 | --- | --- | 0.0000-2 | 0.00-0.01 | --- | - | -- | --- |  |  |  |
| Jeffrey------------- | 0-9 | 7-25 | 1.45-1.55 | 0.6-6 | 0.10-0.15 | 0.0-2.9 | 5.0-8.0 | . 17 | . 24 | 2 | --- | --- |
|  | 9-31 | 7-25 | 1.45-1.55 | 0.6-6 | 0.07-0.13 | 0.0-2.9 | - | . 17 | . 24 |  |  |  |
|  | 31-36 | - | --- | 0.0000-0.01 | 0.00-0.01 | --- | --- | -- | -- |  |  |  |
| CsD: <br> Cullasaja |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-18 | 7-25 | 0.50-1.20 | 2-6 | 0.10-0.16 | 0.0-2.9 | 5. 0-15 | . 10 | . 20 | 5 | 8 | 0 |
|  | 18-60 | 7-25 | 1.00-1.60 | 2-6 | 0.07-0.10 | 0.0-2.9 | - - | . 05 | . 17 |  |  |  |
| CtC, CtD, CtE: Cullasaja |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-18 | 7-25 | 0.50-1.20 | 2-6 | 0.10-0.16 | 0.0-2.9 | 5. 0-15 | . 05 | . 17 | 5 | 8 | 0 |
|  | 18-48 | 7-25 | 1.00-1.60 | 2-6 | 0.07-0.10 | 0.0-2.9 | --- | . 05 | . 17 |  |  |  |
|  | 48-62 | 5-18 | 1.00-1.60 | 2-6 | 0.03-0.06 | 0.0-2.9 | -- | . 05 | . 17 |  |  |  |
| CuA: <br> Cullowhee |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 0-10 | 5-18 | 1.30-1.50 | 2-6 | 0.12-0.18 | 0.0-2.9 | 4. 0-10 | . 20 | . 20 | 3 | 3 | 86 |
|  | 10-30 | 5-12 | 1.35-1.55 | 6-20 | 0.05-0.10 | 0.0-2.9 | --- | . 10 | . 10 |  |  |  |
|  | 30-62 | 1-5 | 1.40-1.60 | 6-20 | 0.02-0.05 | 0.0-2.9 | --- | . 05 | . 10 |  |  |  |
| DAM. Dam |  |  |  |  |  |  |  |  |  |  |  |  |

Table 14.-Physical Properties of the Soils-Continued



Table 14.-Physical Properties of the Soils-Continued

Table 14.-Physical Properties of the Soils-Continued

Table 14.-Physical Properties of the Soils-Continued

Table 14.-Physical Properties of the Soils-Continued

|  |  |  |  |  |  |  |  | Erosi | fac | rs | Wind | Wind |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Map symbol and soil name | Depth | Sand | $\begin{aligned} & \text { Moist } \\ & \text { bulk } \\ & \text { density } \end{aligned}$ | Permea- <br> bility <br> (Ksat) | Available <br> water capacity | Linear extensibility | Organic matter | Kw | Kf | T | erodi- <br> bility group | erodi- <br> bility <br> index |
| WhB, WkC, WtD: Whiteoak | In | Pct | g/cc | In/hr | In/in | Pct | Pct |  |  | 5 | 5 | 56 |
|  | 0-9 | 5-18 | 1.35-1.60 | 2-6 | 0.14-0.24 | 0.0-2.9 | 5.0-15 | . 28 | . 28 |  |  |  |
|  | 9-62 | 12-29 | 1.35-1.60 | 0.6-2 | 0.14-0.22 | 0.0-2.9 |  | . 24 | . 24 |  |  |  |

Table 15．－Chemical Properties of the Soils
（Absence of an entry indicates that data were not estimated）

| Map symbol and soil name | Depth | Cation－ exchange capacity | Effective cation－ exchange capacity | Soil reaction |
| :---: | :---: | :---: | :---: | :---: |
|  | In | meg／100 g | meq／100 g | pH |
| AcF： |  |  |  |  |
| Ashe－－－－－－－－－－－－－－－－ | 0－5 | －－－ | 2．0－8．0 | 3．5－6．0 |
|  | $5-31$ | －－－ | $1.0-5.0$ | $3.5-6.0$ |
|  | 31－36 | －－－ | －－－ | －－－ |
| Cleveland－－－－－－－－－－－－ | $0-17$ | －－－ | 2．0－8．0 | 4．5－6．0 |
|  | $17-22$ | －－－ | －－－ | $---$ |
| Rock outcrop． |  |  |  |  |
| BaD，BaE： |  |  |  |  |
| Balsam－－－－－－－－－－－－－－ | $0-15$ | －－－ | 3．0－15 | $3.5-6.0$ |
|  | $15-62$ | －－－ | $1.0-5.0$ | $3.5-6.0$ |
| BCE，BCF： |  |  |  |  |
| Balsam－－ | $0-15$ | －－－ | $3.0-15$ | $3.5-6.0$ |
|  | $15-62$ | －－－ | $1.0-5.0$ | $3.5-6.0$ |
| Rubble land． |  |  |  |  |
| Buc，Bud，BuF： |  |  |  |  |
| Burton－－－－－－－－－－－－－－ | 0－18 | －－－ | 3．0－17 | 3．5－6．0 |
|  | 18－24 | －－－ | 1．0－3．0 | 3．5－6．0 |
|  | 24－29 | －－－ | －－－ | －－－ |
| Craggey－－－－－－－－－－－－－－ |  | －－－ | 2．0－10 | 3．5－6．0 |
|  | $13-18$ | －－－ | －－－ | －－－ |
| Rock outcrop． |  |  |  |  |
| BwC，BwD，BwE，BwF： |  |  |  |  |
| Burton | 0－18 | －－－ | 3．0－17 | 3．5－6．0 |
|  | 18－24 | －－－ | 1．0－3．0 | 3．5－6．0 |
|  | 24－29 | －－－ | －－－ | －－－ |
| Wayah－－－－－－－－－－－－－－－ | 0－18 | －－－ | 3．0－20 | 3．5－5．5 |
|  | 18－38 | －－－ | 1．0－5．0 | 4．5－6．0 |
|  | 38－62 | －－－ | 1．0－5．0 | 4．5－6．0 |
| CaC，CaD，CaE，CaF： |  |  |  |  |
| Cashiers－－－－－－－－－－－－ | 0－7 | －－－ | 3．0－11 | 4．5－6．0 |
|  | 7－31 | －－－ | 1．0－4．0 | 4．5－6．0 |
|  | 31－62 | －－－ | 1．0－3．0 | 4．5－6．0 |
| CeD，CeE，CeF： <br> Chandler－－－－－－－－－－－－－ |  |  |  |  |
|  | 0－5 | －－－ | 2．0－8．0 | 4．5－6．0 |
|  | 5－62 | －－ー | 1．0－4．0 | 4．5－6．0 |
| Micaville－－ー－ー－ー－ー－－－ | 0－4 | －ーー | 1．0－7．0 | 3．5－6．0 |
|  | 4－44 | －－－ | 1．0－4．0 | 3．5－6．0 |
|  | 44－48 | －－－ | 1．0－3．0 | 3．5－6．0 |
|  | 48－62 | －－－ | －－－ | －－－ |

Table 15.-Chemical Properties of the Soils-Continued


Table 15.-Chemical Properties of the Soils-Continued


Table 15.-Chemical Properties of the Soils-Continued


Table 15.-Chemical Properties of the Soils-Continued


Table 15.-Chemical Properties of the Soils-Continued


Table 15.-Chemical Properties of the Soils-Continued


Table 16.-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 |  | Month | Water table |  | Flooding |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{aligned} & \text { Hydro- } \\ & \text { logic } \\ & \text { group } \end{aligned}$ |  | Upper <br> limit | Lower <br> limit | Duration | Frequency |
|  |  |  | Ft | Ft |  |  |
| AcF: |  |  |  |  |  |  |
| Ashe--------------------- | B | Jan-Dec | --- | --- | --- | None |
| Cleveland----------------- | C | Jan-Dec | --- | --- | --- | None |
| Rock outcrop. |  |  |  |  |  |  |
| BaD, BaE: <br> Balsam- | B | Jan-Dec | --- | --- | --- | None |
| BcE, BcF: <br> Balsam | B | Jan-Dec | --- | --- | --- | None |
| Rubble land. |  |  |  |  |  |  |
| BuC, BuD, BuF: <br> Burton | B |  |  |  |  |  |
|  |  | Jan-Dec | --- | --- | --- | None |
| Craggey------------------- | D | Jan-Dec | --- | --- | --- | None |
| Rock outcrop. |  |  |  |  |  |  |
| BwC, BwD, BwE, BwF: <br> Burton $\qquad$ | B | Jan-Dec | --- | --- | --- | None |
| Wayah--------------------- | B | Jan-Dec | --- | --- | --- | None |
| CaC, CaD, CaE, CaF: <br> Cashiers | B | Jan-Dec | --- | --- | --- | None |
| CeD, CeE, CeF: <br> Chandler | B | Jan-Dec | --- | -- | --- | None |
| Micaville---------------- | B | Jan-Dec | --- | --- | --- | None |
| ChD, ChE, ChF: <br> Chestnut | B | Jan-Dec | --- | --- | --- | None |
| Ashe---------------------- | B | Jan-Dec | --- | --- | --- | None |

Table 16.-Water Features-Continued

|  |  |  | Water | table | Floo | ing |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Map symbol and soil name | $\begin{array}{\|l\|} \text { Hydro- } \\ \text { logic } \\ \text { group } \end{array}$ | Month | Upper <br> limit | Lower <br> limit | Duration | Frequency |
| CnD, CnE, CnF: Chestnut | B | Jan-Dec | Ft | Ft |  |  |
|  |  |  | --- | --- | -- | None |
| Buladean------------------ | B | Jan-Dec | --- | --- | --- | None |
| CoF: <br> Clingman | D |  |  |  |  |  |
|  |  | Jan-Dec | --- | --- | --- | None |
| Craggey------------------- | D | Jan-Dec | --- | --- | --- | None |
| Rock outcrop. |  |  |  |  |  |  |
| Cre, CrF: <br> Crossnore | B | Jan-Dec | --- | --- | --- | None |
| Jeffrey------------------- | B | Jan-Dec | --- | --- | --- | None |
| CsD, CtC, CtD, CtE: Cullasaja------------------ | B | Jan-Dec | --- | --- | --- | None |
| CuA: <br> Cullowhee | B/D |  |  |  |  |  |
|  |  | January | 1.5-2.0 | $>6.0$ | Very brief | Frequent |
|  |  | February | 1.5-2.0 | $>6.0$ | Very brief | Frequent |
|  |  | March | 1.5-2.0 | $>6.0$ | Very brief | Frequent |
|  |  | April | 1.5-2.0 | $>6.0$ | Very brief | Frequent |
|  |  | May | 1.5-2.0 | $>6.0$ | Very brief | Frequent |
|  |  | June | --- | --- | Very brief | Frequent |
|  |  | \|July | --- | --- | Very brief | Frequent |
|  |  | August | - | --- | Very brief | Frequent |
|  |  | September | --- | - | Very brief | Frequent |
|  |  | October |  | --- | Very brief | Frequent |
|  |  | November | 1.5-2.0 | $>6.0$ | Very brief | Frequent |
|  |  | December | 1.5-2.0 | >6.0 | Very brief | Frequent |
| DAM. Dam | A |  |  |  |  |  |
| DeB: <br> Dellwood |  |  |  |  |  |  |
|  |  | January | 2. 0-4.0 | $>6.0$ | Very brief | Occasional |
|  |  | February | 2. 0-4.0 | $>6.0$ | Very brief | Occasional |
|  |  | March | 2.0-4.0 | $>6.0$ | Very brief | Occasional |
|  |  | April | 2.0-4.0 | $>6.0$ | Very brief | Occasional |
|  |  | December |  |  | Very brief | Occasional |
| EpC, EpD, EpE: <br> Edneytown | B |  |  |  |  |  |
|  |  | Jan-Dec | --- | --- | --- | None |
| Pigeonroost--------------- | B | Jan-Dec | --- | --- | --- | None |

Table 16.-Water Features-Continued


Table 16.-Water Features-Continued


Table 16.-Water Features-Continued

| Map symbol and soil name |  | Month | Water table |  | Flooding |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | $\begin{aligned} & \text { Hydro- } \\ & \text { logic } \\ & \text { group } \end{aligned}$ |  | Upper <br> limit | Lower <br> limit | Duration | Frequency |
|  |  |  | Ft | Ft |  |  |
| ShC, ShD: <br> Saunook | B | Jan-Dec | --- | --- | --- | None |
| Thunder------------------ | B | Jan-Dec | --- | --- | --- | None |
| SOD, SOE, SOF: $\qquad$ <br> Ditney $\qquad$ | B | Jan-Dec | --- | --- | --- | None |
|  | C | Jan-Dec | --- | --- | --- | None |
| SpD, SpE: Spivey-- | B | Jan-Dec | --- | --- | --- | None |
| SrC: |  |  |  |  |  |  |
| Spivey-------------------- | B | Jan-Dec | --- | --- | --- | None |
| Whiteoak------------------ | B | Jan-Dec | --- | --- | --- | None |
| ```SsB: Statler``` | B |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  | January | --- | --- | --- | Rare |
|  |  | February | --- | --- | -- | Rare |
|  |  | March | --- | --- | --- | Rare |
|  |  | April | - | --- | - | Rare |
|  |  | May | --- | --- | --- | Rare |
|  |  | June | --- | --- | --- | Rare |
|  |  | July | -- | --- | --- | Rare |
|  |  | August | --- | --- | --- | Rare |
|  |  | September | --- | --- | --- | Rare |
|  |  | October | - | - | - | Rare |
|  |  | November | --- | --- | - | Rare |
|  |  | December | --- | --- | --- | Rare |
| StD, StE, StF: Stecoah------ | B |  |  |  |  |  |
|  |  | Jan-Dec | --- | --- | --- | None |
| Soco---------------------- | B | Jan-Dec | --- | --- | --- | None |
| TsC, TsD, TsE: Thunder | B | Jan-Dec | --- | --- | --- | None |
| Saunook------------------ | B | Jan-Dec | --- | --- | --- | None |
| Ua: |  |  |  |  |  |  |
| Udorthents, loamy--------- | B | Jan-Dec | --- | --- | --- | None |

Table 16.-Water Features-Continued

Table 17.-Soil Features

Table 17.-Soil Features-Continued

| Map symbol and soil name | Restrictive layer |  |  |  | ```Potential for frost action``` | Risk of corrosion |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Kind | $\begin{array}{r} \text { Depth } \\ \text { to top } \end{array}$ | Thickness | Hardness |  | $\begin{aligned} & \text { Uncoated } \\ & \text { steel } \end{aligned}$ | Concrete |
|  |  | In | In |  |  |  |  |
| CnD : <br> Chestnut | $\begin{aligned} & \text { Bedrock } \\ & \text { (paralithic) } \end{aligned}$ | 20-40 | --- | --- | Moderate | Low | High |
| Buladean-------------- | ```Bedrock (paralithic)``` | 40-60 | --- | --- | Moderate | Low | High |
| CnE: |  |  |  |  |  |  |  |
| Chestnut-------------- | ```Bedrock (paralithic)``` | 20-40 | --- | --- | Moderate | Low | High |
| Buladean--------------- | $\begin{aligned} & \text { Bedrock } \\ & \text { (paralithic) } \end{aligned}$ | 20-40 | --- | --- | Moderate | Low | High |
| CnF : |  |  |  |  |  |  |  |
| Chestnut--------------- | ```Bedrock (paralithic)``` | 20-40 | --- | --- | Moderate | Low | High |
| Buladean--------------- | ```Bedrock (paralithic)``` | 40-60 | --- | --- | Moderate | Low | High |
| CoF: <br> Clingman | Bedrock (lithic) | 3-20 | --- | --- | Moderate | High | High |
| Craggey---------------- | Bedrock (lithic) | 10-20 | --- | Indurated | Moderate | High | High |
| Rock outcrop----------- | Bedrock (lithic) | 0-0 | --- | Indurated | None | --- | --- |
| Cre, CrF: <br> Crossnore | ```Bedrock (paralithic)``` | 20-40 | --- | --- | Moderate | Low | High |
| Jeffrey---------------- | Bedrock (lithic) | 20-40 | --- | --- | None | Low | Moderate |
| CsD, CtC, CtD, CtE: <br> Cullasaja- | -- | --- | --- | --- | Moderate | High | High |
| CuA: |  |  |  |  |  |  |  |
| Cullowhee | ```Strongly contrasting textural stratification``` | 20-40 | --- | --- | Low | High | High |
| DAM. <br> Dam |  |  |  |  |  |  |  |

Table 17.-Soil Features-Continued

|  | Restrictive layer |  |  |  |  | Risk of corrosion |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Map symbol and soil name | Kind | Depth to top | Thickness | Hardness |  | ```Uncoated steel``` | Concrete |
|  |  | In | In |  |  |  |  |
| DeB: <br> Dellwood | ```Strongly contrasting textural stratification``` | 8-20 | --- | --- | Low | Low | Moderate |
| EpC, EpD, EpE: <br> Edneytown- | --- | --- | --- | --- | Moderate | Moderate | Moderate |
| Pigeonroost----------- | $\begin{aligned} & \text { Bedrock } \\ & \text { (paralithic) } \end{aligned}$ | 20-40 | --- | --- | Moderate | Moderate | High |
| EtE. EtF: <br> Edneyville | - | - | --- | --- | Moderate | Low | High |
| Chestnut--------------- | $\begin{aligned} & \text { Bedrock } \\ & \text { (paralithic) } \end{aligned}$ | 20-40 | --- | --- | Moderate | Low | High |
| ```FaC, FaD, FeC2, FeD2, FeE2: Fannin``` | --- | -- | --- | --- | Moderate | Moderate | Moderate |
| Gre: <br> Greenlee | --- | -- | --- | --- | Low | Low | High |
| M-W . <br> Miscellaneous water |  |  |  |  |  |  |  |
| NkA: <br> Nikwasi $\qquad$ |  |  |  |  |  |  |  |
| Nikwasi---------------- | ```Strongly contrasting textural stratification``` | 20-40 | --- | --- | High | High | High |
| NnE: <br> Northcove | -- | --- | --- | --- | Low | Low | High |
| NoC, NoD: <br> Northcove | --- | -- | --- | --- | Low | Low | High |
| Maymead---------------- | -- | --- | --- | --- | Moderate | Low | Moderate |
| OsB: <br> Ostin | --- | --- | --- | --- | Low | Low | Moderate |

Table 17.-Soil Features-Continued

| Map symbol and soil name | Restrictive layer |  |  |  | ```Potential for frost action``` | Risk of corrosion |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | Kind | $\begin{array}{r} \text { Depth } \\ \text { to top } \end{array}$ | Thickness | Hardness |  | Uncoated steel | Concrete |
|  |  | In | In |  |  |  |  |
| PaB, PnC, PnD: <br> Pineola | $\begin{aligned} & \text { Bedrock } \\ & \text { (paralithic) } \end{aligned}$ | 20-40 | --- | --- | Moderate | Moderate | High |
| PtD, PtE, PtF: <br> Plott | -- | --- | --- | --- | Moderate | Low | High |
| ```PuC, PuD, PuE, PuF, PwD, PwE: Porters``` | Bedrock (lithic) | 40-60 | --- | --- | Moderate | Low | High |
| Px. <br> Pits, quarries |  |  |  |  |  |  |  |
| ReA : |  |  |  |  |  |  |  |
| Reddies---------------- | ```Strongly contrasting textural stratification``` | 20-40 | --- | --- | Low | Low | Moderate |
| RoA, RsB: <br> Rosman | --- | --- | --- | --- | Moderate | Moderate | Moderate |
| SaB, SaC, SbD, ScB, SdC: Saunook | - | --- | --- | --- | Moderate | Low | High |
| SgC : <br> Saunook | - | --- | --- | --- | Moderate | Low | High |
| Nikwasi | ```Strongly contrasting textural stratification``` | 20-40 | --- | --- | High | High | High |
| ShC, ShD: <br> Saunook | --- | --- | --- | --- | Moderate | Low | High |
| Thunder---------------- | -- | --- | --- | --- | Moderate | Moderate | Moderate |
| SoD, SoE, SoF: <br> Soco | ```Bedrock (paralithic)``` | 20-40 | --- | --- | Moderate | Moderate | High |
| Ditney----------------- | Bedrock (lithic) | 20-40 | --- | --- | Moderate | Low | Moderate |


Table 17.-Soil Features-Continued

|  | Restrictive layer |  |  |  |  | Risk of corrosion |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Map symbol and soil name | Kind | $\begin{array}{\|} \text { Depth } \\ \text { to top } \end{array}$ | Thickness | Hardness |  | Uncoated steel | Concrete |
|  |  | In | In |  |  |  |  |
| WaC, WaD: <br> Watauga | --- | --- | --- | --- | None | Moderate | Moderate |
| WbD, WcE, WcF: <br> Wayah | --- | --- | --- | --- | Moderate | Low | High |
| Burton------------------ | Bedrock (lithic) | 20-40 | --- | Indurated | Moderate | High | High |
| WhB, WkC, WtD: <br> Whiteoak | --- | --- | --- | - | Moderate | Low | High |

Table 18.-Classification of the Soils
(An asterisk in the first column indicates a taxadjunct to the series. See text for a description of those characteristics that are outside the range of the series. The soils were classified using the 1994 Keys to Soil Taxonomy)

| Soil name | Family or higher taxonomic class |
| :---: | :---: |
| Ash | Coarse-loamy, mixed, mesic Typic Dystrochrepts |
| Balsa | Loamy-skeletal, mixed, frigid Typic Haplumbrepts |
| Bulade | Coarse-loamy, mixed, mesic Typic Dystrochrepts |
| Burt | Fine-loamy, mixed, frigid Typic Haplumbrepts |
| Cashier | Fine-loamy, micaceous, mesic Umbric Dystrochrepts |
| Chandle | Coarse-loamy, micaceous, mesic Typic Dystrochrepts |
| Chestnut | Coarse-loamy, mixed, mesic Typic Dystrochrepts |
| Cleveland | Loamy, mixed, mesic Lithic Dystrochrepts |
| Clingman | Dysic Lithic Borofolists |
| Craggey | Loamy, mixed, frigid Lithic Haplumbrepts |
| Crossnore | Fine-loamy, mixed, mesic Umbric Dystrochrepts |
| Cullasaja | Loamy-skeletal, mixed, mesic Typic Haplumbrepts |
| Cullowhee | Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Aquic Haplumbrepts |
| Dellwood----------- | Sandy-skeletal, mixed, mesic Fluventic Haplumbrepts |
| Ditney | Coarse-loamy, mixed, mesic Typic Dystrochrepts |
| Edneytow | Fine-loamy, mixed, mesic Typic Hapludults |
| Edneyvil | Coarse-loamy, mixed, mesic Typic Dystrochrepts |
| Fannin | Fine-loamy, micaceous, mesic Typic Hapludults |
| Greenle | Loamy-skeletal, mixed, mesic Typic Dystrochrepts |
| Jeffrey | Fine-loamy, mixed, mesic Umbric Dystrochrepts |
| Maymead | Coarse-loamy, mixed, mesic Typic Dystrochrepts |
| Micaville | Coarse-loamy, micaceous, mesic Typic Dystrochrepts |
| Nikwasi | Coarse-loamy over sandy or sandy-skeletal, mixed, nonacid, mesic Cumulic Humaquepts |
| Northcove | Loamy-skeletal, mixed, mesic Typic Dystrochrepts |
| Os | Sandy-skeletal, mixed, mesic Typic Udifluvents |
| Pigeonroost-------- | Fine-loamy, mixed, mesic Typic Hapludults |
| Pineola | Fine-loamy, mixed, mesic Humic Hapludults |
| Plot | Fine-loamy, mixed, mesic Typic Haplumbrepts |
| Porte | 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 |
| Saunoo | Fine-loamy, mixed, mesic Humic Hapludults |
| Soco | Coarse-loamy, mixed, mesic Typic Dystrochrepts |
| Spivey | Loamy-skeletal, mixed, mesic Typic Haplumbrepts |
| Statl | Fine-loamy, mixed, mesic Humic Hapludults |
| Steco | Coarse-loamy, mixed, mesic Typic Dystrochrepts |
| Thunde | Loamy-skeletal, mixed, mesic Humic Hapludults |
| Udorthe | Udorthents |
| Un | Fine-loamy, mixed, mesic Umbric Dystrochrepts |
| Unico | Loamy-skeletal, mixed, mesic Lithic Dystrochrepts |
| Watauga | Fine-loamy, micaceous, mesic Typic Hapludults |
| Wayah-------------- | Fine-loamy, mixed, frigid Typic Haplumbrepts |
| *Whiteoak----------- | Fine-loamy, mixed, mesic Umbric Dystrochrepts |

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[^0]:    Potential for commercial species: Not used
    Suitability: Unsuited to commercial production
    Management concerns:

    - This map unit is severely limited for timber production because of damaging high winds, depth to

[^1]:    Suitability: Poorly suited
    Management concerns:Edneytown-slope; Chestnutslope and depth to bedrock
    Management measures and considerations:

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

[^2]:    * Animal unit month: The amount of forage require to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

[^3]:    1 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
    dats, Where insufficient plot data
    site Site indices were assigned using available plot data and comparison curves. Where insufficient plot data exists, with the same soil because of the influence of past management, climate, relief, landform position, aspect, drainage,
    ${ }_{3}$ 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
    ${ }_{4}$ This is a noncommercial forestland unit. See map unit description for composition and management concerns. 5 Data exists but there are not enough plots to meet standards of sampling and analysis.

